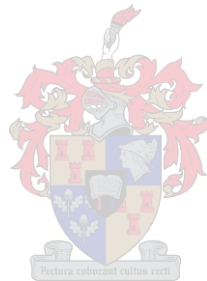


**Validation of the Arabic Version of the Oswestry Disability Index Developed  
in Tunisia for low back pain patients in the UAE**

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A thesis submitted in fulfilment of the requirements for the degree of MSc in  
Physiotherapy



at Stellenbosch University

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## **Declaration**

By submitting this thesis electronically, I declare that the entirety of the work contained therein is my own, original work, that I am the owner of the copyright thereof (unless to the extent explicitly otherwise stated) and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

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## ABSTRACT

### **Introduction**

The prevalence of low back pain (LBP) in United Arab Emirates (UAE) is estimated to be about 57% in males and 64% in females. Low back pain is commonly treated by primary care physicians and physiotherapists in the UAE. are increasingly used for clinical assessment, to demonstrate and reflect on the effectiveness of an intervention. Oswestry Disability Index (ODI) is Self-reported outcome measure that widely used and recommended for LBP. ODI Arabic version was developed and validated in women population. To date no UAE Arabic version of the ODI exists which has been cross-culturally adapted, validated and published in the peer-reviewed literature.

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### **Objective**

The objectives are, to cross-culturally adapt the Arabic version of the ODI developed in Tunisia to devise a pre-final ODI-UAE Arabic version; to pre-test the pre-final ODI-UAE Arabic version in a target group of patients to devise the final ODI-UAE Arabic version; and to determine the reliability and construct validity of the final ODI-UAE Arabic version.

### **Study design**

Culture adaptation, reliability and validity testing.

### **Methodology**

The cross culture adaptation of the ODI Arabic version developed in Tunisia was performed in accordance with the published guidelines. For reliability 108 clients of UAE nationals with LBP were consecutively selected and completed the final ODI-UAE Arabic version, at baseline and 48 hours, and test–retest reliability and internal consistency were calculated. For validity 108 completed the final ODI-UAE Arabic version, VAS, and the Squat test at baseline and 4 weeks follow up;

construct validity, items frequency response, response to change and floor and ceiling were evaluated.

### **Results**

The ODI-UAE (9 questions) had high level of test–retest with ICC of 0.99; the mean at baseline and 48 hours was (0.68); Cronbach's alpha was 0.99. Strong positive correlation with VAS  $r = 0.70$  ( $p = <0.01$ ), and moderate inverse correlation between ODI and Squat  $r = -0.65$  ( $p = <0.01$ ). The results of the maximum frequency response were less than 80% for the entire 9 question. The effect size and the SRM of ODI-UAE, VAS and Squat test at baseline and 4 weeks were identical comparable the effect size, were 1.66, 1.85, and 1.59 respectively. ODI-UAE demonstrated absence of floor and ceiling effect; less than 15% of the respondents achieved the lowest or highest possible score respectively (0 -11.5) or (87-100%).

### **Conclusion**

The ODI-UAE Arabic version is an easy to understand, reliable and valid condition-specific outcome measure for the measurement of the limitation of functional ability cause by LBP in the United Arab Emirates national population.

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## DEDICATION

I dedicate this thesis to the memory of:

My mother, Father

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# CHAPTER 1

## INTRODUCTION

Low back pain (LBP) is one of the most frequent ailments in industrial countries (Ghaffari et al 2006). The lifetime of LBP prevalence in western populations is about 60%, whereas the annual prevalence can be up to 45% (Atlas and Deyo 2001). Although there is still a lack of research into the prevalence of LBP in the Middle East, it is estimated that the LBP prevalence is increasing in the developing world (Oksuz 2006). The prevalence of LBP in the United Arab Emirates (UAE) is estimated to be about 57% in males and 64% in females (Bener et al 2004). LBP is also one of the most common conditions treated by primary physicians and physiotherapists in the UAE (Bener et al 2004).

LBP is a significant condition that results in a range of impairments, participation restrictions and activity limitations (Ghaffari et al 2006). LBP impacts the functional status of patients, interfering with basic activities such as standing, walking, dressing, work-related activities and can lead to absenteeism from work (Ghaffari et al 2006). LBP prevalence studies have also reported high reoccurrence rates up to 70%, and up to 40% of acute low back pain cases can become chronic (Ghaffari et al 2006; Kovacs et al 2005). The transition of LBP from acute pain to chronic pain and onward disability is an emotional and financial burden to individual sufferers, family, employers, and the health care system (Atlas, Deyo 2001).

The differential diagnosis of LBP is broad and includes mechanical and non-mechanical causes (Atlas and Deyo 2001; Caren and Ozcan 2006)). For most patients with acute LBP in primary care, the etiology is thought to be a mechanical cause involving the spine and surrounding structures. Unfortunately, in most cases, a precise, pathoanatomical cause cannot be reliably confirmed by physical or diagnostic testing (Atlas and Deyo 2001). This may be due to the



weak association among symptoms, examination findings, and anatomic changes (Atlas and Deyo 2001). In contrast to this, non-mechanical causes (such as cancer or infection) can be diagnosed with greater certainty (Atlas and Deyo 2001). Thus, for patients with acute LBP, an exact etiology is identifiable in only about 15% (Atlas and Deyo 2001). A wide range of terms are used for non-specific mechanical causes, including LBP/strain/sprain, lumbago, facet joint syndrome, sacroiliac syndromes, segmental dysfunction, somatic dysfunction, ligamentous strain and myofascial syndrome. These involve processes in the muscles and/or ligaments that are difficult to reliably identify by physical examination or diagnostic testing (Atlas and Deyo 2001).

Medical general practitioners and physiotherapists are considered to be first line practitioners in the management of LBP (Bener et al 2004; Davidson and Keating 2002). The evidence for the use of physiotherapeutic interventions in the management of LBP is increasing steadily (Davidson, Keating 2002). There is for instance strong evidence that exercise therapy for chronic LBP patients is effective in improving pain and function (Atlas and Deyo 2001). However, there remains equivocal evidence for many interventions as well as a lack of research to evaluate the evidence for physiotherapeutic interventions (Davidson and Keating 2002; Guyatt et al 1992). A prerequisite to conducting a sound trial into the effectiveness of low back pain interventions is valid and reliable outcome measures relevant to the specific study culture and population (Amick et al 2000; Beaton et al 2000; Kopec and Esdaile 1995; Liebenson and Yeomans 1997; Lurie 2000; Reneman et al 2002; Rocchi et al 2005; Tosteson 2000).

A physiotherapy outcome measure is a test or scale administered and interpreted by physiotherapists that has been shown to accurately measure a particular attribute of interest to patients and therapists, and is expected to be influenced by intervention (Cole 1994; Reneman et al 2002). Important properties of an outcome measure include the practicality, precision, reliability, validity, responsiveness and the ability to detect change in a specific condition (Lurie

2000). There has been an increase in the recognition of the importance of outcome measures amongst rehabilitation medicine specialists over the last decade (Bayar et al 2003). Outcome measures can reflect impairment, activity limitation and participation restriction (reflecting current World Health Organization diagnostic classification criteria) (Grimmer et al 2005). The importance of outcome measures in LBP patients is emphasized in good quality LBP clinical guidelines (Grimmer et al 2005). The measurement of activity limitation and participation restriction is an important component in patients with LBP and self-reported outcome measures appears to be superior in measuring patient outcomes compared to traditional physiotherapeutic impairment measures such as range of motion (Fairbank et al 2000).

Over the last two decades, numerous self-report functional status measures designed to evaluate disability in patients with LBP have been reported in the literature. Functional status measures are classified as either generic or specific measures. Generic measures are designed to be applicable across a broad spectrum of diseases and demographic and cultural groups. Specific measures are intended to assess disability within a specific group, e.g. patients with back disorders.

Currently there are about nine LBP disability outcome measures for LBP patients (Rocchi et al 2005). The ODI was developed in 1976 and is one of the most popular outcome measures for LBP throughout the world (Fairbank et al 2000; Osthus et al 2006). The development process of the ODI involved patient interviews by an orthopedic surgeon and occupational therapist and the instrument was first published in 1980 (Fairbank et al 2000). The popularity of the ODI is evidenced by the fact that it was published in at least four versions and cross-culturally validated and translated into about 10 languages (Fairbank et al. 2000). Currently the ODI (version 2.0) is available in English, Norwegian, Korean, Greek, Danish, Chinese, Brazilian, German, Turkish and Arabic languages (Osthus et al 2006). The ODI has been translated and adapted for the Arabic

language in a population of Tunisian women by Guermazi et al (2005) and they recommended that further research is needed to ascertain that the Arabic version is reliable and valid for other Arab populations. The United Nations defined Arabic as the fifth most important language worldwide. There are approximately 270 million Arabic speakers around the world; 250 million of them are living in 18 Arab countries where Arabic is the mother tongue.

The ODI consists of 10 items that refer to activities of daily living which might be disrupted by LBP. The items were designed to assess limitations in various activities, personal care, lifting, walking, sitting, standing, sleeping, social life, traveling and work. Each item includes six potential responses that describe a greater degree of disability in the activity than the proceeding statement. The statements are scored from 0 (no disability) to 5 (total disability). The ODI indicates the extent to which a person's functional level is restricted due to LBP.

Research into the psychometric properties of the ODI has included face and content validity, test-retest reliability, clinically significant change and internal consistency in both acute and chronic LBP (Fairbank et al 2000; Fritz and Irrgang 2001). A recent study into the responsiveness and minimal clinically important difference of five disability instruments for LBP patients indicated that the ODI is a suitable tool for measuring change in patients with severe and minor LBP symptoms (Lauridsen et al 2006). On the basis of psychometric evaluations, as well as feasibility considerations it has been suggested that the ODI is arguably the best assessment for the level of disability caused by LBP (Fairbank et al 2000; Rocchi et al 2005).

Pain is one of the constructs measured in the ODI (Grotle et al 2004; Mannion et al 2006). The construct validity of the ODI has been measured against the Visual Analogue Scale (VAS). The VAS is a self reporting questionnaire used to measure the severity of pain and frequently used in clinical settings and research reports when evaluating clinical changes in patients with LBP as one of the

outcome measures (Childs et al 2005; Grotle et al 2004). Although the VAS has not been developed to measure disability, previous studies show acceptable correlations between the VAS and ODI ( $n = 94$ ,  $r = 0.62$ ) and have been used for validity testing of the ODI and other outcome measures (Fairbank et al 2000; Gronblad et al 1997; Grotle et al 2004; Mannion et al 2006). The VAS instrument has been shown to have an acceptable reliability upon repeated administration and is a valid measure of pain severity (Fairbank et al 2000; Gronblad et al 1997; Grotle et al 2004).

The role of limitation in back mobility and physical performance test scores as determinants of LBP disability and impairment is uncertain (Gronblad et al 1997). Repetitive squat test (SQUAT) is a one of the physical performance tests that provides an indication of back muscle endurance and dynamic lower limb functional endurance (Gronblad et al 1997). Of all the physical performance tests, SQUAT shows an acceptable correlation with the ODI in men more than women in previous studies (Gronblad et al 1997). Therefore the SQUAT is useful as an objective measurement for validity studies based on the correlation with the ODI.

The implementation of best practice in the clinical setting requires clinicians to monitor patient progress using standard outcome measures, in order to demonstrate and reflect on the effectiveness of an intervention (Grimmer et al 2005). Outcome measures provide information concerning how the injury or condition is affecting the patient (Grimmer et al 2005). By repeating these outcome measures in the follow-up evaluation and comparing the baseline or initial information gathered at follow-up, confident clinical decision making can occur. This could lead to continued care, change in treatment approach, strategy or goals, referral to another health care providers or, earlier discharge (Liebenson and Yeomans 1997). Therefore outcome measures are important for quality assurance purposes within clinical practices, and are also an integral part for continuity of care, by informing the patient themselves, other health care

providers, referring doctors and/or funding agencies about patient progress (Grimmer et al 2005).

Guermazi et al (2005) did a study on Tunisian women with LBP. The aim of the Tunisian study was to cross-culturally validate and translate the ODI into the Arabic language. The findings of this study indicated that the ODI Arabic version was reliable and valid in a Tunisian female population, but recommended further validation into other patient subgroups such as males as well as other Middle Eastern countries. Currently no outcome measure for LBP patients has been validated in the UAE. A valid and reliable outcome measure for LBP patients in the UAE is therefore required. The ODI also forms part of the curriculum content of Sharjah University (UAE), but students are unable to use it clinically due to language and cultural restrictions (Physiotherapy Curriculum 2000 UOS), therefore a valid UAE Arabic version is needed.

### **Aim and objectives**

The aim of this study is to determine if the Arabic version of the Oswestry Disability Index version 2.0 (ODI version 2.0) developed in Tunisia, is culturally appropriate, valid and reliable for use amongst UAE nationals.

The objectives of the study are:

1. To cross-culturally adapt the Arabic version of the ODI developed in Tunisia to devise a pre-final ODI-UAE Arabic version
2. To pre-test the pre-final ODI-UAE Arabic version in a target group of patients to devise the final ODI-UAE Arabic version.
3. To determine the reliability and construct validity of the final ODI-UAE Arabic version.

### **Significance and Justification**

The prevalence of LBP in the UAE is estimated to be about 57% in males and 64% in females (Bener et al 2004). With this high prevalence, there is a high

demand for medical care. From my clinical experience, a great number of the adult referrals each month for treatment in physiotherapy departments in UAE are attributed to LBP.

Researchers studying LBP acknowledge the importance of self-reported functional questionnaires as the most valid outcome measure. The infrequent use of functional outcomes in physiotherapy departments in UAE probably underlines the need for a LBP functional scale validated, and developed for the use of the Arabic-speaking patients. In fact, invalidated and untested Arabic adaptations of existing LBP disability scales are often used, mainly for their brevity and convenience. Psychometric properties of such scales, however, remain to be tested. A reliable, valid and responsive adaptation of a functional ability scale designed for patients with LBP would probably meet the need. Beaton et al (2000) urged researchers not to “reinvent the wheel”, by creating a new measure if more standard tools can serve the same purpose.

Most of the standard questionnaires and indexes were developed for the English-speaking population. However, there is a great need for measures that are specifically designed to be used in non-English speaking countries, because cultural groups vary in disease expression and their use of various health care systems. The need will become even more acute with the growing number of large multicenter studies.

Of several LBP functional outcome measures, the ODI has undergone a stringent process of psychometric and clinical testing, and demonstrated high levels of reliability, validity and responsiveness. The ODI contains items that are more culturally adaptable for use in Arabic cultures and thus it was selected for the investigation in this study. Translation into Arabic and testing for cross-cultural reliability, validity and responsiveness is required before the ODI can be used reliably and validly with patients in Arabic-speaking countries.

## Operational Definition

Reliability is the degree of consistency with which an instrument measures a variable. “Test-retest reliability refers to stability of scores over time in subjects whose condition has remained stable”,

“Internal consistency is an estimate of the homogeneity of an instrument, or the degree to which a set of items in an instrument all measure the same trait”

“Responsiveness is the ability of a measurement tool to detect meaningful changes over time and is also called ‘sensitivity to change’”.

## **ABBREVIATIONS**

**LBP:** Low Back Pain

**ODI:** Oswestry Disability Index questionnaire

**VAS:** Visual Analogue Scale

**SQUAT:** Repetitive squat test

**ICC:** Intraclass correlation coefficient

## **CHAPTER 2**

### **A SYSTEMATIC REVIEW**

#### **THE CROSS-CULTURE ADAPTION AND PSYCHOMETRIC PROPERTIES USED IN THE ADAPTATION OF THE OSWESTRY DISABILITY INDEX ACROSS-CULTURES IN ADULTS WITH LOW BACK PAIN**

##### **2.1 INTRODUCTION**

Low Back Pain (LBP) affects 70% to 85% of the population in their lifetime and is one of the greatest causes of activity limitations and participation restriction in those of working age (Denis et al 2007). The lifetime LBP prevalence in western populations is about 70%, whereas the annual prevalence can be up to 45% (Ghaffari et al 2006). The prevalence of LBP in UAE is estimated to be about 57% in males and 64% in females (Bener et al 2004). LBP is commonly treated by primary care physicians and physiotherapists in the UAE (Atlas and Deyo 2001; Bener et al 2004).

Research evidence for physiotherapeutic interventions in the management of LBP is increasing steadily (Davidson and Keating 2002). For instance, there is strong evidence (evidence from high quality randomised control trials) which suggests that exercise therapy is effective in improving pain and function in chronic LBP clients (Atlas and Deyo 2001). However, there remains equivocal evidence for many of the physiotherapy interventions frequently used by physiotherapists, such as ultrasound, interferential and laser as well as a lack of research to evaluate the evidence for other LBP interventions like manual therapy (Davidson and Keating 2002). A prerequisite conducting a methodologically sound study into the effectiveness of LBP interventions is the use of valid and reliable outcome measures relevant to the specific study culture and population (Amick et al 2000; Beaton et al 2000; Kopec and Esdaile 1995; Liebenson and Yeomans 1997; Lurie 2000; Reneman et al 2002; Rocchi et al 2005; Tosteson 2000). The implementation of evidence based practice in the clinical setting also requires the importance of clinicians monitoring patient progress using standard outcome measures, in order to demonstrate and reflect on the effectiveness of an intervention (Grimmer et al 2005).

A physiotherapy outcome measure is a test or scale administered and interpreted by physiotherapists. It must have sound psychometric properties, including it should accurately



measure a particular attribute of interest to patients and therapists, and is expected to be influenced by intervention (Cole 1994; Reneman et al 2002). Properties of an outcome measure include its practicality, precision, reliability, validity, responsiveness and the ability to detect change in a specific condition (Lurie 2000). Outcome measures can evaluate impairments, activity limitations and participation restrictions (reflecting current World Health Organization disability classification criteria) (Grimmer et al 2005). The importance of outcome measures in LBP patients is emphasized in good quality LBP clinical guidelines (Grimmer et al 2005). The measurement of activity limitation and participation restriction in life is an important component of life domains in patients with LBP and self-reported outcome measures appears to be more superior in measuring patient outcomes than traditional physiotherapeutic impairment measures such as range of motion or muscle power. These impairments are by themselves meaningless for what patients are looking for, such as when they will be functional again and be able to manage daily life activities and their work (Fairbank et al 2000).

Currently there are nine most commonly used questionnaires specifically for LBP patients (Müller et al 2004; Rocchi et al 2005). The Oswestry Disability Index (ODI) developed in 1976; is one of the most frequently-used outcome measures that have been developed for evaluating self-reported activity limitations in individuals with LBP (Fairbank et al 2000; Osthus et al 2006). The popularity of the ODI is evidenced by the fact that it was cross-culturally adapted, validated; and translated into about 12 languages (Fairbank et al 2000).

Cross-cultural adaptation is more than just a simple translation of English text (Leonardo et al 2007). The term “cross-cultural adaptation” is used to encompass a process that looks at both language (translation) and cultural adaptation issues in the process of preparing a measure for use in a specific country or culture (Beaton et al 2000). Researchers must follow published guidelines for cross-culture adaptation to ensure that the adapted measures are semantically equivalent to the original and that scale items are relevant in the new culture (Leonardo et al 2007). It is also essential to assess whether the adapted self-report outcome measure has retained the content validity of the original outcome measure. This second step requires an assessment of the psychometric properties of the adapted measure.

The majority of existing self-report outcome measures was developed in English. The ODI is one of them, and with the increase in the number of multinational and multicultural research projects, the need for cross-cultural adaptation of the existing self-report outcome measures for use in other than the source language has grown rapidly (Beaton et al 2000; Leonardo et al

2007). Cross-culture adaptation of the existing outcome measures is important for at least four main reasons. First, not all populations are proficient in English, and even in the English-speaking countries like Australia, United Kingdom, and United States, English is not the first language of a significant proportion of population. Second, the availability of the cross-culturally adapted self-report outcome measures may reduce the undesirable, but common, practice of excluding non-English subjects from studies, which could lead to a systematic bias in studies of health care utilization or quality (Beaton et al 2000). Third, the existence of cross-culturally adapted self-report outcome measures would be of value to researchers conducting meta-analyses to include the eligible trials conducted in non-English-speaking countries.(Leonardo et al 2007; Wagner et al 1998). Finally, cross-cultural adaptation of existing self-reported outcome measures is more economical and efficient than developing new outcome measures for non-English-speaking countries (Wagner et al 1998).

Traditionally, clinicians and researchers have evaluated the quality of outcome instruments by investigating their psychometric properties, such as validity and reliability. However, it has been proposed that “responsiveness” should be central in the choice of an evaluative instrument because of increasing the demand to measure a change in a clients’ health status (Lauridsen et al 2006; Liebenson and Yeomans 1996). Research into the psychometric properties of the English version of the ODI included face and content validity, test-retest reliability, clinically significant change and internal consistency in both acute and chronic LBP (Fairbank et al 2000). A recent study into the responsiveness and minimal clinically important difference of five outcome measure instruments for LBP patients indicated that the ODI is a suitable tool for measuring change in patients with severe and minor LBP symptoms (Lauridsen et al 2006). On the basis of psychometric properties evaluations, as well as clinical utility, it has been suggested that the ODI is arguably one of the best assessments activity limitations associated with LBP (Fairbank et al 2000; Rocchi et al 2005).

## **2.2 OBJECTIVES**

This systematic review was conducted to identify published modified versions of the ODI for low back pain patients in non-English-speakers countries; to ascertain whether an Arabic version of the ODI was developed and published, to review the methodology used in the adaptation process of the ODI, to identify which psychometric properties were assessed during the cultural adaptation process and how these were evaluated.

## 2.3 DEFINITIONS

**2.3.1 Low Back Pain (LBP):** is defined as non-specific mechanical low back pain presented as spinal and paraspinal symptoms in the lumbosacral region, without clear specific cause (Atlas and Deyo 2001).

**2.3.2 Self-Report Outcome Measure:** a questionnaire completed by the patient to indicate the status of functional loss in a specific area or condition (Müller et al. 2004)

**2.3.3 Disability (ICF):** any alteration in functioning related to the individual in terms of performance or impairments, activity limitations, and participation restrictions (Müller et al 2004).

**2.3.4 Psychometric Properties:** the reliability and validity, including responsiveness and sensitivity to change, of measurement tool (Müller et al. 2004).

**2.3.5 Validity:** refers to the degree to which a study accurately reflects or assesses the specific concept that the researcher is attempting to measure (Terwee et al 2007).

**2.3.6 Content Validity:** examines the extent to which content concepts of an adapted measure are equivalent to content concepts of the source measure. In this review, retrieved article got positive rating for the content validity if a clear description is provided of, measurement aim, the target population. Furthermore the target population should have been involved during the culture adaptation, as well as experts (Terwee et al 2007).

**2.3.7 Construct Validity:** Construct validity refers to the extent to which scores on a particular instrument relate to other measures in a manner that is consistent with theoretically derived hypotheses concerning the concepts that are being measured. Construct validity should be assessed by testing predefined hypotheses (e.g. expected correlation between adapted measure and other measure (Müller et al 2004).

**2.3.8 Reliability:** is the extent to which a self-reported outcome questionnaire or a scale is measuring something in a reproducible and consistent fashion. Reliability indicates the stability

of a measure and is commonly assessed by rating test–retest reliability and internal consistency (Müller et al 2004).

**2.3.9 Test-retest Reliability:** the degree to which repeated measurements in stable clients provide similar answers. The intra-class correlation coefficient (ICC) is the most suitable and most frequently used method for test–retest reliability for continuous data. The ICC is the variation in the population (interindividual variation) divided by the total variation, which is the interindividual variation plus the intraindividual variation (measurement error), expressed as a ratio between 0 and 1. (Terwee et al 2007).

**2.3.10 Internal Consistency:** is a measure of the extent to which items in a self-reported outcome questionnaire or a scale are correlated (homogeneous), thus measuring the same concept. Internal consistency is an important measurement property for the measures or scales that intend to measure a single underlying concept (construct) by using multiple items. If a questionnaire has a number of items addressing the same underlying dimension (e.g. activity limitations in LBP patients), then it is reasonable to expect that scores on each item would be correlated with scores on all other items. Internal consistency is determined by calculating Cronbach's alpha. (Terwee et al 2007)

**2.3.11 Responsiveness:** is the ability of self-reported outcome or an instrument to detect clinically important changes over time, even if the changes are small. Responsiveness is considered as a measure of the construct validity and longitudinal validity. Calculating change scores over time for a group of clients whose health status is expected to have changed and to examine the correlation with the corresponding changes in a reference measure is considered one method to assess responsiveness. This is evaluated by calculating the effect size or the standardised response means (Müller et al 2004).

**2.3.12 Floor or Ceiling Effects:** are considered to be present if more than 15% of respondents achieved the lowest or highest possible score in a specific domain, respectively. If floor or ceiling effects are present, it is likely that items assessing the extremes of the attribute are missing from the scale. For this review, positive rating was given for (the absence) floor and ceiling effects if no floor or ceiling effects were present in a sample size of at least 50 clients (Terwee et al 2007).

## **2.4 REVIEW METHODOLOGY**

Prior to commencing this review, 13 electronic databases (Pubmed, Pedro, Science Direct, Psycho info, Web of Science, Biomed Central, Cochrane Library, Proquest, Scirus, Cinahl, Ebscohost, Journals Ovid, Sports Discus) were searched for the period from January 1990 to September 2007 to verify that there is no published systematic review that describes the validation of ODI across-cultures.

### **2.4.1 Inclusion Criteria for Selection of Studies**

Descriptive studies, where the authors have described the process of development, and or cross-culture adaptation, and or reliability, and validity of the ODI adapted versions and assessed reliability (test-retest, internal consistency, face and content validity, construct validity, responsiveness) were eligible for inclusion. Articles were included if, there is ODI in their title or in the following text, published in Arabic, or English languages, and included female and or male adults who were older than 18 years and suffered from LBP.

### **2.4.2 Exclusion Criteria for Selection of Studies**

Articles were excluded if only discriminative validity of the ODI was assessed for the purpose of appropriateness tools for certain population or conditions or if the ODI was used to evaluate the outcomes or effectiveness of interventions for LBP (Müller et al 2004).

### **2.4.3 Search Strategy and Methods:**

Two independent reviewers searched 13 electronic bibliographic databases that included: Pubmed, Pedro, Science Direct, Psycho info, Web of Science, Biomed Central, Cochrane Library, Proquest, Scirus, Cinahl, Ebscohost, Journals Ovid, Sports Discus. The databases were searched for the period from January 1990 to September 2007. Each database has its own indexing terms and functions, and therefore different search strategies were developed for each database. In PubMed, medical subject headings (MeSH) terms were used where possible, with Boolean operators. The search strategies for the remaining databases were adapted and applied accordingly, and are illustrated in (Appendix 3). The following keywords and terms were used: Oswestry disability index, psychometric properties, cross culture adaptation, validity, reliability. The limits used in the databases were: Publication Date from 1990 to 2007, Humans, Male, Female, Validation Studies, English, and Adults: 19+ years. In addition, secondary searching (pearling) was performed on the reference list of retrieved articles.

### Pearling and Hand searching

The reference lists of all publications of the included and excluded trials were searched for additional trials. Hand searching of journals not indexed in electronic databases was not conducted, as this method is difficult to replicate.

For including articles for this review, two independent reviewers selected the eligible articles by firstly screening all the hits, secondly reading the abstracts and, finally, reading the full text version of potentially eligible articles and the articles where the abstracts was not providing sufficient information. Figure 2.1 illustrates the procedure followed to select the eligible studies; selected studies are listed in table 2.1.

## **2.4.4 Methodological Quality Appraisal**

The full text version of the eligible articles was obtained and independently assessed by two reviewers according to the Guidelines of the Process of Cross-Culture Adaptation (Beaton et al 2000) and the Quality Criteria for the Psychometric Properties of Health Status Questionnaires (Terwee et al 2007). Consensus was reached first by editing, and meeting was held and a each reviewer presented his justifications for the evaluation differences among them regarding the included articles; after a discussion for about an hour consensus was reached; the reviewers produced a consolidated assessment of the psychometric properties of the eligible studies.

### **2.4.4.1 The Process of Cross-Culture Adaptation**

The process of cross-culture adaptation was reviewed according to the Guidelines for the Process of Cross-Culture Adaptation of Self-Reported Measures recommended by Beaton et al 2000. The guidelines contain five stages: stage 1, Translation; stage 2, Synthesis; stage 3, Back translation; stage 4, Expert committee review; stage 5, Pretesting. (Appendix 1)

### **2.4.4.2 Quality Assessment for Psychometric Properties that were evaluated**

To evaluate the quality of the psychometric properties for the validation of ODI cross-culture in the eligible studies; subscale was adapted from the Quality Criteria for the Psychometric Properties of Health Status Questionnaires (Appendix 4), developed by Terwee et al (2007) was used. The Quality Criteria are from the Scientific Advisory Committee (SAC) of the Medical Outcome Trust. The SAC defined eight attributes of outcome measure properties that include: (1) conceptual and measurement model, (2) validity, (3) reliability, (4) responsiveness, (5) interpretability, (6) respondent and administrative burden, (7) alternative forms, and (8) cultural adaptation and language adaptations (translations) (Terwee et al 2007).

The adapted subscale included six criteria: (1) content validity; (2) test-retest reliability; (3) internal consistency; (4) construct validity; (5) floor and ceiling effect; (6) responsiveness. The six criteria were used to evaluate the methodological quality of the psychometric properties were identified from the eligible studies. This Quality Criteria considers the definition, the quality and the results of the psychometric testing of the identified adapted ODI cross-cultures.

The psychometric properties that were evaluated, the definitions of the psychometric properties, the method, the statistical analysis and results. In this review, the identified articles were received positive rating if hypotheses were specified in advance and at least 75% of the results were in correspondence with these hypotheses, in (sub) groups of at least 50 clients. Repeated administrations comparison were rated positive if: (1) test-retest with ICC >0.70 in a sample size at least 50 clients, (2) internal consistency of the identified studies was achieved when the dimensional structure of the instrument was explored by both Cronbach's alpha and factor analysis, and Cronbach's alpha was between 0.7 and 0.95, (4) responsiveness was considered adequately tested if hypotheses were predefined (e.g. expected correlations between changes in measures) and the results corresponded with these hypotheses, (5) no floor or ceiling effects were present in a sample size of at least 50 clients (Terwee et al 2007).

Each psychometric property was rated by the reviewers independently using the following grades:

- + = positive rating, indicated that adequate methods and results were used.
- ? = indeterminate rating, indicated doubtful methods and results were used
- - = negative rating, indicated that inadequate methods and results were used
- 0 = no information available.

Doubtful design or method corresponds to a lack of a clear description of the design or methods of the study, sample size smaller than 50 subjects (should be at least 50 in every (subgroup) analysis, or any important methodological weakness in the design or execution of the study.

Data extraction and synthesis:

The full text of all the included articles were read and all the information that were relevant cross culture adaptation and reliability and validity were had been highlighted and transferred to Microsoft Excel XP database in order by the year of publication. The following data were extracted from the included articles that described the adaptation process and psychometric

testing of the adapted (modified) versions of ODI: author, year of publication, title, study design, sample type and size, process of adaptation (translation method, review of expert committee, pretesting); and all types of psychometric properties occurred (i.e., test-retest reliability, internal consistency, construct validity, responsiveness, floor and ceiling effect). Extracted data was stored on a Microsoft Excel XP database.

## **2.5 RESULTS**

### **2.5.1 Search Results**

Two independent reviewers searched the database presented in Table 2.1. Figure 2.1 illustrates the numbers of hits from each of the 13 databases and the number of eligible studies. Initially there were 151 hits; 141 did not meet the inclusion criteria leaving 10 eligible studies. The most frequent reasons for the exclusion were the absence of the Oswestry Disability Index (ODI) in the title or in the text followed by no evidence that the study included the ODI. The reviewers added 2 extra articles that were found by pearling from the references of the included articles.



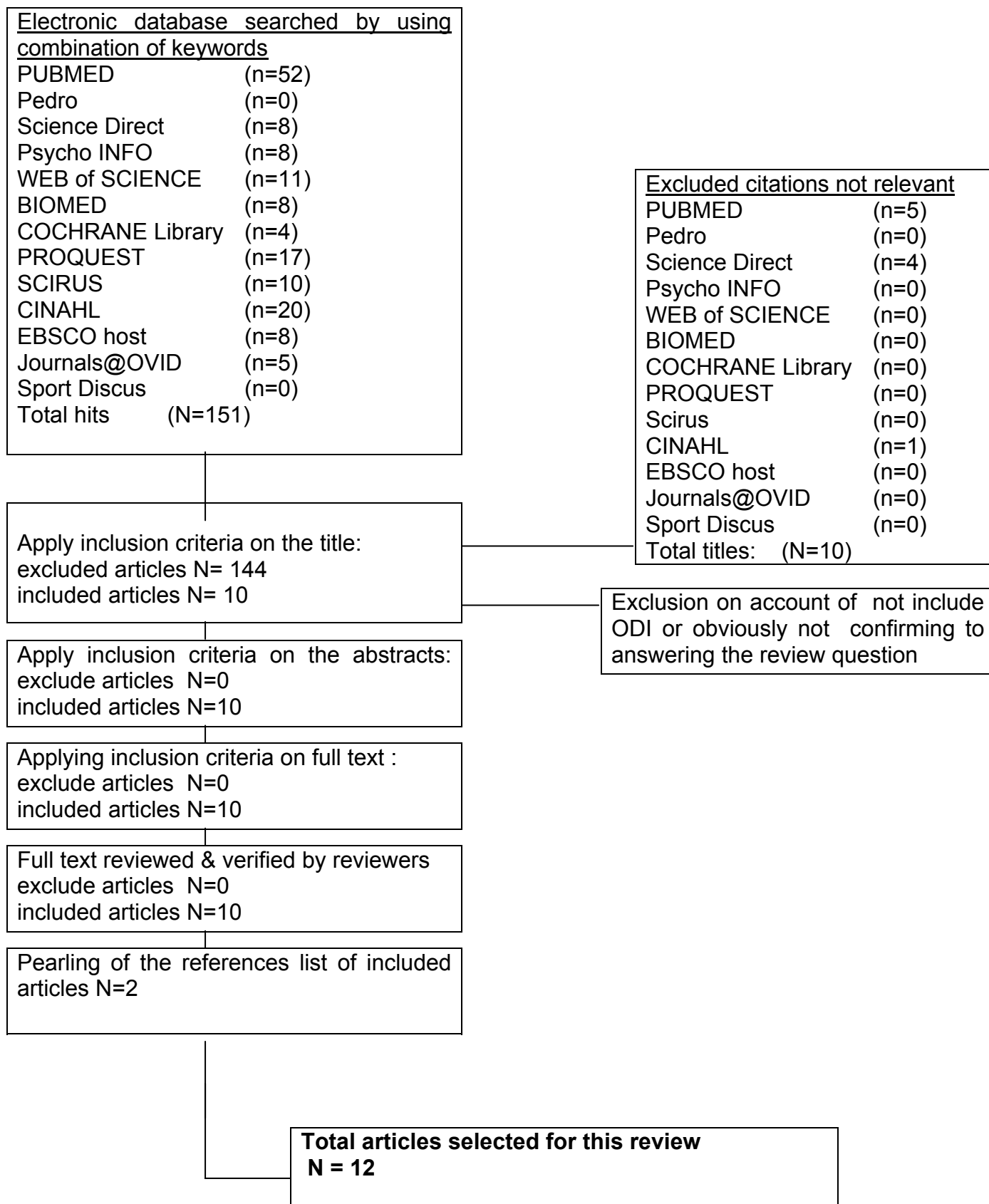


Figure 2.1 Flow chart to demonstrate the selection of studies

## 2.5.2 Studies Included

Table 2.1 presents 12 studies were conducted for ODI adaptation and validation to 12 languages for non English speaking countries.

Table 2.1: Details of the studies included

Authors / References	Title	Languages that English Version of ODI Translated to
Vigatto et al 2007 Spine, vol. 32, no. 4, pp. 481-486	Development of a Brazilian Portuguese Version of the Oswestry Disability Index. Cross-Cultural Adaptation , Reliability, and Validity	Portuguese
Mousavi et al 2006 Eur Spine J, vol. 5, pp. 66 – 73.	The ODI, the RM and the Quebec back pain disability scale: Translation and validation of the Iranian versions	Persian
Lauridsen et al (a) 2006 Eur Spine J, vol.15, pp.1705-1716	Danish version of the ODI for patients with LBP Part 1: Cross-cultural adaptation, reliability, and validity in two different population	Danish
Lauridsen et al (b) 2006 Eur Spine J, vol. 15, no. 11, pp. 1717-1728.	Danish version of the ODI for patients with LBP Part 2: Sensitivity, specificity and clinically significant improvement in two low back pain populations	Danish
Hideki et al 2006 Eur Spine J, vol. 15, pp.1645-1650	Discriminative validity and responsiveness of the Oswestry Disability Index among Japanese outpatients with lumbar conditions	Japanese
Mannion, et al (a) 2006 Eur Spine J, vol. 15, pp. 55-65	Development of a German version of the Oswestry Disability Index. Part 1:cross-cultural adaptation, reliability, and validity	German
Mannion, et al (b) 2006 Eur Spine, vol.15, pp. 66-73	Development of a German version of the Oswestry Disability Index. Part 2:sensitivity to change after spinal surgery	German
Sakulsriprasert et al 2006 J Med Assoc Thai, vol. 89, no.10, pp. 1694-1701	Cross-Cultural Adaptation of Modified Oswestry Low back Pain Disability Questionnaire to Thai and Its Reliability	Thai
Chow and Chain 2005 Work, vol. 25, pp. 307-314	Validation of the Chinese version of the Oswestry Disability Index	Chinese
Yakut. et al 2004 Spine, vol 29, no. 5, pp 581-585	Validation of the Turkish Version of the Oswestry Disability Index for Patient With Low Back Pain	Turkish
Kim et al 2004 Spine, vol. 30, no. 5, pp. E123-E127	Validation of the Korean Version of the Oswestry Disability Index	Korean
Guermazi et al 2005 Annales de readaptation et de medicine physique, vol. 48, pp. 1-10	The Oswestry Index for low back pain translation into Arabic and validation in an Arab population	Arabic
Grotle et al 2003 J Rehabil Med, vol. 35, pp. 241-247	Cross-Cultural Adaptation of the Norwegian Version of the Roland-Morris Disability Questionnaire and the Oswestry Disability Index	Norwegian
Boscainos et al 2003 Clin Orthop Relat Res vol. 411, pp. 40-53	Greek Versions of the Oswestry and Roland-Morris Disability Questionnaires	Greek

## **2.5.3 Study Design and Sample Description**

### **2.5.3.1 Sample size**

The sample sizes of the selected studies are summarized in (Table 2.2). The sample sizes ranged from 40 in the Sakulsriprasert et al 2006 study to 697 in the Boscainos et al 2003 study (see table 2.2).

### **2.5.3.2 Gender**

All the studies include male and female participants, except for two studies. Guermazi et al 2003 included only female participants, and Sakulsriprasert et al 2006 other did not specify the gender of their participants (see table 2.2).

### **2.5.3.3 Age**

The participants' age ranged from 15 to 80 years, and the reported mean ranged from 37.9 to 55 years (see table 2.2).

### **2.5.3.4 Diagnosis**

The participants' diagnosis that was described in the reviewed studies were, low back pain (not defined) in four studies by Guermazi et al 2005; Mosavi et al 2007; Sakulsriprasert et al 2006; Boscainos et al 2003, chronic low back (3 months) in four studies by; Chow and Chain 2005; Mannion, et al 2006; Yakut et al 2004, low back pain or leg pain in two studies by Lauridsen et al 2006 (a); (b), acute low back pain (< 2 weeks) in one study by Grotle et al 2003, surgical decompression in two studies by Mannion et al 2006, and lumbar spinal disorder in one study by Kim et al 2004. (see table 2.2)

### **2.5.3.5 Setting of the studies**

Eleven of the twelve studies were conducted in outpatients' settings (physiotherapy departments, primary and secondary health care centers, and rehabilitation centers). Only one study by Mannion et al 2006 indicated that participants were recruited from hospital databases.

Table 2.2: Sample Description

Authors / References	Sample size (number of Clients)	Gender M=male/ F=female	Age (range) in Years	Diagnosis
Vigatto et al 2007 Spine, vol. 32, no. 4, pp. 481-486	120	not stated	Mean = 37.9	LBP – Duration from 25 to 60 months
Mousavi et al 2006 Eur Spine J, vol. 5, pp. 66 – 73.	100	45 M	mean=40.14 range(17-68)	LBP- Not defined
Lauridsen et al (a) 2006 Eur Spine, vol.15, pp.1705-1716	68 refuses Pr. 168 Sec. 133	M n=65 (51%) F n=63 (49%) M n=50 (47%) F n=55 (52%)	mean=42 range (18-76) mean=46 range (28-85)	LBP and or leg pain. Primary sector  Secondary sector
Lauridsen et al (b) 2006 Eur Spine, vol. 15, pp 1705-1716	233	M n=65 (51%) F n=63 (49%) M n=50 (47%) F n=55 (52%)	mean=42 range (18-76) mean=46 range (28-85)	LBP and or leg pain. Primary sector (initial treatment)  Secondary sector (longer treatment)
Hideki et al 2006 Eur Spine J, vol. 15, pp.1645-1650	183	M 80 (50%)	mean = 57 range (22-87)	Outpatient under treatment for spinal condition
Mannion et al (a) 2006 Eur Spine J, vol. 15, pp. 55-65	166 105 respond (63%)	13 M & 19 F 34 M & 34 F	mean= 49 mean= 55	chronic LBP > 3 months identified from the computer conservative non specific BP surgical (decompression)
Mannion et al (b) 2006 Eur Spine, vol.15, pp. 66-73	68 57 Complete	31 F, 26 M	mean= 55	Surgical decompression)
Sakulsriprasert et al 2006 J Med Assoc Thai, vol. 89, no.10, pp. 1694-1701	40 20 Acute 20 Chronic	Not mentioned	range (40.1±10.7)	Low back pain (acute & chronic) Not defined
Chow and Chain 2005 Work, vol. 25, pp. 307-314	79	50 M, 25 F	mean=42.0 range (60 and below)	chronic LBP (mean duration=13.5 month)
Yakut et al 2004 Spine, vol 29, no. 5, pp 581-585	95 total	16 M, 49 F	mean=39.24	chronic LBP, 3 months duration without neurological deficit, receive therapeutic interventions
Kim et al 2005 Spine, vol. 30, no. 5, pp. E123-E127.	206	131 M, 75 F	mean=46	lumbar spinal disorders, undergone operations
Guermazi et al 2005 Annales de readaptation et de medicine physique, vol. 48, pp.1-10	80	F	range (18-65)	LBP - Not defined
Grotle et al 2003 J Rehabil Med, vol. 35, pp. 241-247	55 50	34 M, 71 F	range (18 – 60)	acute LBP< 2 weeks and chronic LBP>3 months
Boscainos et al 2003 Clin Orthop Relat Res vol. 411, pp. 40-53	697	235 M & 462 F	mean=45.9 range (15-80)	LBP acute or chronic Not defined

F= Female, M= male, and n= sample size.

## **2.5.4 Methodological quality appraisal**

### **2.5.4.1 The Process of Cross-Culture Adaptation**

Almost all the included studies had followed the guidelines of the cross-culture adaptation (Appendix 1) as illustrated in (Table 2.3), except the Japanese ODI by Hideki et al 2006. They used an existing Japanese version that was adapted by one of their co-authors in 2002. Also the authors of adapted Thai ODI (Sakulsriprasert et al 2006) did not conduct the pretesting procedure for the Thai pre-final version (stage 5 of the process); and the authors of the adapted Chinese ODI (Chow and Chain 2005) had dropped the back translation procedure from the translation process. The reviewers had an agreement on the methodology process of cross-culture adaptation that occurred in 10 studies and also they had the same comment regarding the pretesting stage of the cross-culture adaptation of Thai version that had not been conducted (see table 2.3)

Table 2.3: Five Stages of Cross-Culture Adaptation Guidelines

Modified (Adapted) ODI Versions	Stage 1: Translation - two translation (T1 &T2) - into target language - informed + uninformed translator	Stage 2: Synthesis - Synthesis T1&T2 → T-12 - resolve any discrepancies with translators' report	Stage 3:Back Translation - 2 English first-language - from T-12 version create 2 back translation BT1&BT2	Stage 4:Expert committee review - review all reports - reach consensus on discrepancies - produce pre - final version	Stage 5: Pretesting - n=30-40 - complete questionnaire - probe to get at understanding of item
Portuguese Vigatto et al 2007	√ √ √	√ √	√ √	√ √ √	√ √ √
Persian Mousavi et al 2006	√ √ √	√ √	√ √	√ √ √	√ √ √
Danish Lauridsen et al 2006	√ √ √	√ √	√ √	√ √ √	√ √ √
Japanese Hideki et al 2006	- - -	- -	- -	- - -	- - -
German Mannion et al 2006	√ √ √	√ √	√ √	√ √ √	√ √ √
Thai Sakulsriprasert et al 2006	√ √ √	√ √	√ √	√ √ √	- - -
Chinese Chow and Chain 2005	√ √ √	√ √	- -	√ √ √	√ √ √
Turkish Yakut. et al 2004	√ √ √	√ √	√ √	√ √ √	√ √ √
Korean Kim et al 2005	√ √ √	√ √	√ √	√ √ √	√ √ √
Arabic Guermazi et al 2005	√ √ √	√ √	√ √	√ √ √	√ √ √
Norwegian Grotle et al 2003	√ √ √	√ √	√ √	√ √ √	√ √ √
Greek Boscainos et al 2003	√ √ √	√ √	√ √	√ √ √	√ √ √

- = Not done

Table 2.4 Quality criteria for measurement properties of health status questionnaires

Property	Definition	Quality criteria
1. Content validity	The extent to which the domain of interest is comprehensively sampled by the items in the questionnaire	+ A clear description is provided of the measurement aim, the target population, the concepts that are being measured, and the item selection AND target population and (investigators OR experts) were involved in item selection; ? A clear description of above-mentioned aspects is lacking OR only target population involved OR doubtful design or method; - No target population involvement; 0 No information found on target population involvement.
2. Internal consistency	The extent to which items in a (sub)scale are Interrelated, thus measuring the same construct	+ Factor analyses performed on adequate sample size ( $7 * \#$ items and $\geq 100$ ) AND Cronbach's alpha(s) calculated per dimension AND Cronbach's alpha(s) between 0.70 and 0.95; ? No factor analysis OR doubtful design or method; - Cronbach's alpha(s) $< 0.70$ or $> 0.95$ , despite adequate design and method; 0 No information found on internal consistency.
3. Criterion validity	The extent to which scores on a particular questionnaire relate to a gold standard	+ Convincing arguments that gold standard is "gold" AND correlation with gold standard $\geq 0.70$ ; ? No convincing arguments that gold standard is "gold" OR doubtful design or method; - Correlation with gold standard $< 0.70$ , despite adequate design and method; 0 No information found on criterion validity.
4. Construct validity	The extent to which scores on a particular questionnaire relate to other measures in a manner that is consistent with theoretically derived hypotheses concerning the concepts that are being measured	+ Specific hypotheses were formulated AND at least 75% of the results are in accordance with these hypotheses; ? Doubtful design or method (e.g., no hypotheses); - Less than 75% of hypotheses were confirmed, despite adequate design and methods; 0 No information found on construct validity.
<b>5. Reproducibility</b>		
5.1. Agreement	The extent to which the scores on repeated measures are close to each other (absolute	+ MIC $<$ SDC OR MIC outside the LOA OR convincing arguments that agreement is acceptable; ? Doubtful design or method OR (MIC not defined AND no convincing arguments

	measurement error)	that agreement is acceptable); – MIC $\geq$ SDC OR MIC equals or inside LOA, despite adequate design and method; 0 No information found on agreement.
5.2. Reliability	The extent to which patients can be distinguished from each other, despite measurement errors (relative measurement error)	+ ICC or weighted Kappa $\geq$ 0.70; ? Doubtful design or method (e.g., time interval not mentioned); – ICC or weighted Kappa $<$ 0.70, despite adequate design and method; 0 No information found on reliability.
6. Responsiveness	The ability of a questionnaire to detect clinically important changes over time	+ SDC or SDC $<$ MIC OR MIC outside the LOA OR RR $>$ 1.96 AUC $\geq$ 0.70; ? Doubtful design or method; – SDC or SDC $\geq$ MIC OR MIC equals or inside LOA OR RR $\leq$ 1.96 OR AUC $<$ 0.70, despite adequate design and methods; 0 No information found on responsiveness.
7. Floor and ceiling effects	The number of respondents who achieved the lowest or highest possible score	+ $\leq$ 15% of the respondents achieved the highest or lowest possible scores; ? Doubtful design or method; – $>$ 15% of the respondents achieved the highest or lowest possible scores, despite adequate design and methods; 0 No information found on interpretation.
8. Interpretability	The degree to which one can assign qualitative meaning to quantitative scores	+ Mean and SD scores presented of at least four relevant subgroups of patients and MIC defined; ? Doubtful design or method OR less than four subgroups OR no MIC defined; 0 No information found on interpretation.
<p>MIC = minimal important change; SDC = smallest detectable change; LOA = limits of agreements; ICC = internal consistency  + = positive rating; ? = indeterminate rating; – = negative rating; 0 = no information available.  Doubtful design or method = lacking of a clear description of the design or methods of the study, sample size smaller than 50 subjects</p>		

#### 2.5.4.2 Critical Appraisal of Methodological Quality

##### 1) Content validity

Ten out of twelve ODI adaptations had information about content validity, and achieved a rating of “+” adequate for the method and results for content validity (see Table 2.5). Only two ODI adaptations (Hideki et al 2006; Sakulsriprasert et al 2006) achieved a rating of “?” doubtful for this criterion.



## 2) Construct validity

All ODI adaptations had positive “+” rating value in the evaluation of construct validity (see table 2.5) except the adapted Thai version had “?” doubtful method and result (Sakulsriprasert et al 2006) and adapted Chinese scored “0” (Chow, Chain 2005).

## 3) Internal consistency reliability

Almost all the cross-culture adaptations achieved a positive rating for internal consistency (see table 2.5). Only two studies scored “0” as they had not undergone internal consistency evaluation (Chow, Chain 2005; Kim et al 2004).

## 4) Test–retest reliability

Test retest reliability was evaluated in four of the ODI adaptations. Each scored a positive rating “+” (see table 4), except for the adapted Japanese version (Hideki et al 2006). An evaluation of test retest reliability was not one of this study’s objectives as an existed adapted Japanese version was used. The adapted Greek ODI (Boscainos et al 2003) scored “0” as test-test reliability was not evaluated (see table 2.5).

## 5) Responsiveness

Responsiveness was assessed in three studies (Lauridsen et al 2006; Hideki et al 2006; Mannion et al 2006). All received a rating of “+” (sufficient information was indicated and adequate methodology was used). The other nine studies receive “0” as no information was found on responsiveness (see table 2.5).

## 6) Ceiling and Floor effects

Only two articles, the ODI Danish version (Lauridsen et al 2006) and ODI German version (Mannion et al 2006 ) scored a “+” rating due to adequate information were provided and an adequate methodology were used. The other ten adapted ODI versions were given “0” as no information was provided on ceiling and floor effects (see table 2.5).

Table 2. 5: Summary of methodological critical appraisal

Modified (Adapted) ODI Versions/Authors	Content Validity	Internal consistency	Construct validity	Test-retest reliability	Responsiveness	Ceiling and Floor effects
Portuguese Vigatto, Alexandra, Correa 2007	+	+	+	+	0	0
Persian Mousavi et al (2006)	+	+	+	+	0	0
Danish Lauridsen et al 2006	+	+	+	+	+	+
Japanese Hideki et al 2006	?	+	+	0	+	0
German Mannion, et al 2006	+	+	+	+	+	+
Thai Sakulsriprasert et al 2006	+	+	?	+	0	0
Chinese Chow, Chain 2005	?	0	0	+	0	0
Turkish Yakut. et al 2004	+	+	+	+	0	0
Korean Kim et al 2005	+	0	+	+	0	0
Arabic Guermazi et al (2005)	+	+	+	+	0	0
Norwegian Grotle, Brox, Vollestad 2003	+	+	+	+	0	0
Greek Boscainos et al 2003	+	+	+	0	0	0

- + = positive rating
- ? = indeterminate rating
- - = negative rating
- 0 = no information available.
- Doubtful design or method = lacking of a clear description of the design or methods of the study, sample size smaller than 50 subjects (should be at least 50 in every (subgroup) analysis, or any important methodological weakness in the design or execution of the study.

## **2.5.5 Description of Psychometric Properties**

Table 2.5 summarizes the psychometric properties that were assessed and reported in all the adapted versions of the ODI.

### **2.5.5.1 Content Validity**

Ten of the identified articles provide clear information about content validity; item selection, item reduction and interpretability, details of the translation process, experts' committee procedure, and the interview of clients in the pretesting were well reported in those articles (see table 2.3). In addition, measurement aim, target population, and concepts that the ODI was intended to measure were included in these the ten articles. The two studies by Hideki et al 2006; Chow, Chain 2005, did not provide information regarding the translation process, experts' committee procedure, and the interview clients in the pilot pretesting, as they used pre adapted versions.

### **2.5.5.2 Test-Retest**

Ten of the retrieved ODI versions had an evaluation of test-retest reliability and internal consistency , Vigatto et al 2007; Mousavi et al 2006; Lauridsen et al 2006; Mannion et al 2006; Sakulsriprasert et al 2006; Chow and Chain 2005; Yakut et al 2004; Kim et al 2005; Guermazi et al 2005; Grotle et al 2003, except the Greek adaptation by Boscainos et al 2003 (see table 2.5). The Japanese adaptation of the ODI by Hideki et al 2006, did not evaluate test-retest as they were aimed to evaluate discriminative validity and responsiveness only. Test-retest reliability established with the calculation of an intraclass correlation coefficient (ICC), using the model denoted ICC (2, 1), which suggests all within-variation measurement error, was used. The ICC values ranged from 0.63 of Thai ODI adaptation by Sakulsriprasert et al 2006 to 0.99 of Portuguese ODI adaptation by Vigatto et al 2007. In addition, plots of difference between the first and second response on the self-reported outcome or questionnaire scales against a mean of the sum scores were constructed according to Bland, Altman 1995 in three adaptations (Lauridsen et al 2006; Guermazi et al 2005; Grotle et al 2003).

## 2.6 Test retest reliability summary

<b>Modified (Adapted) ODI Versions</b>	<b>Methods used and Data analysis</b>	<b>Results</b>
Portuguese Vigatto et al 2007	Type 2,1 intra Time interval: 24	0.99 (95% CI)
Persian Mousavi et al 2006	Type 2,1 intra Time interval: 24	ODI:0.91 RDQ:0.86 QDS:0.86
Danish Lauridsen et al 2006	Type 2,1 intra Time interval: 24 hours and 1 week	0.91 (95% CI) -11.5 to +13
Japanese Hideki et el 2006	Not done	Not done
German Mannion et al 2006	Type 2,1 intra Time interval: 2 weeks	0.96
Thai Sakulsriprasert et al 2006	Type 2,1 intra Time interval: 20 to 30 minutes	0.98
Chinese Chow and Chain 2005	Type 2,1 intra Time interval: 48	0.86 (95% CI)
Turkish Yakut. et al 2004	Type 2,1 intra Time interval: 7 days	0.94
Korean Kim et al 2004	Type 2,1 intra Time interval: 48	0.916
Arabic Guermazi et al 2005	Type 2,1 intra Time interval: 48	0.98
Norwegian Grotle et al 2003	Type 2,1 intra Time interval: 48	0.88
Greek Boscainos et al 2003	Not done	Not done

### 2.5.5.3 Internal consistency (homogeneity)

Internal consistency was tested in all the identified cross-culture adaptations of ODI (see table 2.7) and the results of Cronbach's alpha ranged from 0.70 of Arabic ODI adaptation by Guermazi et al 2004 to 0.94 of Japanese ODI adaptation by Hideki et al 2006.

Table 2.7 Summary of the Internal Consistency

Modified (Adapted) ODI Versions	Internal Consistency (Cronbach's alpha)	Measurement time calculated from
Portuguese Vigatto et al 2007	0.87	Baseline
Persian Mousavi et al 2006	ODI:0.75 RDQ:0.83 QDS:0.92	Baseline
Danish Lauridsen et al 2006	0.88	Baseline
Japanese Hideki et el 2006	0.94	Baseline
German Mannion, et al 2006	0.90	Baseline
Thai Sakulsriprasert et al 2006	Not calculated	Baseline
Chinese Chow and Chain 2005	0.81	Baseline
Turkish Yakut. et al 2004	0.89-0.91	Baseline
Korean Kim et al 2004	0.84	Baseline
Arabic Guermazi et al 2005	0.70-0.76	Baseline
Norwegian Grotle et al 2003	0.94	Baseline
Greek Boscainos et al 2003	0.83	Baseline

#### **2.5.5.4 Responsiveness**

Three out of twelve cross-culturally adapted ODI had been tested for the responsiveness (Lauridsen et al 2006; Hideki et al 2006; Mannion et al 2006) and the results were within acceptable level. Responsiveness was evaluated in three ways: a) The Danish ODI authors (Lauridsen et al 2006) used the receiver operating characteristics curve (ROC) analysis that was capable of distinguishing between improved and unimproved clients. The discriminative ability of the ODI (“important improvement” versus “no change” clients) was assessed by the sensitivity to change coefficient which is the area under the curve (AUC) of the receiver operating characteristics curve (ROC). The ODI ROC was 0.82 (95% CI: 0.75-0.89) for the raw change score and 0.84 (95% CI:0.78-0.91) for the percentage change score.; b) The adapted Japanese ODI (Hideki et al 2006), area under the ROC curve (AUC) was calculated as an index of discriminative performance, and (AUC) =0.70, 0.76 for ODI, 0.69-0.70 for SF-36 PF (physical function); and c) The adapted German ODI (Mannion, et al 2006) used the standard error mean (SEM) as a method to be able to distinguish the measurement error from the “real” change due to treatment and the result for the ODI was 0.85 (SEM = 0.06).

#### **2.5.5.5 Ceiling and Floor Effects**

Ceiling and floor effects were evaluated in the adapted Danish ODI. Twenty five patients (10.7%) scored within lower score ranged from (0 – 11.5%), no patients scored within the higher score. In the adapted German ODI only 4 out of 100 patients scored within lower score ranged between (6 – 8). These results showed acceptable distribution of the group scores across the entire ODI scores as evidence by no ceiling and floor effects.

#### **2.5.5.6 Construct Validity**

Construct validity was assessed in 10 of the cross-culture adaptations (see Table 2.8) except for two did not test the construct validity (Sakulsriprasert et al 2006; Chow and Chain 2005). Construct validity was assessed by comparing the adapted ODI scores to the scores of other questionnaires that measured similar constructs. The most frequently used self-reported questionnaires were the Visual Analogue Scale (VAS) to measure pain intensity followed, Roland Morris Disability Questionnaire (RMDQ) and the Short Form Health Survey (SF-36). Less frequently used comparators were Low Back Rating Scale; Quebec Back Pain Disability Scale (Quebec); and World Health Organization Quality of Life Assessment (WHOQOL-BREF). The r value and p value were included in evaluation of the correlation for almost all the cross-culture adaptations and were frequently reported as significant. And the p value ranged from ( $P < 0.05$ ) of the Korean adaptation by Kim et al 2004 to ( $P < 0.0001$ ) of the Portuguese

adaptation by Vigatto et al 2007. Two studies did not report the  $p$  value in the analysis of correlation, the Arabic adaptation by Guermazi et al 2004, and Norwegian adaptations by Grotle et al 2003.

Table 2.8 Summary of the validity

Modified (Adapted) ODI Versions	Instrument used for correlation	Validity (Pearson correlation)
Portuguese Vigatto et al 2007	RMQ Pain VAS (phys. function)	RMQ:r=0.81; Pain VAS: r=0.66, SF-36 (phys. function):r=0.83, (Phys. role):r=0.53, (pain):r=0.58 (P < 0.0001)
Persian Mousavi et al 2006	SF-36 (phys. Function) VAS	with SF-36 (phys. function):r= -0.66 (P < 0.001) with VAS:r=0.54 (P < 0.001)
Danish Lauridsen et al 2006	RDQ LBPRS SF-36	RDQ:r=0.78; LBPRS:r=0.69; SF-36:r=0.75; NRS:r=0.61 (P <0.01)
Japanese Hideki et el 2006	SF36 (phys Function) (physical limitation/bodily pain)	SF36 (phys Function):r= 0.80 (P < 0.001), (physical limitation/bodily pain):r= 0.61 (P < 0.01)
German Mannion et al 2006	VAS: RDQ	VAS:r= 0.78 (P < 0.001); RDQ: r=0.80 (P < 0.001)
Thai Sakulsriprasert et al 2006	Not Compared	Not compared
Chinese Chow and Chain 2005	Not Compared	Not compared
Turkish Yakut. et al 2004	VAS Schober test RDQ	Concurrent VAS (day1&4):r=0.367&0.392 (P < 0.01); Schober test (day1&4): r=-0.068&-0.041 (P < 0.591)&(P < 0.745) Construct RDQ (day1&4): r= 0.815&0.708 (P < 0.001)
Korean Kim et al 2004	VAS	VAS (NS&SU): r=0.425&0.626 (P <0.0001), WHOQOL-BREF:r= -0.48 (P <0.05)
Arabic Guermazi et al 2005	Quebec	Quebec: r=0.86; VAS:r=0.57
Norwegian Grotle et al 2003	RDQ	RDQ: r=0.73-0.60, Pain VAS: r= 0.39-0.52
Greek Boscainos et al 2003	Six-point rating scale	Concurrent: Six-point pain rating scale: r= 0.835 (P < 0.0005)

Visual Analogue Scale (VAS), Roland Morris Disability Questionnaire (RMDQ), Short Form Health Survey (SF-36), Low Back Rating Scale (LBPRS) Quebec Back Pain Disability Scale (Quebec); and World Health Organization Quality of Life Assessment (WHOQOL-BREF).



## 2.6 DISCUSSION

This systematic review aimed to identify and describe the psychometric properties that were evaluated in the cross-culture adaptation and validation of the Oswestry Disability Index (ODI) in different cultures. Our results identified a total of 12 cross-culture adaptation studies that were conducted in 12 different languages (countries) other than the English. One of the twelve studies was conducted in Tunisia; the ODI was translated to Arabic language and adapted to Tunisian Arabic culture, and validated among female population (Guermazi et al 2005). As this was the only study that had been conducted in Arabic culture and was validated in female population, the authors recommended further studies to validate the ODI Arabic version in other Arabic countries and cultures for male and female population. This indicates that there is a need for further studies to validate the ODI Arabic version developed in Tunisia in other Arabic countries to allow the comparability of responses and results across populations and cultures, and to determine normative data on relevant populations using the adapted ODI.

The researcher identified the steps that were followed in the process of cross-culture adaptation of the ODI across the twelve cultures, and the psychometric properties that were measured and tested to psychometrically evaluate the adapted versions in each culture. All the studies were conducted on adult samples; however sample's diagnosis was varied. The most frequent diagnosis used was acute LBP followed by chronic LBP. Although all the diagnosis used described relevant condition to the back or spine, there was a lack of well defined characteristics of pain and its duration in some studies. Some studies were conducted in two different samples to check if the ODI was valid for different samples. Grotle et al 2003 reported that ODI was more valid in chronic LBP conditions more than acute.

The translation procedures used in the included studies were similar to those recommended in the Guidelines for the Process of Cross-Culture Adaptation of Self-Reported Measures (Beaton et al 2000). Almost all the adaptations followed the five stages that were indicated in these Guidelines except the Japanese adaptation by Hideki et al 2006 who did not conducted a cross culture adaptation as they used a current adapted Japanese version. The Thai adaptation by Sakulsriprasert et al 2006 did not implement stage 3 (back translation), which may affect the process of translation and the quality of the content of the ODI. The Thai adaptation by Sakulsriprasert et al 2006 also did not implement stage 5 (pretesting the pre-final version) which may affect the content of the adapted ODI. Consistency of following these guidelines among the majority of the identified studies provides evidence and confidence for the researcher to follow these guidelines in this study and the future cross-culture adaptation

studies to maximize the attainment of semantic, idiomatic, experiential, and conceptual equivalence between the source (original) and target self-report outcome measure. Beaton et al 2000 also proposed what is called Possible Scenarios Where Some Form of Cross-Culture is required (Appendix 2). These Scenarios help the researcher to identify the form of culture adaptation required, especially in the countries that speak the same language, but they are different from the culture lifestyle point of view.

The psychometric testing of the adapted ODI self-reported outcomes questionnaire varied substantially between studies. There are major differences in sample sizes, test-retest periods and minor differences in the statistical analysis, and benchmarks considering reliability and validity. In spite of major differences of the sample size among the studies, the minimum sample size of 50 recommended by Beaton et al. (2000) was achieved in all the studies, except the one by Sakulsriprasert et al 2006 (n=40).

Internal consistency was tested in all the identified adaptations of ODI and the results were between good to excellent, with Cronbach's alpha ranging from 0.70 of Arabic ODI adaptation by Guermazi et al 2004 to 0.94 of the Japanese ODI adaptation by Hideki et al 2007. Internal consistency was evaluated consistently in all the identified studies and was considered as one of the properties to be evaluated in our study. Test-retest reliability was consistently evaluated in all the included studies and results were statistically significant and supported what was hypothesized in the studies. However there was a variation of the interval of time between the baseline and the second measure, which ranged from 3-4 hours to 4-6 weeks.

For validation of self-reported outcomes questionnaire across culture, content validity is considered as one of the most important measurement properties that tries to produce equivalency between the original questionnaire (source) and the adapted version (target) (Beaton et al 2000). Therefore if the content validity of a self-reported outcome questionnaire is adequate, one will consider using the self-reported questionnaire, and evaluation of the other measurement properties is useful (Terwee et al 2007). Furthermore, the aim of the self-reported questionnaire demands different qualities of the questionnaire with respect to reproducibility and responsiveness. As the ODI is an evaluative self-reported questionnaire, it requires a high level of reliability to be able to measure important changes and responsive to change is one of the psychometric properties that would be considered in the validation of the ODI for UAE culture.

Construct validity was frequently evaluated among the retrieved studies, but there was no gold standard instrument available to be used for correlation analysis with the ODI. As Visual Analogue Scale (VAS) was found to be the most common instrument that was used for the correlation with the ODI in the eligible studies as it measures the same variable across studies (e.g. pain intensity) followed by Roland Morris Disability Questionnaire (RDQ), followed by SF-36 Short form Health Survey, it was an indication for us to include the VAS in our validation analysis. The VAS is a simple outcome tool that uses a couple of simple words that has been interpreted in similar way across cultures. Other self-reported outcome measures used in the correlation analysis in the identified studies were not available in Arabic language. This limits our selection of other instrument for the evaluation of construct validity.

The responsiveness was one of the psychometric properties testing that were recommended by Terwee et al 2007 for validation however it was only reported in three studies. The results of the three studies were supported the authors interpretation of the findings (see section 2.5.5.4) therefore we decided to test this property to support the validity of our study. Floor and ceiling effects were evaluated in two studies, and as it is included in the quality criteria we are intended to include it in our analysis to support the validity of the ODI-UAE.

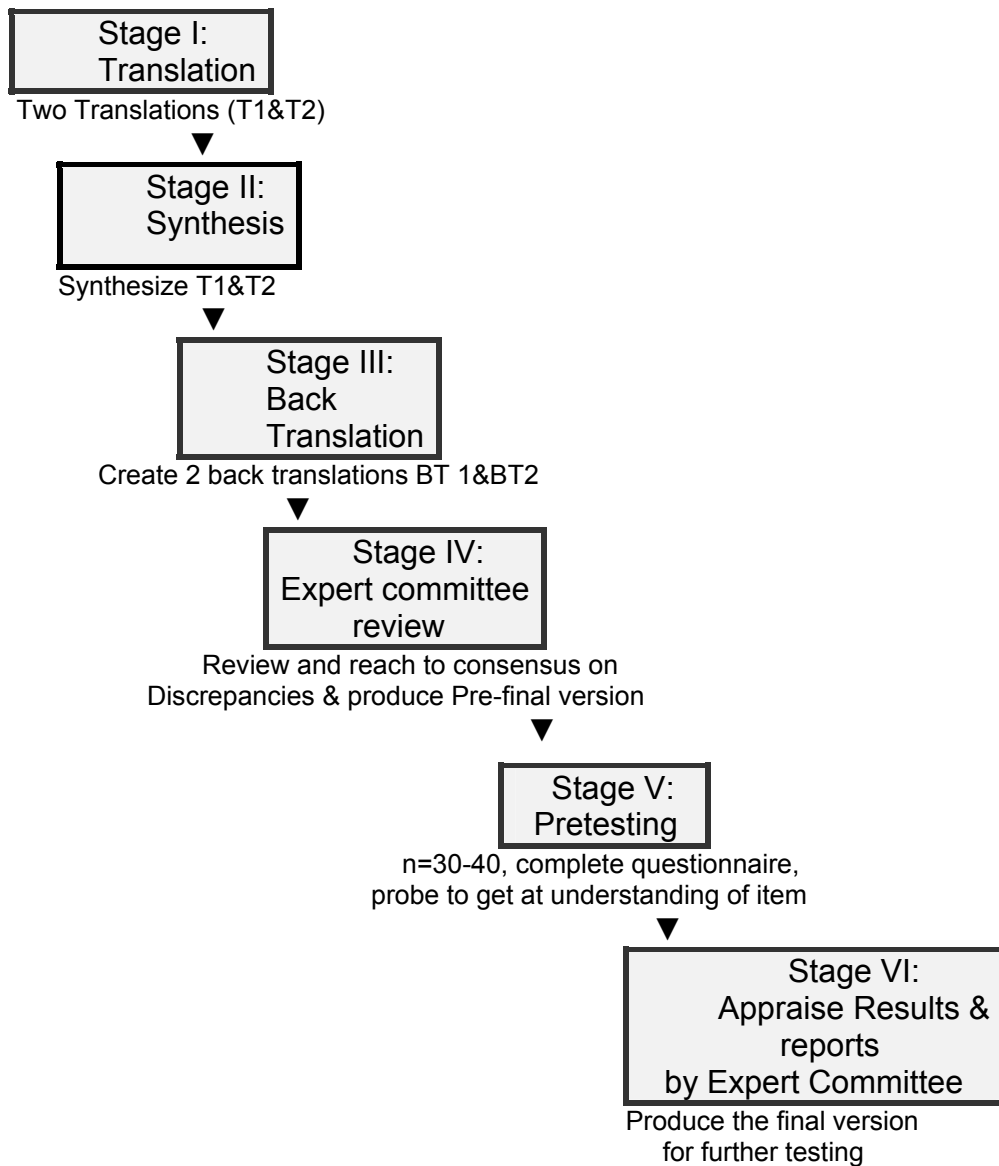
The Terwee Quality Criteria was useful rules of thumb to determine the quality of the identified ODI culture adaptations in this study (Terwee et al 2007). The Terwee Quality Criteria provided evidence for this study to evaluate methodological quality of the psychometric properties that were used for the validation of the adapted ODI cross-culture. The Terwee Quality Criteria do not summate into one total quality score which is often done with trial methodological quality scales, such as the PEDro scale (Leonardo et al 2007; Terwee et al 2007). A total quality score presumes that the psychometric properties assess the same attribute and that each psychometric property is equally important, a presumption that may not be true (Leonardo et al. 2007; Terwee et al 2007). Additionally, summed quality scores do not indicate the specific methodological problems that are most prevalent (Leonardo et al 2007). Therefore it is more informative to separately consider each of the measurement properties of the Terwee Quality Criteria (Leonardo et al 2007). Since there is no standardized criteria to evaluate the quality of self-reported health measurement instruments, and Terwee criteria are mostly opinion based, it may not be discriminative enough to distinguish between good and very high-quality self-reported outcome measures (Leonardo et al 2007; Terwee et al 2007). Because of that, guidelines are needed to set standards and define the criteria by which self-report physical function outcome measures should be assessed.

## **2.7 CONCLUSION**

Our systematic review has provided information regarding the process of cross-culture adaptation for the ODI self-report outcome measure. In addition it has described the relevant psychometric properties to reliability and validity of the ODI across cultures.

This systematic review shows that further adaptation and validation studies of the self-reported outcome measures for LBP across Arabic cultures are needed to produce instruments that can be used to evaluate intervention outcomes; comparability of responses across population and/or cultures; normative data collection using the new instrument; and provide a pool of information to researchers.

## Appendix 1



Stages of cross-cultural adaptation (Adapted from Beaton et al. 2000)

## Appendix 2

### Possible Scenarios Where Some Form of Cross-Culture Adaptation is required

Wanting to use a questionnaire in population described as follows:	Result in a change in....			Adaptation Required	
	Culture	Language	Country of use	Translation	Culture Adaptation
A- Use in same population. No change in culture, language, or country from source.	—	—	—	—	—
B- Use in established immigrants in source country	√	—	—	—	√
C-Use in other country, same language (Current ODI Arabic Version)	√	—	√	—	√
D- Use in new immigrants, not English-speaking, but in same source country	√	√	—	√	√
E- Use in another country and another language	√	√	√	√	√

Adapted from Beaton et al. (2000)

# CHAPTER 3

## CROSS-CULTURE ADAPTATION

### 3.1 Introduction

This Cross-culture adaptation study is one component of a validation research project that also included a reliability and validity study. The validation research project aimed to validate the Oswestry Disability Index (ODI) Arabic version developed in Tunisia for United Arab Emirates (UAE) clients with Low Back Pain (LBP).

This chapter presents the methodology used to address the aims of the study presented in section 3.2 including the cultural adaptation process, pretesting the ODI-UAE pre-final version, the pretesting results, experts' committee review of the pretesting results, and outcome of experts committee review (pretesting results) that was the final ODI-UAE Arabic version.

### 3.2 Aims of the Study

The aims of the study were:

- ❖ To determine the cross-cultural adaptation required for the Arabic version of the ODI developed in Tunisia (Appendix 1) to produce a pre-final ODI-UAE Arabic version.
- ❖ To determine whether further adaptation changes for the pre-final ODI-UAE Arabic version were needed to produce the final ODI-UAE Arabic version.

### 3.3 Study Design

A cross-cultural adaptation process using consensus methodology was used to determine the content validity of the ODI Arabic version developed in Tunisia at a conceptual level across UAE culture.

## **3.4 Cross-Cultural Adaptation Process**

The cross cultural adaptation process comprised of well-recognized methods and procedures which were followed in this study.

### **3.4.1 Guidelines of Cross-Culture Adaptation Process**

The guidelines for the cross-cultural adaptation process are outlined in Figure 3.4 and involve a two-step process: translation process and culture adaptation process. The guidelines serve as a template for the translation and the culture adaptation processes and were recommended by Beaton et al (2000). The guidelines were based on their review of cross-culture adaptation in the medical, sociological, and psychological literature. These guidelines were used and followed in the cross-culture adaptation of the ODI to 10 different languages (refer to Table 4 in Chapter 2). These guidelines also describe the process that was recommended by the American Association of Orthopedic Surgeons (AAOS) Outcomes Committee (Mannion et al 2006). The cross-culture adaptation process aims to maximize the attainment of equivalency in the content and face validity between the source (where it was developed) and the target (where it is going to be used) (Beaton et al. 2000). However this is not always the case, perhaps because of the subtle differences in the living habits in different cultures that render an item more or less difficult than other items in the measure (Leonardo et al 2007 and Terwee et al 2007). For example, if the new culture has a different way of approaching a task that makes it inherently more or less difficult compared with other items; it would change the validity, in terms of item-level analysis such as item response (Terwee et al 2007). Further tests should be conducted on the psychometric properties of the adapted measure after translation and adaptation were completed (Beaton et al 2000, and see the previous Chapter 2 table 4). In this study we considered the current ODI Arabic version developed in Tunisia as the source, and the developed ODI-UAE Arabic version as the target that would be used in UAE. Figure 3.1, (Stage IV) outlines the method suggested by Beaton et al (2000) and Wagner et al (1998), which was used in a number of similar research studies (Grotel et al 2003, Lauridsen et



al 2006, Manion et al 2006, Mousavi et al 2006, and Reicardo et al 2007). In Stage (VI) Beaton suggested an expert committee appraisal process to avoid erroneous comparisons of results across different translated versions. Also this process was used in a number of cross-culture adaptations of ODI studies that were conducted after 2000 (see Chapter 2, Table 2.1).

#### **3.4.1.1 Translation Process**

Translation process is the first step of cross-culture adaptation that is carried out by translators. The translation process starts with initial forward translation from the original (source language) to the target language; followed by synthesis of the translation; and ends with back translation. The translators compare the translations and discuss the ambiguous wording in the source (where it was developed) or discrepancies in the translation and resolve it.

Note: The results that were obtained from applying the suggested scenarios of Beaton et al (2000) to this study indicated that translation is not required for this study (see 3.1).

#### **3.4.1.2 Culture adaptation Process**

The culture adaptation process is the second step in the cross-culture adaptation process and starts with the composition of an expert committee. The expert committee's role was to consolidate the two versions, Tunisian and English, and develop what would be considered the pre-final version. This was followed by the pretesting study of the pre-final version and ended with the expert committee reviewing the results and producing what was considered the final version.

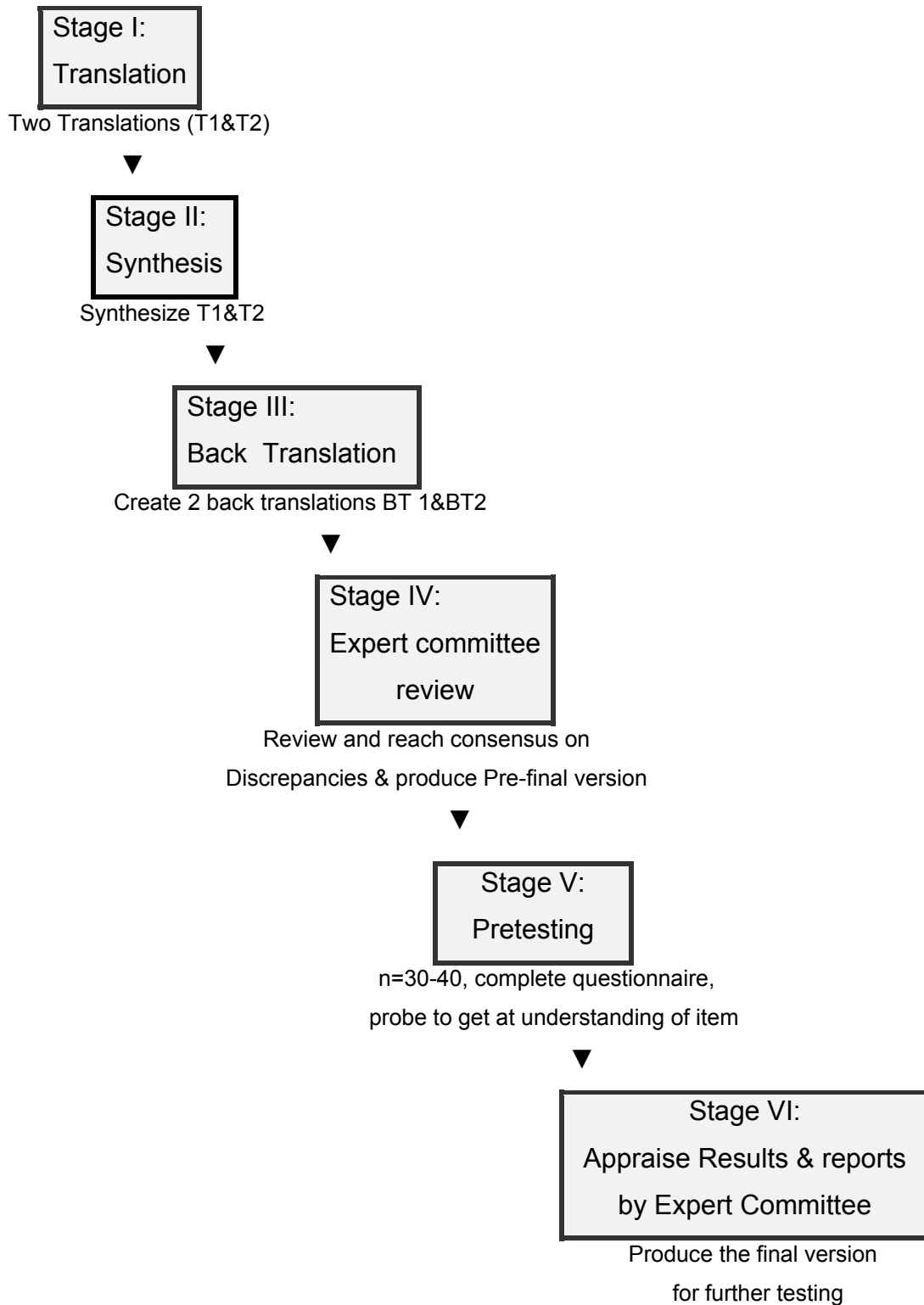


Figure 3.1 Stages of cross-cultural adaptation (Adapted from Beaton et al. 2000)

### **3.4.1.3 Stage V Pretesting Sample**

The sample size used for pretesting in the previous studies varied between 15 participants (Manion et al 2006) and 40 (Lauridsen et al 2006). However the sample size that was used in the Delphi technique was followed in this study and varies between 15 to 60 participants as reported by Felicity et al (2000). The Delphi method is a multistage rounds process that continues until consensus is reached on the opinions of the focus group (Felicity et al 2000). We decided to conduct the pretesting using the Delphi method in a group of 20 participants in rounds. It had been expected that the pretesting would take approximately three rounds, which means repeated piloting in three different group of 20 participants; the results (participants comments) would be used to modify the pre-final version, that would be used in the second round and carry on to the third round. We expected that the results of the third round would have no comment from the 20 participants and therefore data collection would be stopped as participants reported no further difficulty understanding the pre-final ODI-UAE version.

### **3.4.2 The Type of Cross-Cultural Adaptation Required**

The type of cross-culture adaptation required for this study was determined based on the scenarios that are summarized in Table 3.2 and reflects the situations described by Beaton et al. (2000) where some form of translation and/or culture adaptation processes is needed.

#### **3.4.2.1 Procedure to determine the type of Cross-Culture Adaptation**

Cross- culture adaptations should be considered for several different scenarios presented in Table 3.2. In some cases, this is more obvious than in others. Beaton et al (2000) suggest five different examples of when attention should be paid to this adaptation by comparing the target language (where it is going to be used) and the source language (where it was developed). The first scenario is that it is to be used in the same language and culture in which it was developed. No adaptation is necessary. The second scenario is that it is to be used in the

same language in which it was developed but a different culture and this requires culture adaptation. The third scenario is the application of the measure in a different culture and country but same language in which it was developed - moving the current ODI Arabic version developed in Tunisia (source) to the UAE (target) which is a different country and culture and this would require culture adaptation. Therefore culture adaptation was the type of adaptation required for the current ODI Arabic version developed in Tunisia, which is considered the source for this study.

Table 3.1 Possible Scenarios Where Some Form of Cross-Culture Adaptation is required

Wanting to use a questionnaire in a new population described as follows:	Result in a change in....			Adaptation Required	
	Culture	Language	Country of use	Translation	Culture Adaptation
A- Use in same population. No change in culture, language, or country from source.	—	—	—	—	—
B- Use in established immigrants in source country	√	—	—	—	√
C-Use in other country, same language (Current ODI Arabic Version)	√	—	√	—	√
D- Use in new immigrants, not English-speaking, but in same source country	√	√	—	√	√
E- Use in another country and another language	√	√	√	√	√

Adapted from Beaton et al. (2000)

### 3.4.3 The Cross cultural Adaptation Process Used

The stages of the cross-culture adaptation process required for this study were:

- Stage IV: Expert Committee Review
- Stage V: Pre-testing the Pre-final Version

- Stage VI: Appraisal of Results & reports by Expert Committee to produce the final version for further testing

### **3.4.4 Expert Committee Review**

#### **3.4.4.1 Recruitment of Expert Committee Participants**

A bilingual expert committee was assembled by the coordinator (researcher) in September 2007. The Committee comprised methodologists, health professionals, and language professionals. The potential participants received a letter (Appendix 3) from the researcher inviting them to participate in this study. All the potential participants who received the letter agreed to participate. All participants were bilingual, with Arabic being their first language, and English their second language.

The Expert committee participants consisted of:

- University of Sharjah-based Methodologist
- Quassimi Hospital-Orthopedic consultant-Head of Orthopedic Department
- University of Sharjah - based Methodologist-Chair, Dept. of Sociology
- Zayed Military Hospital - Physiotherapist-superintendent
- University of Sharjah-English language professionals-Chair of English Language department
- University of Sharjah-Arabic language professional-Arabic language department
- University of Sharjah – Physiotherapist - Chair of Physiotherapy department
- Principle researcher (coordinator). The researcher was responsible for documenting discussion of the expert committee and to modify the Arabic version according to this discussion.

#### **3.4.4.2 The Expert Committee Objectives**

The objectives of the committee were to:

- Review the current ODI Arabic version developed in Tunisia by Guerhazi et al (2006) and the ODI English version 2.0 (Appendix 2) and to resolve major discrepancies, errors of interpretation and missed nuances.
- Determine and consolidate the changes required for culture adaptation of the current ODI Arabic version to produce the pre-final ODI-UAE Arabic version that will be used in pre-testing.
- Collate the results of the pre-testing and decide whether further changes would be needed to produce the final ODI-UAE Arabic version.

#### **3.4.4.3 Method**

Consensus methodology was used to solve the discrepancies and to determine the required adaptation changes to produce the pre-final ODI-UAE Arabic version.

#### **3.4.4.4 Procedure**

##### Responsibilities of Expert Committee

The responsibilities of the expert committee were to examine and evaluate the following aspects recommended by Beaton (2000):

- Semantic equivalence: ascertain that the words meant the same thing, resolve the issue of multiple meanings to a given item and resolve any grammatical difficulties.
- Idiomatic equivalence: ascertain that the idioms in the Arabic version developed in Tunisia were acceptable in the UAE. The committee decided on and provided the equivalent expressions in the pre-final ODI-UAE version.
- Experiential equivalence: ascertain that all differences in cultural experiences in daily life between Tunisia and the UAE had been considered and the necessary changes were made in the current adapted Arabic version. An example would be if an item worded 'do you find it difficult eating with a knife

and fork' would be inappropriate in Arabic cultures where utensils were not used.

- Conceptual equivalence: determine the words that were holding different conceptual meanings between cultures and select appropriate words for UAE culture.

#### Responsibilities of the researcher

Responsibilities of the researcher were to call for, and coordinate the required meetings, write meeting reports and document suggested adaptation changes after reaching consensus. He provided the committee participants with hard and soft copies of the current ODI Arabic version and ODI English version and collected the final changes made after consensus was reached and developed a soft copy of the pre-final version. He presented the results of the pretesting to the committee to review and produce the final ODI-UAE Arabic version.

#### Development of the final ODI-UAE Arabic version

The expert committee met twice at the University of Sharjah, Health Sciences College to develop the pre-final Arabic ODI-UAE version. The meetings were held in the college meeting room that was equipped with computer, printer, and internet access. The researcher called for the first meeting. This meeting with the experts was held on Monday September 3, 2007 from 11:00 am to 1:00 pm and all members attended. The meeting started and the members introduced themselves. Then the coordinator presented comprehensive information about the research aims, methods and procedures. The coordinator presented also the objectives and the responsibilities of the experts committee and he explained the consensus methodology would be used after each discussion to determine the adaptive changes that would be made. The researcher also presented the ODI English version 2.0 (original version) as a self administered outcome measure for clients with LBP developed in England (Appendix 2) and the current ODI Arabic version (Appendix) which was developed in Tunisia in Arabic. He distributed hard copies of both versions to all members. The coordinator explained the process of

culture adaptation required for the current ODI Arabic version. All members requested 20 minutes to review the two versions. The members decided to divide into three groups, language group, methodology group and health group. Each group reviewed the two versions for about 45 minutes and presented their proposed changes for cultural adaptation. All members discussed the proposed changes for about 30 minutes. At the end of the discussion, consensus was reached regarding the changes, and a draft of an electronic copy of the pre-final ODI-UAE Arabic version was developed on the researcher's laptop. At the end of the session, printed copies of the draft were distributed to all members by the researcher for further revision. At the end the members decided to conduct further individual revision at home for the three versions (the draft of the pre-final ODI-UAE Arabic version, ODI English version 2.0 and the current ODI Arabic version) and to meet again after two weeks to finalize the pre-final version of the ODI. The coordinator sent to all members what they requested: electronic copies of the three versions of the ODI for easy use and access.

Two weeks later on September 17, 2007 the second meeting was held at the College of Health Sciences from 11:00 am to 12:30 pm. All members attended and brought their recommended changes to the meeting for discussion. There were suggested minor changes presented by one of the methodology group; (yes) or (no) should not be used at the beginning of the sentence of the choices in each section; the reason was retention of psychometric aspect as yes or no were not the answer of any choices of each section of the pre-final ODI-UAE Arabic version. These changes, which are presented in section 3.6.7.1, were discussed and were made after consensus of all members was reached. The second draft of the pre-final ODI-UAE was developed by the coordinator on the computer. Printed copies of the second draft were distributed by the coordinator to all members for final revision. Consensus was reached that no further changes were needed to the pre-final ODI (Appendix 4).



### 3.4.5 Expert Review Results

#### 3.4.5.1 The Adaptation Changes Required

The changes that were made are presented in Table 3.2.

Table 3.2

Part	Changes in English	Changes in Arabic
Instruction	added word "most" suitable	الأكثر مناسبة
instruction	Added standard instruction sentence "(choose only one answer from the following choices of each section that are most suitable to describe your condition today)"	( اختر إجابة واحدة من كل فقرة من الخيارات الآتية يكون الأكثر مناسبة في وصف حالتك اليوم )
Section 2: (choice 6)	Reconstruct the sentence " I stay in bed, I do not get dressed and wash with difficulty"	أبقى في الفراش ولا يمكنني أن ألبس ثيابي، ولا أغتسل
Section 3: (Choice 6)	Reconstruct the sentence "I can not lift or carry any thing at all"	رفع أو حمل أي شي ليس في استطاعتي على
Section 4: Choice 1	Reconstruct the sentence "Pain does not prevent me from walking for any distance"	الأوجاع لا تمنعني من المشي أي مسافة.
Section 4: Choice 2	Add "more than" Pain does not prevent me from walking "more than" 1 mile	الأوجاع تمنعني من المشي لأكثر من كيلو متر ونصف
Section 4: Choice 3	Add "more than" Pain does not prevent me from walking "more than" 1/2 mile	الأوجاع تمنعني من المشي لأكثر من أربعمائة متر
Section 4: Choice 4	Add "more than" Pain does not prevent me from walking "more than" 1/4 mile	الأوجاع تمنعني من المشي لأكثر من مائة متر
Section 4: Choice 5	Reconstruct the sentence "I can only walk with a stick or crutches.	أستطيع المشي فقط باستعمال عصا أو عكاز
Section 4: Choice 6	Reconstruct the sentence "I am in bed most of the time and have to crawl to the toilet"	أبقى في الفراش معظم الوقت وأزحف للوصول إلى المراض.
Section 5: Choice 2	Reconstruct the sentence "I can sit in my favorite chair as long as I like"	الأوجاع تمنعني من الجلوس على الكرسي لأكثر من ساعة.
Section 5: Choice 3	Reconstruct the sentence and add "more than" and remove over "Pain prevents me sitting for more than	الأوجاع تمنعني من الجلوس على الكرسي لأكثر من نصف ساعة.

	1 hour”	
Section 5: Choice 4	Reconstruct the sentence & add “more than” & remove over “Pain prevents me sitting for more than 1/2 hour”	الأوجاع تمنعني من الجلوس على الكرسي لأكثر من 10 دقائق
Section 5: Choice 5	Reconstruct the sentence & add “more than” and remove over “Pain prevents me sitting for “more than” 10 minutes”	الأوجاع تمنعني من الجلوس مطلقا .
Section 6: Choice 3	Reconstructs the sentence and correct meaning “Pain prevents me from standing for more than 1 hour”	الأوجاع تمنعني من الوقوف لأكثر من ساعة.
Section 6: Choice 4	Reconstruct the sentence and correct meaning “Pain prevents me from standing for more than 30 minutes”	الأوجاع تمنعني من الوقوف لأكثر من نصف ساعة
Section 6: Choice 5	Reconstruct the sentence and correct meaning “Pain prevents me from standing for more than 10 minutes”	الأوجاع تمنعني من الوقوف لأكثر من 10 دقائق.
Section 6: Choice 6	Reconstruct the sentence& correct meaning “Pain prevents me from standing at all”	الأوجاع تمنعني من الوقوف مطلقا.
Section 7: Choice 1	Reconstruct the sentence “My sleep is never disturbed by pain”	نومي لا يضطرب أبدا بالأوجاع. (الأوجاع لا تؤثر على نومي على الإطلاق)
Section 7: Choice 2	Reconstruct the sentence and correct meaning “My sleep is occasionally disturbed by pain”	نومي يضطرب أحيانا بالأوجاع. (الأوجاع تؤثر على نومي أحيانا)
Section 7: Choice 6	Reconstruct the sentence “Pain prevents me from sleeping at all”	الأوجاع تمنعني من النوم مطلقا (تماما).
Section 8: Choice 6	Reconstruct the sentence and correct meaning “My sex life is severely restricted by pain”	الأوجاع تمنعني مطلقا من الحياة الجنسية.
Section 9: Choice 3	Reconstruct the sentence and correct meaning “Pain has no significant effect on my social life apart from limiting my more energetic interests”	الأوجاع لا تؤثر بفاعلية على حياتي الاجتماعية ولكنها تقلل من أنشطتي التي تتطلب مجهودا كبيرا
Section 9:	Reconstruct the sentence and correct	الأوجاع حددت حياتي الاجتماعية

Choice 4	meaning "Pain has restricted my social life and I do not go out as often"	فأنا لا اخرج كالمعتاد كما كنت اخرج من قبل.
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### 3.4.5.3 Pre-final ODI-UAE Arabic Version Developed

See the pre-final ODI-UAE Arabic version (Appendix 4)

## 3.5 Pre-testing the Pre-Final ODI-UAE Arabic Version

### 3.5.1 Aim

The aim of this study was to determine whether further adaptation changes for the pre-final ODI-UAE Arabic version were needed to produce the final ODI-UAE Arabic version

### 3.5.2 Objectives

The objective of pre-testing the pre-final ODI-UAE Arabic version was to evaluate the participants understanding of the response choices in each section of the pre-final ODI-UAE Arabic version.

### 3.5.3 Design

An evaluative Delphi pilot study design was used to evaluate participants' understanding of the content and instructions of the pre-final ODI-UAE Arabic version. It was anticipated that the results from the 20 participants would be collected and analysed. Based on these results changes to the pre-final ODI-UAE Arabic version would be made. This process would continue until no further changes were required. The study was conducted over a two week period, based on the first 20 participants results that showed no difficulties were experienced understanding the pre-final ODI-UAE Arabic version. The results were obtained from first 20 participants indicated no need to repeat the procedure for other 20 participants; were considered final results.

### **3.5.4 Study Population**

The population consisted of United Arab Emirates nationals, both males and females adults aged 18 years and older, who had low back pain at the time of the study.

### **3.5.5 Sampling Method**

#### **3.5.5.1 Recruitment of Hospitals**

The United Arab Emirates are seven united Emirates, and Abu Dhabi is the Capital. Population sizes vary from larger to smaller are Dubai, Abu Dhabi, Sharjah, Ras-Alkhyamah, Ajman, Fujairah, and Om-Al Queen. The health care services are delivered through the federal government by the Ministry of Health, Emirate local government (District or Authority) and the private sector. Health care services are free for UAE nationals in federal and local government facilities. The Ministry of Health delivers health care services through federal government's health care facilities (hospitals and centers) in each of the Emirates except in Abu Dhabi and Dubai. In Abu Dhabi all health care facilities are managed by the local government (Abu Dhabi Health Authority). In Dubai there are four hospitals managed by the local government (Department of Health), Rashid (Trauma), Dubai (Medical Conditions), Al Wasel (Pediatric & Maternity) and Al Maktoom (Chest). In Sharjah there are two federal government Hospitals, called Al Quasimmi and Kuwaiti.

Rashid hospital and Dubai hospitals were selected for this study; they are the largest hospitals in the UAE that have more Arabic patients than international patients. The researcher sent a letter to the Department of Health asking permission to conduct the research project in Rashid and Dubai hospitals (Appendix 5). Permission was obtained from the two hospitals after the research approval letter (Appendix 6) was issued on July 19 2007 from the Research Ethics Committee of the Department of Health. The researcher provided copies of the research approval letter to each of the two hospitals' director offices before

permission was obtained. The researcher approached the physiotherapy department of each hospital to arrange for the data collection.

#### **3.5.5.2 Recruitment of Physiotherapists**

The researcher approached the managers of the physiotherapy departments at Rashid and Dubai hospitals on September 18, 2007, and introduced the details of the research. Both managers suggested that the researcher present the research details at the regular weekly department meeting to identify physiotherapists who were interested in participating in data collection. The research details were introduced at the next department meeting of each hospital and at the end of the meeting, three physiotherapists from each hospital who speak Arabic agreed to participate in this study. All physiotherapists received training regarding the standard data collection protocol that was to be followed during the data collection.

#### **3.5.5.3 Recruitment of Participants**

Adult UAE nationals, both male and female, with low back pain who were currently receiving physiotherapy treatment or referred to physiotherapy with low back pain were approached by the physiotherapists to participate in this study. Once the inclusion and exclusion criteria (sections 3.5.5.4 and 3.5.5.5) were established the included clients were approached and the physiotherapist introduced them to purpose of the study before they received their physiotherapy intervention. Twenty patients were recruited consecutively; twelve clients were recruited from Rashid hospital, and eight clients from Dubai hospital. The physiotherapists obtained an Arabic written consent (Appendix 6) from the recruited clients prior to participating in the study.

#### **3.5.5.4 Inclusion Criteria:**

The following inclusion criteria were applied:

- UAE nationals who had been referred to physiotherapy for LBP without suspected pathological disorders, with or without referred leg pain.
- Male and female adults, aged 18 years and older.
- Subjects were able to read and write in the Arabic language.

#### **3.5.5.5 Exclusion Criteria:**

The following exclusion criteria were applied to the sample population:

- Patients who demonstrated inability to effectively communicate in Arabic.
- Patients with suspected pathological disorder of the spine, such as fractures, spinal infections or malignancy, ankylosing spondylitis, rheumatoid arthritis, or other inflammatory diseases.
- Patients with psychiatric disorders.

#### **3.5.5.6 Pre-final ODI-UAE Arabic version**

The pre-final ODI-UAE Arabic version developed by the expert committee was completed by the participants to evaluate if they experienced difficulty understanding the meaning of a word or item during their completion. Pretesting also examined the response rate of participants to identify the proportion of missing items. This information would be presented to the expert committee to review and decide on any changes required to the pre-final ODI-UAE Arabic version.

A survey questionnaire (Appendix 10) was designed to evaluate patients' understanding of the pre-final ODI-UAE Arabic version. The questionnaire was developed on September 19, 2007 by four experts; an Arabic language specialist, English language specialist, Methodology specialist and the researcher. The survey questionnaire was developed in Arabic and translated into English. The four experts were members of the expert committee, presented in Section 3.7.2.

The survey questionnaire was chosen as an appropriate tool for the Delphi method used for data collection (Felicity et al 2000). The objectives of using the survey questionnaire were:

- Collect detailed information from a small number of participants.
- To obtain information through the Delphi rounds that at a certain point would generate consensus of no difficulties experienced on the part of the participants (stakeholders) when they answered the pre-final version.
- Maintain consistencies of data collection procedure among the 6 physiotherapists involved. Facilitate the procedure of data collection for the physiotherapist, as they were busy with increased daily hospital case load.

The questionnaire was semi structured. The semi structured questionnaire design was selected for two reasons. First, the four experts identified that free independent input and suggestions of clients were needed as they were seen as the most important stakeholders in this study (Felicity et al 2000). Second, this decision allowed participants to specify the words, sentences, and sections that were difficult to understand and present their suggestions to help the expert committee to determine the further adaptation changes might needed.

The survey questionnaire included three questions that focused on; (1) whether the participant experienced any difficulty in understanding the content of the ODI; (2) if they did experience any difficulty, to identify the sections where this difficulty was experienced; (3), to suggest the words or sentences to replace the parts that were difficult to understand.

### **3.5.5.7 Ethical Considerations**

Approval for this study was obtained from; the Committee for Human Research of Stellenbosch University (Appendix 7), College of Health Sciences/Research Development Committee (Appendix 9), Medical Research Committee/DOHMS (Appendix 6). The study was conducted according to the international accepted ethical standards and guidelines. Written Arabic consent was obtained from each client prior to participate in the study (Appendix 8). Each client had the right to withdraw from the study at any time by notifying the study Physiotherapist.

### **3.5.5.8 Study Procedure**

#### Arrangement for data collection

The researcher met with the recruited physiotherapists in each hospital on September 25, 2008 and in that meeting a coordinator was assigned for each hospital from the recruited physiotherapists. The coordinators' responsibilities were to follow up the data collection with the physiotherapists, distribute and collect data collection sheets from the physiotherapists. A date was set for the data collection to be started at October 1, 2007 in both hospitals.

#### The Researcher's Role and responsibilities

- The researcher conducted a training session for the physiotherapists; on September 25, 2007 for Rashid Hospital and on September 26, 2007 for Dubai Hospital. In that session the physiotherapists practiced the standard protocol of data collection presented in figure 3.2.
- The researcher visited each hospital twice a week during the two week period of data collection to monitor the recruitment of participants and the data collection process. He followed up with the coordinator to solve any issues and collected and securely stored the data collection sheets once they were completed.



### Data Collection

Data collected included, demographics data (name, age, and gender), diagnosis, the pre-final ODI-UAE Arabic version (see Appendix 4), and the survey questionnaire (see Appendix 10).

Once the inclusion and exclusion criteria as presented in sections 3.5.5.4 and 3.5.5.5 were applied; the physiotherapist followed the standard protocol for data collection. The included clients were approached by the physiotherapists to participate in the study. The physiotherapist introduced the purpose of the research to the potential participants before they received their physiotherapy intervention. The clients who agreed to participate provided written Arabic consent prior to participating in the study. The physiotherapists gave each participant the data collection papers that included the pre-final ODI-UAE Arabic version and the attached survey questionnaire and instructed them to answer both and to inform the physiotherapist when they finished. The survey questionnaire and the pre-final ODI-UAE Arabic version completed by the patient were collected by the physiotherapist. The physiotherapist collected the papers from the participants and reviewed them to make sure they were fully completed. The papers were handed to the coordinator at the end of the day. The papers were stored in a locked filing cabinet that was only accessible to the coordinator in each hospital. The coordinator handed the papers to the researcher at the weekly follow up visits. The researcher stored all the completed copies in the pilot study box file that was locked in his office. The researcher inserted code numbers from 1 to 20 beside the name of each client on the data collection sheets. The participant name was replaced by the participant coding number for confidentiality. The researcher also transferred the coding numbers and the data from the completed papers to Excel on his laptop that was secured with a personal password, to be presented to the expert committee for review.

### Process of the Standard Protocol

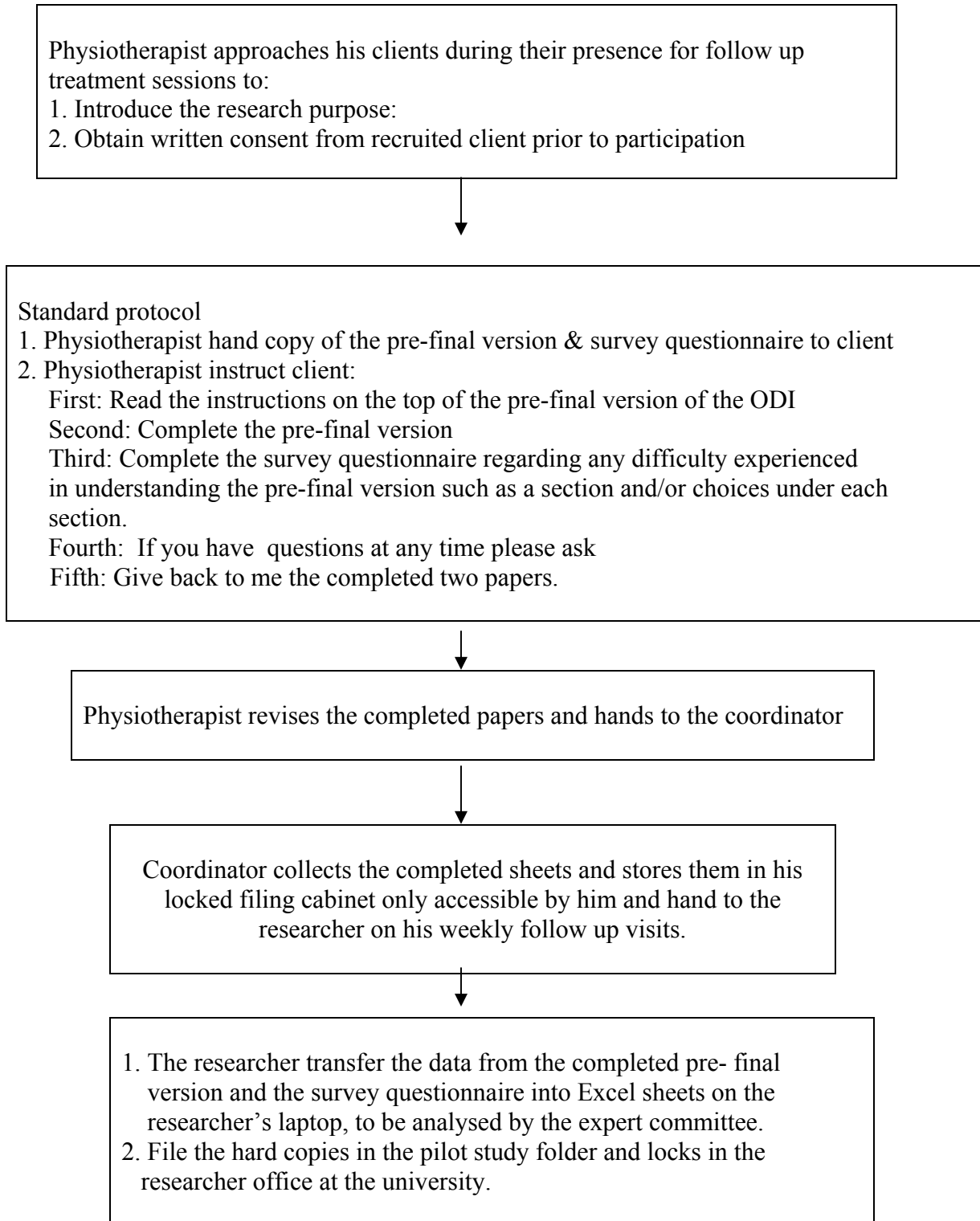


Figure 3.2 Flow Chart of Standard Protocol process

### 3.5.6 Pre-testing Results

The data were collected from the 20 participants and included response rate, demographic details, and results from the survey questionnaire.

#### 3.5.6.1 Response rate

The results of participants' answers for the pre-final ODI-UAE Arabic version were summarized as follows and appear in Table 3.3:

- Number of Participants was 20.
- The number of participants answered sections 1, 2,3,4,5,6,7,9 and10 was 20 for each section. This represents a 100% response rate for each section, except for Section 8.
- For section 8, the number of participants answered was 15. This represents a 75% response rate.

Table 3.3 Results of pretesting the Pre-final ODI-UAE Arabic version

Section	Number of Answers	Number of No Answers
1. Pain intensity	N=20	N=0
2. Personal Care (Washing, Dressing, etc.)	N=20	N=0
3. Lifting	N=20	N=0
4. Walking	N=20	N=0
5. Sitting	N=20	N=0
6. Standing	N=20	N=0
7. Sleeping	N=20	N=0
8. Sex Life	N=15	N=5
9. Social Life	N=20	N=0
10. Traveling	N=20	N=0

### 3.5.6.2 Demographic Characteristics of the Participants

Twenty eligible UAE clients that agreed to participate were recruited consecutively, 14 male and 6 female. Written consent was obtained from all clients prior to participation. They were aged between 28 to 52 years. Fifteen out of twenty participants were diagnosed with acute low back pain, and the other 5 were diagnosed with chronic low back pain. The mean time of low back pain for acute and chronic was as follows: acute mean= 2 weeks, and chronic mean = 5 months. All of them were receiving physiotherapy treatment.

### 3.5.6.3 Survey Questionnaire

The results of participants' answers to the survey questionnaire are summarized in Table 3.4, and are as follows;

- The number of participants was 20.
- Question 1: There was no difficulty experienced by any of the participants when they answered the pre-final ODI-UAE Arabic version
- Question 2: There was no difficulty experienced from participants to understand any of the sections of the pre-final ODI-UAE Arabic version
- Question 3: There was no word or sentence that participants could not understand

Table 3.4 Results of the Survey Questionnaire

Question	Participant Response
1. Did you experience any difficulty to answer the pre-final ODI-UAE Arabic version	(Yes) N=0 – (No) N=20
2. Circle the number of the sections that you experienced difficulty in understanding 1 2 3 4 5 6 7 8 9 10	Number of sections Circled (N=0)
3. Write down the word or sentence that you couldn't understand and suggest a word or a sentence to replace them <ul style="list-style-type: none"> <li>• The word or sentence was difficult</li> <li>• Suggested word or sentence</li> </ul>	Written N=0 Suggested sentences word or sentence N=0

### **3.5.7 Expert Committee Review (Pre-testing Results)**

The researcher called for a meeting with the expert committee to review the pre-testing results. The meeting was held on November 5, 2007 at the College of Health Sciences' meeting room at 11:00 am and lasted for about an hour and a half. All members attended. The researcher handed a copy of the results presented in sections 3.3 and section 3.4 to all members to review. The methodology group suggested standardized review methods to be applied to the results for consistency. A short discussion took place regarding the review methods. Consensus was reached regarding these

#### **3.5.7.1 Review Methods**

- The method used for reviewing the pre-final ODI-UAE Arabic version of participants' answers was identified. Sections with a response rate of less than 60% would be identified so that they could be revised. Decisions for retaining or removing these sections would be made upon consensus of all committee members.
- The method used for reviewing the survey questions consisted of identifying where two or more participants had difficulty understanding the meaning of a question.

#### **3.5.7.2 Procedure**

During the meeting held on November 5, 2007, all members applied the review methods. The methodology group presented their view regarding the sex life section of the current pre-final version. Their view was in spite of section 8 having a 75% participant response rate; it looks like an offensive item because of the UAE culture. A discussion for about 20 minutes started and ended with consensus reached by all members to keep section 8 in the current pre-final version for further testing as the pilot study had a relatively small group of participants, that was difficult to judge on. There were no other issues raised and there was no need to further adapt the pre-final ODI-UAE Arabic version. No additional data were recommended to be collected. All members approved the

current pre-final version to be the final ODI-UAE Arabic version to be used in the validation study.

### 3.5.7.3 Outcome of Expert Committee Review (Pre-testing Results)

The outcome of the expert committee review was the final ODI-UAE Arabic version to be used in the validation study and presented below in Arabic languages.

#### استبانته اوسويستري لقياس العجز (النسخة 2.0)

(صممت هذه الاستبانته لتقدم لنا معلومات عن مدى تأثير أوجاع ظهرك على قدراتك على القيام بأمور حياتك اليومية)

أرجو التكرم بالإجابة عن الأسئلة الآتية بوضع إشارة صح على خيار الأكثر مناسبة من كل مجموعة من الخيارات الآتية. ( اختر إجابة واحدة من كل فقرة من الخيارات الآتية يكون الأكثر مناسبة في وصف حالتك اليوم)

#### الفقرة 1: شدة الأوجاع

0. حالياً لا أشعر بأوجاع.
1. أشعر حالياً بأوجاع خفيفة.
2. أشعر حالياً بأوجاع متوسطة.
3. أشعر حالياً بأوجاع شديدة.
4. أشعر حالياً بأوجاع شديدة جداً.
5. أشعر حالياً بأوجاع أسوأ مما يمكن تصورها .

#### الفقرة 2: العناية الشخصية (كالإغتسال واللباس)

0. يمكنني العناية بنفسني والقيام بأموري الخاصة عادة من غير أن يزيد ذلك في أوجاعي.
1. يمكنني العناية بنفسني والقيام بأموري الخاصة غير أنني أشعر بوجع شديد عند القيام بذلك.
2. يمكنني العناية بنفسني والقيام بأموري الخاصة، ولكن ببطء وحذر.
3. أحتاج إلى بعض المساعدة، ولكن يمكنني القيام بمعظم أموري الخاصة.
4. أحتاج إلى مساعدة يومياً للقيام بأموري الخاصة.

5. أبقى في الفراش ولا يمكنني أن ألبس ثيابي، ولا أغتسل

### الفقرة 3: رفع الأشياء ونقلها

0. أستطيع رفع الأشياء الثقيلة من غير أن يزيد ذلك من أوجاعي.
1. أستطيع رفع الأشياء الثقيلة ولكن ذلك يزيد من أوجاعي.
2. الأوجاع تمنعني من رفع الأوزان الثقيلة إذا كانت على الأرض لكن يمكنني التعامل معها إذا كانت في وضع مرتفع عال -كالطاولة مثلا.
3. الأوجاع تمنعني من رفع الأشياء الثقيلة ولكن بإمكانني التعامل مع رفع الأشياء الخفيفة ومتوسطة الوزن إذا كانت في وضع مناسب.
4. أستطيع رفع الأشياء خفيفة الوزن فقط.
5. رفع أو حمل أي شي ليس في استطاعتي على الإطلاق

### الفقرة 4: المشي

0. الأوجاع لا تمنعني من المشي أي مسافة.
1. الأوجاع تمنعني من المشي لأكثر من كيلو متر ونصف
2. الأوجاع تمنعني من المشي لأكثر من أربعمائة متر.
3. الأوجاع تمنعني من المشي لأكثر من مائة متر.
4. أستطيع المشي فقط باستعمال عصا أو عكاز.
5. أبقى في الفراش معظم الوقت وأزحف للوصول إلى المراض.

### الفقرة 5: الجلوس

0. يمكنني الجلوس على أي كرسي المدة التي أريدها.
1. يمكنني الجلوس فقط على كرسي المفضل المدة التي أريدها.
2. الأوجاع تمنعني من الجلوس على الكرسي لأكثر من ساعة.
3. الأوجاع تمنعني من الجلوس على الكرسي لأكثر من نصف ساعة.
4. الأوجاع تمنعني من الجلوس على الكرسي لأكثر من 10 دقائق.
5. الأوجاع تمنعني من الجلوس مطلقا .

## الفقرة 6: الوقوف

0. أستطيع البقاء واقفا المدة التي أريدها دون زيادة أوجاعي.
1. أستطيع البقاء واقفا المدة التي أريدها ولكن ذلك يزيد من أوجاعي.
2. الأوجاع تمنعني من الوقوف لأكثر من ساعة.
3. الأوجاع تمنعني من الوقوف لأكثر من نصف ساعة.
4. الأوجاع تمنعني من الوقوف لأكثر من 10 دقائق.
5. الأوجاع تمنعني من الوقوف مطلقا.

## الفقرة 7: النوم

0. نومي لا يضطرب أبدا بالأوجاع. (الأوجاع لا تؤثر على نومي على الإطلاق)
1. نومي يضطرب أحيانا بالأوجاع. (الأوجاع تؤثر على نومي أحيانا)
2. أنام اقل من 6 ساعات يوميا بسبب الأوجاع.
3. أنام اقل من 4 ساعات يوميا بسبب الأوجاع.
4. أنام اقل من ساعتين يوميا بسبب الأوجاع.
5. الأوجاع تمنعني من النوم مطلقا (تماما).

## الفقرة 8: الحياة الجنسية

0. حياتي الجنسية عادية ولا تسبب زيادة في أوجاعي.
1. حياتي الجنسية عادية ولكنها تسبب زيادة في بعض أوجاعي.
2. حياتي الجنسية تكاد تكون عادية ولكنها تسبب لي أوجعا شديدة .
3. حياتي الجنسية مقيدة بشدة بسبب الأوجاع.
4. حياتي الجنسية تقريبا مقطوعة بسبب الأوجاع.
5. الأوجاع تمنعني مطلقا من الحياة الجنسية.



**الفقرة 9: الحياة الاجتماعية (زيارة الأقارب والأصحاب والخروج مع الأصدقاء والمشاركة في أنشطة اجتماعية):**

0. حياتي الاجتماعية عادية ولا تزيد في أوجاعي.
1. حياتي الاجتماعية عادية ولكنها تزيد في أوجاعي.
2. الأوجاع لا تؤثر بفاعلية على حياتي الاجتماعية ولكنها تقلل من أنشطتي التي تتطلب مجهودا كبيرا
3. الأوجاع حددت حياتي الاجتماعية فأنا لا اخرج كالمعتاد كما كنت اخرج من قبل.
4. بسبب الأوجاع أصبحت حياتي الاجتماعية منحصرة في المنزل.
5. بسبب الأوجاع انقطعت حياتي الاجتماعية.

**الفقرة 10: السفر (بالسيارة)**

0. أستطيع السفر إلى أي مكان من غير أن يزيد ذلك في أوجاعي.
1. أستطيع السفر إلى أي مكان ولكنه يزيد في أوجاعي.
2. الأوجاع شديدة ولكن التعامل مع الرحلات في حدود ساعتين
3. الأوجاع تقيد رحلاتي لأقل من ساعة.
4. الأوجاع تقيد رحلاتي القصيرة الضرورية لأقل من نصف ساعة.
5. الأوجاع تمنعني من القيام بالرحلات لأي مكان إلا لتلقي العلاج

## Appendix 1

### استبانة أوسويستري لقياس العجز (النسخة 2.0)

(لقد صممت هذه الاستبانة لتقدم لنا معلومات عن مدى تأثير أوجاع ظهرك على قدراتك على القيام بأمور حياتك اليومية).  
أرجو التكرم بالإجابة عن الأسئلة الآتية بوضع إشارة صح على الخيار المناسب في كل مجموعة من الخيارات الآتية.

#### الفقرة 1: شدة الأوجاع في الأسبوع الأخير

0. حاليا لا أشعر بأوجاع.
1. أشعر حاليا بأوجاع خفيفة.
2. أشعر حاليا بأوجاع متوسطة.
3. أشعر حاليا بأوجاع شديدة.
4. أشعر حاليا بأوجاع شديدة جدا.
5. أشعر حاليا بأوجاع أسوأ مما يمكن تصورها .

#### الفقرة 2: العناية الشخصية (كالإغتسال واللباس)

0. يمكنني الاعتناء بنفسي والقيام بأموري الخاصة عادة دون أن يزيد ذلك من أوجاعي.
1. يمكنني الاعتناء بنفسي والقيام بأموري الخاصة غير أنني أشعر بوجع شديد عند القيام بذلك.
2. يمكنني الاعتناء بنفسي والقيام بأموري الخاصة، ولكن ببطء وحذر.
3. احتاج إلى بعض المساعدة، ولكن يمكنني القيام بمعظم أموري الخاصة.
4. احتاج إلى مساعدة يوميا للقيام بأغلب أموري الخاصة.
5. لا يمكنني أن ألبس ثيابي، وأغتسل بصعوبة، وأبقى في الفراش.

#### الفقرة 3: رفع الأشياء ونقلها

0. أستطيع رفع الأشياء الثقيلة من غير أن يزيد ذلك من أوجاعي.
1. أستطيع رفع الأشياء الثقيلة ولكن ذلك يزيد من أوجاعي.
2. الأوجاع تمنعني من رفع الأشياء الثقيلة إذا كانت على الأرض لكن يمكنني رفعها إذا كانت في مكان مرتفع (عال) كطاولة مثلا.
3. الأوجاع تمنعني من رفع الأشياء الثقيلة ولكن بإمكانني رفع الأشياء الخفيفة ومتوسطة الوزن إذا كانت في مكان يسهل رفعها منه.
4. أستطيع رفع الأشياء خفيفة الوزن فقط.

5. لا أستطيع رفع أو حمل أي شيء على الإطلاق.

#### الفقرة 4: المشي

0. لا تمنعني الأوجاع من أن أمشي أي مسافة.
1. الأوجاع تمنعني من المشي أكثر من كيلو متر ونصف.
2. الأوجاع تمنعني من المشي أكثر من أربع مائة متر.
3. الأوجاع تمنعني من المشي أكثر من مائة متر.
4. لا أستطيع المشي دون الاستعانة بعصا أو عكاز.
5. أبقى في الفراش معظم الوقت ولا أستطيع الوصول إلى المرحاض إلا زحفاً.

#### الفقرة 5: الجلوس

0. يمكنني أن أجلس على أي كرسي المدة التي أريد.
1. لا يمكنني الجلوس إلا على كرسي خاص المدة التي أريد.
2. لا أستطيع البقاء جالسا أكثر من نصف ساعة بسبب الأوجاع.
3. لا أستطيع البقاء جالسا أكثر من عشر دقائق بسبب الأوجاع.
4. لا أستطيع البقاء جالسا أكثر من ساعة بسبب الأوجاع.
5. لا أستطيع الجلوس أبداً بسبب الأوجاع.

#### الفقرة 6: الوقوف

0. أستطيع البقاء واقفاً المدة التي أريد دون أن يزيد ذلك من أوجاعي.
1. أستطيع البقاء واقفاً المدة التي أريد ولكن ذلك يزيد من أوجاعي.
2. لا أستطيع الوقوف أكثر من ساعة بسبب الأوجاع.
3. لا أستطيع الوقوف أكثر من نصف ساعة بسبب الأوجاع.
4. لا أستطيع الوقوف أكثر من عشر دقائق بسبب الأوجاع.
5. لا أستطيع الوقوف أبداً بسبب الأوجاع.

#### الفقرة 7: النوم

0. لا تقطع الأوجاع نومي على الإطلاق.
1. أحيانا تقطع الأوجاع نومي.
2. أنام أقل من 6 ساعات يوميا بسبب الأوجاع.
3. أنام أقل من 4 ساعات يوميا بسبب الأوجاع.

4. أنام أقل من ساعتين يوميا بسبب الأوجاع.
5. لا أستطيع النوم أبدا بسبب الأوجاع.

#### الفقرة 8: الحياة الجنسية

0. حياتي الجنسية عادية ولا تزيد في أوجاعي.
1. حياتي الجنسية عادية ولكنها تزيد في أوجاعي.
2. حياتي الجنسية تكاد تكون عادية ولكنها تسبب لي أوجاعاً شديدة.
3. الأوجاع قيّدت حياتي الجنسية إلى حد كبير.
4. حياتي الجنسية انقطعت تقريبا بسبب الأوجاع.
5. الأوجاع تمنعني من ممارسة حياتي الجنسية منعا تاما.

#### الفقرة 9: الحياة الاجتماعية (زيارة الأقارب والأصحاب والخروج مع أصدقاء و المشاركة في تظاهرات أنشطة اجتماعية.... )

0. حياتي الاجتماعية عادية ولا تزيد في أوجاعي.
1. حياتي الاجتماعية عادية ولكنها تزيد في أوجاعي.
2. حياتي الاجتماعية عادية ولكنها تقلل من الأعمال التي تتطلب مجهودا كبيرا.
3. حياتي الاجتماعية قليلة بسبب الأوجاع فأنا لا أخرج كما كنت أخرج من قبل.
4. بسبب الأوجاع أصبحت حياتي الاجتماعية منحصرة في المنزل.
5. حياتي الاجتماعية انقطعت بسبب الأوجاع.

#### الفقرة 10: السفر.

0. أستطيع السفر إلى أي مكان دون أن يزيد ذلك في أوجاعي.
1. أستطيع السفر إلى أي مكان ولكنه يزيد في أوجاعي.
2. الأوجاع شديدة ولكنني أستطيع القيام برحلات تزيد مدتها على ساعتين.
3. الأوجاع تمنعني من القيام برحلات مدتها أقل من ساعة.
4. الأوجاع تمنعني من القيام برحلات ضرورية قصيرة مدتها أقل من نصف ساعة.
5. الأوجاع تمنعني من السفر لأي مكان إلا لتلقي العلاج.

## **Appendix 2**

## OSWESTRY DISABILITY INDEX (VERSION 2.0)

Could you please complete this questionnaire? It is designed to give us information as to how your back (or leg) trouble has affected your ability to manage in everyday life.

Please answer *every section*. Mark *one box only* in each section that most closely describes you *today*.

### Section 1- Pain Intensity

- I have not pain at the moment.
- The pain is very mild at the moment.
- The pain is moderate at the moment.
- The pain is fairly severe at the moment.
- The pain is very severe at the moment.
- The pain is the worst imaginable at the moment.

### Section 2- Personal Care (Washing, Dressing, etc.)

- I can look after myself normally without causing extra pain.
- I can look after myself normally but it is very painful.
- It is painful to look after myself and I am slow and careful.
- I need some help but manage most of my personal care.
- I need help every day in most aspects of self care.
- I do not get dressed, wash with difficulty and stay in bed.

### Section 3- Lifting

- I can lift heavy weights without extra pain.
- I can lift heavy weights but it gives extra pain
- Pain prevents me from lifting heavy weights off the floor, but I can manage if they are conveniently position, *e.g.*, on a table.
- Pain prevents me from lifting heavy weights but I can manage light to medium weights if they are conveniently positioned.
- I can lift only very light weights.
- I cannot lift or carry anything at all.

### Section 4- Walking

- Pain does not prevent me walking any distance.
- Pain prevents me walking more than 1 mile.
- Pain prevents me walking more than ¼ mile.
- Pain prevents me walking more than 100 yards.
- I can only walk using a stick or crutches.
- I am in bed most of the time and have to crawl to the toilet.

### Section 5- Sitting

- I can sit in any chair as long as I like.
- I can only sit in my favourite chair as long as I like.
- Pain prevents me from sitting more than 1 hour.
- Pain prevents me from sitting more than half an hour.
- Pain prevents me from sitting more than 10 mins.
- Pain prevents me from sitting at all.

### Section 6- Standing

- I can stand as long as I want without extra pain.
- I can stand as long as I want but it gives me extra pain.
- Pain prevents me from standing for more than 1 hour.
- Pain prevents me from standing for more than half and hour.
- Pain prevents me from standing for more than 10minutes.
- Pain prevents me from standing at all.

### Section 7- Sleeping

- My sleep is never disturbed by pain.
- My sleep is occasionally disturbed by pain.
- Because of pain I have less than 6 hours' sleep.
- Because of pain I have less than 4 hours sleep.
- Because of pain I have less than 2 hours sleep.
- Pain prevents me from sleeping at all.

### Section 8- Sex Life

- My sex life is normal and causes no extra pain.
- My sex life is normal but causes some extra pain.
- My sex life is nearly normal but is very painful.
- My sex life is severely restricted by pain.
- My sex life is nearly absent because of pain
- Pain prevents any sex life at all.

### Section 9- Social Life

- My social life is normal and causes me no extra pain.
- My social life is normal but increases the degree of pain.
- Pain has no significant effect on my social life apart from limiting my more energetic interests, *e.g.*, dancing, *etc.*
- Pain has restricted my social life and I do not go out as often.
- Pain has restricted my social life to my home.
- I have no social life because of pain.

### Section 10- Travelling

- I can travel anywhere without extra pain.
- I can travel anywhere but it gives extra pain.
- Pain is bad but I manage journeys over 2 hours.
- Pain restricts me to journeys of less than 1 hour.
- Pain restricts me to short necessary journeys under 30 minutes.
- Pain prevents me from travelling except to receive treatment.

## **Appendix 3**

### Letter to expert panel

To Whom It May Concern:

#### **Validation of the Arabic Version of the Oswestry Disability Index for low back pain patients in the UAE.**

The above research project is part of an MSc course in Physiotherapy, at the Stellenbosch University in Cape Town, South Africa. The aim of this study is to devise a valid and reliable UAE version of the ODI for adult patients with Low back pain.

Low back pain (LBP) is a major public health problem. The prevalence of LBP UAE is estimated to be about 57% in males and 64% in females. LBP is commonly treated by physiotherapists in the UAE. The restoration of normal function is considered a key outcome of physiotherapy. Therefore, Physiotherapists in UAE need standardized measurement tools that accurately assess function, activity limitation and monitor change over time.

The purpose of the expert committee is to resolve major discrepancies detected in the translated Arabic version compared with the English version.

Both the Arabic version and the English one will be distributed to all members of the expert panel. The researcher will call you for a meeting to discuss all the changes and consensus will be obtained at the end or another meeting as needed. Consensus obtained of these meetings regarding changes of the Arabic version will be used to devise the pre-final Arabic version.

I shall contact you for a final meeting as needed based on the results of the pilot testing of the pre-final Arabic version to approve the final Arabic version.

Thank you for your time and participation.

Lt. Raafat Ramzy  
BSc Physio (UAE)

Prof. Quinette Louw  
Dr Andrea Bailocerkowski  
(Melbourne University)



## Appendix 4

### استبانته اوسويستري لقياس العجز (النسخة 2.0)

(صممت هذه الاستبانته لتقدم لنا معلومات عن مدى تأثير أوجاع ظهرك على قدراتك على القيام بأمور حياتك اليومية)

أرجو التكرم بالإجابة عن الأسئلة الآتية بوضع إشارة صح على خيار الأكثر مناسبة من كل مجموعة من الخيارات الآتية. ( اختر إجابة واحدة من كل فقرة من الخيارات الآتية يكون الأكثر مناسبة في وصف حالتك اليوم)

#### الفقرة 1: شدة الأوجاع

0. حاليا لا أشعر بأوجاع.
1. أشعر حاليا بأوجاع خفيفة.
2. أشعر حاليا بأوجاع متوسطة.
3. أشعر حاليا بأوجاع شديدة.
4. أشعر حاليا بأوجاع شديدة جدا.
5. أشعر حاليا بأوجاع أسوأ مما يمكن تصورها .

#### الفقرة 2: العناية الشخصية (كالإغتسال واللباس)

0. يمكنني العناية بنفسني والقيام بأموري الخاصة عادة من غير أن يزيد ذلك في أوجاعي.
1. يمكنني العناية بنفسني والقيام بأموري الخاصة غير أنني أشعر بوجع شديد عند القيام بذلك.
2. يمكنني العناية بنفسني والقيام بأموري الخاصة، ولكن ببطء وحذر.
3. أحتاج إلى بعض المساعدة، ولكن يمكنني القيام بمعظم أموري الخاصة.
4. أحتاج إلى مساعدة يوميا للقيام بأموري الخاصة.
5. أبقى في الفراش ولا يمكنني أن ألبس ثيابي، ولا أعتسل

### الفقرة 3: رفع الأشياء ونقلها

0. أستطيع رفع الأشياء الثقيلة من غير أن يزيد ذلك من أوجاعي.
1. أستطيع رفع الأشياء الثقيلة ولكن ذلك يزيد من أوجاعي.
2. الأوجاع تمنعني من رفع الأوزان الثقيلة إذا كانت على الأرض لكن يمكنني التعامل معها إذا كانت في وضع مرتفع عال -كالطاولة مثلا.
3. الأوجاع تمنعني من رفع الأشياء الثقيلة ولكن بإمكانني التعامل مع رفع الأشياء الخفيفة ومتوسطة الوزن إذا كانت في وضع مناسب.
4. أستطيع رفع الأشياء خفيفة الوزن فقط.
5. رفع أو حمل أي شيء ليس في استطاعتي على الإطلاق

### الفقرة 4: المشي

0. الأوجاع لا تمنعني من المشي أي مسافة.
1. الأوجاع تمنعني من المشي لأكثر من كيلو متر ونصف
2. الأوجاع تمنعني من المشي لأكثر من أربع مائة متر.
3. الأوجاع تمنعني من المشي لأكثر من مائة متر.
4. أستطيع المشي فقط باستعمال عصا أو عكاز.
5. أبقى في الفراش معظم الوقت وأزحف للوصول إلى المراض.

### الفقرة 5: الجلوس

0. يمكنني الجلوس على أي كرسي المدة التي أريدها.
1. يمكنني الجلوس فقط على كرسي المفضل المدة التي أريدها.
2. الأوجاع تمنعني من الجلوس على الكرسي لأكثر من ساعة.
3. الأوجاع تمنعني من الجلوس على الكرسي لأكثر من نصف ساعة.
4. الأوجاع تمنعني من الجلوس على الكرسي لأكثر من 10 دقائق.
5. الأوجاع تمنعني من الجلوس مطلقا .

## الفقرة 6: الوقوف

0. أستطيع البقاء واقفا المدة التي أريدها دون زيادة أوجاعي.
1. أستطيع البقاء واقفا المدة التي أريدها ولكن ذلك يزيد من أوجاعي.
2. الأوجاع تمنعني من الوقوف لأكثر من ساعة.
3. الأوجاع تمنعني من الوقوف لأكثر من نصف ساعة.
4. الأوجاع تمنعني من الوقوف لأكثر من 10 دقائق.
5. الأوجاع تمنعني من الوقوف مطلقا.

## الفقرة 7: النوم

1. نومي لا يضطرب أبدا بالأوجاع. (الأوجاع لا تؤثر على نومي على الإطلاق)
6. نومي يضطرب أحيانا بالأوجاع. (الأوجاع تؤثر على نومي أحيانا)
7. أنام اقل من 6 ساعات يوميا بسبب الأوجاع.
8. أنام اقل من 4 ساعات يوميا بسبب الأوجاع.
9. أنام اقل من ساعتين يوميا بسبب الأوجاع.
10. الأوجاع تمنعني من النوم مطلقا (تماما).

## الفقرة 8: الحياة الجنسية

0. حياتي الجنسية عادية ولا تسبب زيادة في أوجاعي.
1. حياتي الجنسية عادية ولكنها تسبب زيادة في بعض أوجاعي.
2. حياتي الجنسية تكاد تكون عادية ولكنها تسبب لي أوجعا شديدة .
3. حياتي الجنسية مقيدة بشدة بسبب الأوجاع.
4. حياتي الجنسية تقريبا مقطوعة بسبب الأوجاع.
5. الأوجاع تمنعني مطلقا من الحياة الجنسية.

**الفقرة 9: الحياة الاجتماعية (زيارة الأقارب والأصحاب والخروج مع الأصدقاء والمشاركة في أنشطة اجتماعية):**

0. حياتي الاجتماعية عادية ولا تزيد في أوجاعي.
1. حياتي الاجتماعية عادية ولكنها تزيد في أوجاعي.
2. الأوجاع لا تؤثر بفاعلية على حياتي الاجتماعية ولكنها تقلل من أنشطتي التي تتطلب مجهودا كبيرا
3. الأوجاع حددت حياتي الاجتماعية فأنا لا اخرج كالمعتاد كما كنت اخرج من قبل.
4. بسبب الأوجاع أصبحت حياتي الاجتماعية منحصرة في المنزل.
5. بسبب الأوجاع انقطعت حياتي الاجتماعية.

**الفقرة 10: السفر (بالسيارة)**

0. أستطيع السفر إلى أي مكان من غير أن يزيد ذلك في أوجاعي.
1. أستطيع السفر إلى أي مكان ولكنه يزيد في أوجاعي.
2. الأوجاع شديدة ولكن التعامل مع الرحلات في حدود ساعتين
3. الأوجاع تقيد رحلاتي لأقل من ساعة.
4. الأوجاع تقيد رحلاتي القصيرة الضرورية لأقل من نصف ساعة.
5. الأوجاع تمنعني من القيام بالرحلات لأي مكان إلا لتلقي العلاج

## Appendix 5

Letter to: Rashid hospital  
Dubai hospital

Dear Sir/Madam

### **Validation of the Arabic Version of the Oswestry Disability Index for low back pain patients in the United Arab Emirates.**

The above research project is part of the MSc course in Physiotherapy, at the Stellenbosch University in Cape Town, South Africa. The aim of this study is to determine whether the Oswestry Disability Index (ODI) (version 2.0) is valid and reliable for United Arab Emirate (UAE) nationals.

Low back pain (LBP) is a major public health problem. The prevalence of LBP in the UAE is estimated to be about 57% in males and 64% in females. LBP is commonly treated by physiotherapists in the UAE. The restoration of normal function is considered a key outcome of physiotherapy. The implementation of best practice in the clinical setting also requires the importance of clinicians monitoring patient progress using standard outcome measures, in order to demonstrate and reflect on, the effectiveness of intervention. The physiotherapist routinely assesses and collects information in the course of their intervention. The self-reported standardized questionnaire will provide a convenient method of collecting and synthesizing a large amount of information on activity and functional outcome of the service provided within 5 minutes.

We are hereby seeking permission to conduct the study at your hospital. Implementation of the functional outcome tool that results from this study will help to improve the quality of services and quality assurance in clinical settings.

Thank you for your time and participation.

Lt. Raafat Ramzy  
BSc Physio (UAE)

Prof. Quinette Louw  
Dr Andrea Bailocerkowski  
(Melbourne University)

## Appendix 6

### GOVERNMENT OF DUBAI

DEPARTMENT OF HEALTH AND MEDICAL SERVICES

#### RASHID HOSPITAL

P.O.Box : 4545

Dubai - United Arab Emirates

Tel. : 3371111 & 3374000

Fax : 3113222

Website : [www.dohms.gov.ae](http://www.dohms.gov.ae)

e-mail: [rh@dohms.gov.ae](mailto:rh@dohms.gov.ae)



مستشفى راشد  
دائرة الصحة والخدمات الطبية

ص. ب : 4545

دبي - الإمارات العربية المتحدة

تليفون : 3371111 / 3374000

فاكس : 3113222

الموقع : [www.dohms.gov.ae](http://www.dohms.gov.ae)

البريد الإلكتروني : [rh@dohms.gov.ae](mailto:rh@dohms.gov.ae)

July 19, 2007

Dear Mr. Raafat Ramzy,

**Subject: Approval of Research Project titled "Validation of the Arabic Version of the Oswestry Disability Index for low back pain patients in the UAE"**

Thank you for submitting the above project to the Medical Research Committee, DOHMS. The Medical Research Committee has been organized and operates according to the Good Clinical Practice (GCP) Guidelines.

Your protocol was discussed by the Medical Research Committee at its meeting held on 19/7/07. I am pleased to advise you that the Committee has granted ethical approval of the above research proposal. However we would like to enquire as to if you have already been granted approval by the research ethics committee of the Ministry of Health? If you kindly forward us a copy of the approval letter.

Please note that it is the MRC's policy that the principal investigator should report to the committee of the following:

1. Anything which might warrant review of ethical approval of the project in the specified format, including:
  - any serious or unexpected adverse events; and
  - unforeseen events that might affect continued ethical acceptability of the project.
2. Any proposed changes to the research protocol or to the conduct of the research.
3. Any new information that may affect adversely the safety of the subjects
4. If the project is discontinued before the expected date of completion (reason to be specified).
5. Annual report to the MRC about the progress of the study.
6. A final report of findings on completion of the study.

Please note that this approval is valid for one year from the date of this letter. It is your responsibility to ensure that an application for continuing review approval has been submitted by the required time.

The MRC wishes you every success in your research

Yours faithfully

**Dr. Azan BinBrek**  
Chairman  
Medical Research Committee



## Appendix 7

17 September 2007

Mr RR Ramzy  
Dept of Physiotherapy

Dear Mr Ramzy

**RESEARCH PROJECT : "VALIDATION OF THE ARABIC VERSION OF THE  
OSWESTRY DISABILITY INDEX DEVELOPED IN TUNISIA FOR  
LOW BACK PAIN PATIENTS IN THE UAE"**  
**PROJECT NUMBER : N07/08/177**

My letter dated 13 August 2007 refers.

At a meeting that was held on 5 September 2007 the Committee for Human Research ratified the approval of the abovementioned project.

Yours faithfully

**CJ VAN TONDER**  
**RESEARCH DEVELOPMENT AND SUPPORT (TYGERBERG)**  
Tel: +27 21 938 9207 / E-mail: [cjvt@sun.ac.za](mailto:cjvt@sun.ac.za)

CJVT/pm

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## Appendix 8

### PARTICIPANT INFORMATION LEAFLET & CONSENT FORM

**TITLE OF THE RESEARCH PROJECT:** Accuracy of the Oswestry Disability Index for low back pain patients in the United Arab of Emirates

**REFERENCE NUMBER:**

**PRINCIPAL INVESTIGATOR:** Lt. Raafat Ramzy

**ADDRESS:** P.O. Box 27272 Sharjah  
United Arab Emirates

**CONTACT NUMBERS:** (9716) 505-7513 or (97150) 647-5752

You are hereby invited to participate in the above mentioned research project. Please take some time to read the information presented here, which will explain the details of this project. Please ask the study staff any questions about any part of this project that you do not fully understand. It is very important that you are completely satisfied and that you clearly understand what this research entails and how you could be involved. Your participation is **entirely voluntary** and you are free to decline to participate. If you decline participation, you will not be affected negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you initially do agree to take part.

This study has been approved by the **Committee for Human Research at Stellenbosch University** and will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki's common rule.

#### ***What is this research study all about?***

- *A group of 120 patients referred to physiotherapy for low back pain at Rashid, Quassimi, Sheikh Khalifa Medical Center, and Zayed Military hospitals will be invited to participate in this study.*
- *Low back pain is described as pain, or muscle stiffness localized in the lower area of the back with or without referred leg pain. The aim of this study is to adapt a questionnaire used in many other countries to evaluate how low back pain influences the daily activities of people. The questionnaire will be adapted according to the culture and activities of low back pain sufferers in the United Arab Emirates.*

#### ***Why have you been invited to participate?***

- *Hospitals with physiotherapy departments where United Arab Emirates nationals with low back pain receive physiotherapy treatment have been selected for this*



*study. Four hospitals in the United Arab Emirates have been invited and agreed to participate in this study. You have been chosen as the physiotherapy at the hospital you are attending has agreed to participate in the study.*

***What will your responsibilities be?***

- *By agreeing to participate in this study, you will be asked to complete a 2-page questionnaire. The questionnaire will ask how your experience of low back pain influences your daily activities such as walking, driving your car, etc. Your physiotherapist will present the questionnaire to you as well as instructions explaining how to complete the questionnaire. You should not take longer than 10 minutes to complete the questionnaire.*

***Will you benefit from taking part in this research?***

- *There are no personal benefits by participating in this study. The aim of this study is to provide a meaningful questionnaire which will improve the evaluation of low back pain sufferers in the United Arab Emirates.*

***Who will have access to your personal records?***

- *No personal data will be recorded for this study.*

***Will you be paid to take part in this study and are there any costs involved?***

- *No you will not be paid to take part in the study. There will also be no costs involved for you, if you do take part.*

***Is there any thing else that you should know or do?***

- *You can contact the Committee for Human Research, Stellenbosch University, Cape Town, South Africa, at 011-2721-938 9207 if you have any concerns or complaints that have not been adequately addressed by your study doctor.*
- *You will receive a copy of this information and consent form for your own records.*

**Declaration by participant**

By signing below, I ..... agree to take part in a research study entitled Validation of the Arabic Version of the Oswestry Disability Index Developed in Tunisia for low back pain patients in the United Arab Emirates

I declare that:

- I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable.
- I have had an opportunity to ask questions and all my questions have been adequately answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- I may choose to leave the study at any time and will not be penalised or prejudiced in any way.
- I may be asked to leave the study before it has finished, if the study doctor or researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.

Signed at (*place*) ..... on (*date*) .....  
2005.

.....  
**Signature of participant**

.....  
**Signature of witness**

**Declaration by investigator**

I (*name*) ..... declare that:

1. I explained the information in this document to .....
2. I encouraged him/her to ask questions and took adequate time to answer them.
3. I am satisfied that he/she adequately understands all aspects of the research, as discussed above
4. I did/did not use a translator.
- 5.

Signed at (*place*) ..... on (*date*) .....

.....  
**Signature of investigator**

.....  
**Signature of witness**

**Patient Inform Consent form in Arabic Language**



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27272

:

(971) 507473004 (971) 506475752 :

**The Committee for Human Research at Stellenbosch )**

**(University**

ما أهمية هذا البحث العلمي وعن ماذا يبحث؟

(120)



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*Stellenbosch University, Cape Town, )*

*(South Africa, at 011-2721-938 9207*

/

أتعهد أنا الموقع أدناه ..... بالمشاركة في هذا البحث العلمي تحت عنوان توثيق استبانة  
اوسويستري لقياس العجز للمرضى المصابين بأوجاع الظهر في دولة الإمارات العربية المتحدة العربية المتحدة. وبناء  
على ذلك أقر بما يلي:

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## Appendix 9

University of Sharjah  
College of Health Sciences



جامعة الشارقة  
كلية العلوم الصحية

27 June 2007

To: Mr. Raafai Ramzy, PT

Dear Mr. Ramzy,

Greetings!

I would like to let you know that your research project titled "Validation of an Arabic Version of the Oswestry Disability Index (ODI) for low back pain patients in the UAE", which was submitted to the College of Health Sciences/Research Development Committee (CHS/RDC) for ethical review has been approved.

On behalf of the committee I would like to wish the best of luck in your research project

Best regards,

Ra'ed Abu Odeh, PhD  
CHS/RDC Chair

**Appendix 10**

**Survey Questionnaire  
For Interpreter and Answer  
Oswestry Disability Index (Version 2.0)**

**Could you please complete the attached Oswestry Disability Index questionnaire and answer the following questions:**

- 1. Did you experience any difficulty to answer any of the questions of the attached Oswestry Disability Index questionnaire?**

Yes                                   No

**If the answer is yes please answer question 2 and 3**

- 2. Circle the number of the sections that you experience difficulty to understand.**

**1                      2                      3                      4                      5  
6                      7                      8                      9                      10**

- 3. Write down the ward or the sentence that you could not understand and suggest a word or a sentence to replace them.**

**The word or sentence  
Suggested ward or sentence  
The word or sentence  
Suggested ward or sentence  
The word or sentence  
Suggested word or sentence  
The word or sentence  
Suggested ward or sentence  
The word or sentence  
Suggested word or sentence**

( 2.0 )

يرجى قراءة الاستبانة المرفقة بتمعن، ثم التكرم بالإجابة عن الأسئلة الآتية:

1- هل وجدت أي صعوبة في الإجابة عن أي سؤال من أسئلة الاستبانة؟

نعم  لا

إذا كانت الإجابة بـ نعم، أرجو الإجابة عن السؤالين (2) و(3).

2- ضع دائرة حول رقم الفقرة التي تجد فيها صعوبة:

5	4	3	2	1
10	9	8	7	6

3- اكتب الكلمة أو العبارة التي لم تفهم معناها مقترحًا البديل.  
الكلمة أو العبارة غير المفهومة:  
المقترح البديل:

الكلمة أو العبارة غير المفهومة:  
المقترح البديل:

الكلمة أو العبارة غير المفهومة:  
المقترح البديل:

الكلمة أو العبارة غير المفهومة:  
المقترح البديل:

الكلمة أو العبارة غير المفهومة:  
المقترح البديل:



# **CHAPTER 4**

## **VALIDATION OF FINAL ODI-UAE ARABIC VERSION**

### **METHODOLOGY**

This chapter reports on a validation study, aimed to validate the final Oswestry Disability Index - United Arab Emirates (ODI-UAE) Arabic version (Appendix 1) in UAE nationals with Low Back Pain (LBP). This chapter presents the research question, study aim, objectives, design, population, settings, and the instruments, procedure description, data analysis, results and ethical considerations.

Note: According to the results of the cross-culture adaptation study in the previous chapter (3), the Oswestry Disability Index Arabic version developed in Tunisia had been culturally adapted to United Arab Emirates (UAE) nationals with LBP and the final ODI-UAE Arabic version had been produced (see chapter 3 for the cross-culture adaptation study).

### **4.1 RESEARCH QUESTION**

Is the final ODI-UAE Arabic version valid and reliable amongst UAE nationals with LBP?

### **4.2 STUDY AIM**

- To evaluate test-retest reliability and internal consistency of the final ODI-UAE Arabic version to determine its reliability in UAE Nationals with LBP
- To evaluate construct validity, effect size, response to change, floor and ceiling effects and item response frequency of the final ODI-UAE Arabic version to determine its validity in UAE Nationals with LBP.

For reliability it was hypothesized that the final ODI-UAE Arabic version would be reliable for UAE Nationals with LBP if test-retest results that were calculated from the baseline and 48 hours measurements would show an ICC >0.70, and the

Bland & Altman mean of the inter-individual differences was  $= < 1$ ; if internal consistency results that were calculated from the baseline measurement would show a Cronbach's alpha between 0.7 and 0.95.

For validity it was hypothesized that the final ODI-UAE Arabic version would be valid for UAE Nationals with LBP if:

a) The construct validity results calculated from the baseline score and 4 weeks measurements for the final ODI-UAE, VAS and Squat test demonstrated strong positive correlation between ODI-UAE and VAS  $r \Rightarrow 0.70$  ( $p = < 0.01$ ), and moderate inverse correlation between ODI and Squat  $r \Rightarrow 0.65$  ( $p = < 0.01$ ).

b) The results of the frequency response of the options under the 10 questions of the final ODI-UAE calculated from the baseline score measurements were less than 80% for the option under the 10 questions.

c) The sensitivity to change results of the standardized response mean (SRM) and effect size calculated from the measurements of the ODI-UAE, VAS and Squat test at baseline and 4 weeks follow-up were comparable values (SRM of 0.2 is considered a small change, 0.5 moderate, and  $\geq 0.8$  a large change) (Osthus et al 2006).

d) The results of the floor and ceiling effects calculated from the measurements of final ODI-UAE at baseline, 48 hours and 4 weeks demonstrated that less than 15% of the respondents achieved the lowest or highest possible score respectively (0 -11.5) or (87-100%) of all the options under the 10 questions of ODI-UAE, thus determining an absence of floor and ceiling effects (Lauridsen et al 2006).

### **4.3 STUDY DESIGN**

A reliability study was conducted to determine the test-retest reliability and internal consistency of the final ODI-UAE Arabic Version. A validity study was conducted to determine the construct validity of the final ODI Arabic version.

## **4.4 STUDY POPULATION**

The population consisted of United Arab Emirates nationals, both male and female adults aged 18 years and older, who: read and write in Arabic, were diagnosed with low back pain, and referred for physiotherapy by medical doctor.

## **4.5 SAMPLING METHOD**

The following sampling method was used for the reliability and validity studies.

### **4.5.1 Recruitment of Hospitals**

#### **4.5.1.1 UAE Health Care Delivery System**

United Arab Emirates (UAE) consist of seven united Emirates, and Abu Dhabi is the Capital. Most of the population of the UAE can be found in Dubai, Abu Dhabi and Sharjah respectively.

#### Health Care Delivery Sectors

In these Emirates the health care services are provided by the:

- Federal government. These were established, managed and regulated by the Ministry of Health.
- Local Emirate government, and these were established, managed and regulated, either by local authority, (e.g. Abu Dhabi Health Authority in Abu Dhabi), or by the local Department of Health (e.g. Department of Health and Medical Services in Dubai).
- Private health care facilities, which were established and managed by the private sector. These are regulated by Ministry of Health in all Emirates, except for Abu Dhabi and Dubai, where they are regulated by the local government.

#### Sector Representation in Each Emirate

In all Emirates, the Health care services are provided by two sectors; the health care facilities of the Ministry of Health of the Federal government, which is the

main provider, and the private health care facilities, which are regulated by the Ministry of Health as a second provider (except in Abu Dhabi and Dubai).

In Abu Dhabi the health care services are provided mainly by the health care facilities of the Local government, which are, managed and regulated by the Abu Dhabi Health Authority, and the private health care facilities, which are managed by the private sector and regulated by Abu Dhabi Health Authority.

In Dubai the health care services are provided by the three sectors as follows: First, the main providers are the health care facilities of the local government which are managed and regulated by the Department of Health and Medical Services. These services are for UAE nationals and non-nationals. Second, the health care facilities of the Ministry of Health (Federal government) is considered a secondary provider for nationals but the main provider for non nationals. Third, the private health care facilities those provide fee-paying services for nationals and non nationals.

#### **4.5.1.2 Procedure for Hospitals Recruitment**

Hospitals were recruited through the health care systems, using developed selection criteria.

##### Recruitment Criteria

The recruitment criteria were used as a method to select the appropriate hospitals for this study. The recruitment criteria aimed to achieve: firstly, recruitment of suitable participants for this study; secondly, in a similar geographical location to the researchers, which facilitated the regular follow up visits made to the selected hospitals to support the physiotherapists in the data collection; thirdly, emphasized the data collection protocol was followed by the physiotherapists to obtain accurate data; fourthly, recruitment of the physiotherapists who were native speaking, reading and writing in Arabic to achieve proper communication and facilitate understanding between the

physiotherapists and UAE participants who were native Arabic reading and writing. Figure 4.1 summarizes the recruitment procedure used to select hospitals for the study.

The following criteria were used to recruit hospitals for this study:

1. Federal and/or Local government hospitals that were accessible and located within a distance of 100 km roundtrip or less from Sharjah.
2. Federal and/or Local government hospitals which had a physiotherapy department with the following resources:
  - Estimated number of referrals ( $\geq 50$  referrals per month) of UAE nationals with the diagnosis of LBP
  - Two male and two female physiotherapists or more, who were native reading and writing in Arabic, who agreed to participate in this study and collect the required data.
3. Federal and/or Local government hospitals that primarily agreed for the study to be conducted.

The recruitment criteria were applied as follows:

- **1<sup>st</sup> Criteria:** The researcher applied the first criteria to the available federal and local government hospitals; six hospitals in total were selected.
- **2<sup>nd</sup> Criteria:** The researcher approached the physiotherapy departments heads and presented the research briefly. The required information for the second criteria were obtained from them and after that the researcher had a short meeting with the available Arabic physiotherapists and explained the research objectives and the data collection briefly before obtaining their agreement to participate in the study. The hospitals that had 2 male and 2 female Arabic speaker physiotherapists or more that agreed to participate in the study were Rashid, Dubai, and Quassimmi hospitals.

- **3<sup>rd</sup> Criteria:** The researcher visited the three included hospital directors and presented the purpose of the research to them. All directors agreed that their hospital could participate in the study.

The recruited hospitals that met the selection criteria were Rashid and Dubai Hospitals in Dubai, and Quassimmi Hospital in Sharjah.

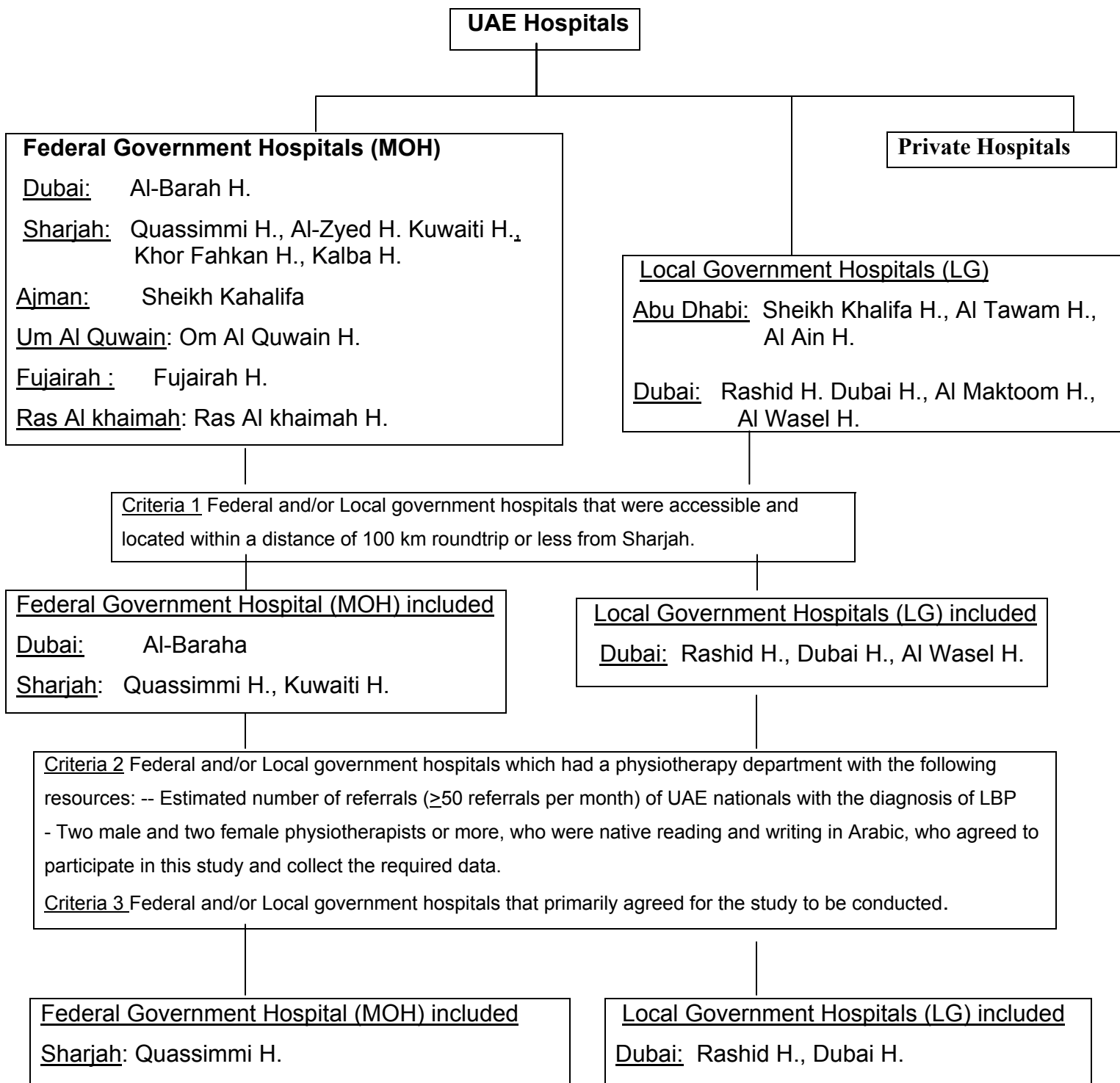


Figure 4.1: A flow chart to summarize the procedure used to recruit hospitals.

## Hospital Permission

### *Hospital Directors*

The researcher approached the Directors of the participating hospitals directors (Rashid and Dubai hospitals in Dubai, and Quassimmi hospital in Sharjah) and asked permission for the study to be conducted in their hospital. The directors of the three hospitals agreed that the research could be conducted in their hospital if ethical approval was gained from their ethics committee. |

### *Hospital Research Ethics Committee*

The researcher approached the research ethics committee at Rashid Hospital, which acts for both Rashid and Dubai Hospitals, and the committee at Quassimmi hospital by submitting a research proposal. The Research Ethics Committee at Rashid hospital first approved the research (Appendix 3). The researcher forwarded a copy of the approval letter to Rashid and Dubai Hospitals and permission for conducting the study was then obtained from these two hospitals. The Ethics Research Committee at Quassimmi Hospital took longer to approve the research (Appendix 6). Once permission was obtained, the researcher forwarded a copy of the approval letter to the Hospital Director and permission for conducting the study was granted. The researcher then approached the physiotherapy department of each participating hospital to arrange for data collection.



Table 4.1 Recruited hospitals information / Physiotherapists in each hospital

	Sector/ Emirate	Round trip Distance	Available Arabic Physiotherapists	Physiotherapists Agreed	Estimated Referral
Rashid Hospital- 500 beds	DOHMS Dubai	70 km	6 males 3 female	4 male 3 female	70
Dubai Hospital - 600 beds	DOHMS Dubai	65 km	2 male 3 female	2 male 2 female	100
Quassimmi Hospital - 500 beds	MOH Sharjah	30 km	3 male 2 female	3 male 2 female	50

#### 4.5.2 Recruitment of Physiotherapists

The researcher approached each physiotherapy department head of the participating hospitals and organized a meeting with the Arabic physiotherapists in their departments on the first week of October 2007. The researcher informed the therapists about the research and explained the data collection procedure to them. Therapists who were willing to participate in this study informed the researcher. The researcher obtained the agreement from all the physiotherapists except three who worked in the hospital wards. The physiotherapists who agreed to participate in this study are presented in Table 4.1.

#### 4.5.3 Recruitment of Participants

Male and female adult UAE nationals, who were referred to physiotherapy with the diagnosis of LBP, were approached by the physiotherapists, and the inclusion and exclusion criteria presented in sections 4.5.4 and 4.5.5 were applied. The physiotherapist introduced the purpose of the study to the resultant

included clients. The included clients who agreed to participate provided written consent prior to participation in the study.

#### **4.5.4 Inclusion Criteria:**

The following inclusion criteria were applied to the sample population:

- UAE nationals who had been referred to physiotherapy because of LBP without suspected pathological disorders, with or without referred leg pain.
- Male and female adults, aged 18 years and older.
- Able to read and write in the Arabic language.

#### **4.5.5 Exclusion Criteria:**

The following exclusion criteria were applied to the sample population:

- Inability to effectively communicate written and spoken Arabic.
- Suspected pathological disorder of the spine including disc prolapse, tumors, spinal fracture, infections, rheumatoid arthritis, ankylosing spondylitis and cancer.
- Patients with psychiatric disorders.

#### **4.5.6 SAMPLE SIZE**

The sample size required for this study was calculated based on an ICC equal to 0.9 and the maximum width of the 95% CI of 0.15 (Stratford 2004). The equation used to calculate the sample size was  $N = [16 p (1-p)] / w^2$ , where p was the expected ICC = 0.9 and w was the width of 95% CI = 0.15, these were estimated based on the previous published studies ((Fairbank et al 2000; Shoukri et al 2004; Walter et al 1998). This substitution calculation,  $N = [16 (0.9) (0.1)] / (0.15)^2$ , showed that 64 participants were required for the study. A sample of 108 participants was recruited to accommodate participants dropping out from the study.

#### **4.5.7 Sampling procedure**

Consecutive sampling was applied to the new referrals of clients diagnosed with LBP to the physiotherapy departments at Rashid, Dubai hospitals in Dubai and Quasimodo hospital in Sharjah. Data were collected over a four month period.

### **4.6 MEASUREMENT TOOLS**

#### **4.6.1 Final ODI-UAE Arabic Version (ODI-UAE Arabic Version)**

The final ODI-UAE Arabic version (Appendix 1) was the version that had been culturally adapted for UAE through the cross-culture adaptation study presented in the previous chapter (3) from the current ODI Arabic version developed in Tunisia by Guermazi et al (2005). Clients completed the ODI-UAE Arabic version during the initial physiotherapy assessment (baseline), 48 hours after the assessment and at 4 weeks following the baseline assessment.

#### **4.6.2 Discriminating Question**

A translation question was used to determine the included and excluded clients. The client was asked whether his/her back pain had improved, remained the same, or got worse during the time span until “retest” (48 hours). This question was included in Final ODI-UAE Arabic version that the client completed at the 48 hours measurement.

#### **4.6.3 Visual Analogue Scale**

The Visual Analogue Scale (VAS) is a self reported measurement scale that has been used to measure pain intensity. It is frequently used in clinical settings and research reports when evaluating clinical changes in patients with LBP (Grotle et al 2004; Childs et al 2005).

#### Procedure for visual analogue scale (VAS)

The VAS consists of a 10-cm (100-mm) straight line of horizontal orientation. The line is anchored by two extremes of pain: “no pain” and “worst pain“. The VAS evaluates the patient’s perception of his or her pain intensity level on a 0 to10 cm pain scale. The patients were provided with a translated VAS (Appendix 12) with 10-cm line and a pen. They were instructed by the physiotherapist to indicate their current pain intensity in their low back and to mark this on the 10cm line. The researcher then measured the distance between the left side anchor “no pain” and the mark on the VAS by laying a transparent 10-cm ruler over the line. This was recorded in millimeters. Pain intensity using the VAS was measured on the initial assessment (baseline score) as well as at 4 weeks post baseline score.

#### **4.6.4 Squat Test**

The repetitive squat test is one physical performance test that provides an indication of back muscle endurance and dynamic lower limb functional endurance (Gronblad et al 1997). Of all the physical performance tests, the Squat test showed an acceptable correlation with the ODI in men more than women in previous studies (Gronblad et al 1997). Therefore the Squat test provided a useful objective measure to evaluate the validity of the ODI.

#### Procedure for Squat Test

The repetitive squatting test evaluates the strength and endurance of those muscles required to perform a squat and the muscles that stabilize the trunk and back during squatting. The patient stands with their feet 15 cm apart and squats until their thighs are horizontal. The patient then returns to the upright position. Each repetition lasts 2 to 3 seconds in duration, and each test is repeated until a maximum number of repetitions are achieved or 50 repetitions are performed, whichever occurs first. The number of repetitions performed is recorded. The normative data exists for the squat test, and these are stratified by age, gender, and occupational status (Liebenson and Yeomans 1997).The Squat test was

performed on the initial assessment (baseline score) and 4 weeks post baseline score measurement.

#### **4.7 ETHICAL CONSIDERATION**

Approval for this study was obtained from; the Committee for Human Research of Stellenbosch University (Appendix 4), College of Health Sciences/Research Development Committee (Appendix 5), Medical Research Committee/DOHMS (Appendix 3), Medical Research Committee of Quassimmi Hospital (Appendix 6). The study was conducted according to the international accepted ethical standards and guidelines. Written Arabic consent was obtained from each client prior participating in the study (Appendix 7). Each client had the right to withdraw from the study at any time by notify the participating physiotherapist.

#### **4.8 STUDY PROCEDURE**

The same procedure was used for the reliability and validity studies.

##### **4.8.1 Arrangement for Data Collection**

The researcher approached the recruited physiotherapists at each recruited hospitals on the first week of November 2007, and conducted information/training session at the gym of each physiotherapy department. In that session the researcher assigned a coordinator for each hospital, and he consulted each group of physiotherapists to set dates for starting the data collection in the first week of November 2007. The researcher also distributed the data collection colour coded papers to the coordinators.

##### **4.8.2 Training Session for the Physiotherapists**

A training session was held at the gym of the physiotherapy department in each hospital on the third week of October, 2007. At the beginning of the session, the researcher provided detailed information regarding the responsibilities of each

therapist, coordinator, and researcher, and then a training demonstration was conducted by the researcher. Training included demonstrating and practicing the procedure of the data collection at baseline, 48 hours follow up and 4 weeks follow up.

### **4.8.3 The Researcher Role and responsibilities**

The researcher conducted and supervised all training sessions for the participating physiotherapists at each hospital during the third week of October, 2007. The researcher visited each hospital twice a week during the four month period to achieve the following:

- Monitor the progress of the study
- Follow up the therapist to ensure that they followed the data collection protocol
- Check the data collection protocol papers were completed, and file them.
- Resolve issues raised by the participant physiotherapists and coordinators, to maintain their motivation and interest during the period of data collection.

The researcher replaced patients' name with coding numbers for confidentiality during the data analysis.

### **4.8.4 The Data Collection Protocol**

The data collection protocol (Appendix 7) was specifically designed and was used for each participant. The aim of the protocol was to emphasize and maintain consistency of the procedure. Also it was aimed to facilitate data filing and processing.

The protocol binder included the following (Appendix 7):

- Cover paper which contained detailed instructions for the physiotherapist on what, when and how data should be obtained, and the participant's name, date of admission and diagnosis.
- Baseline measurement (white copies)
  - Arabic consent form
  - Final ODI-UAE Arabic version.
  - Translated VAS in Arabic
  - Squat record form
- 48 hours measurement (blue copies)
  - Final ODI-UAE Arabic version that included the discriminating question.
- 4 weeks measurement (yellow copies)
  - Final ODI-UAE Arabic version
  - Translated VAS in Arabic
  - Squat record form

#### **4.8.5 Measurement at baseline**

The baseline measurement was performed at the beginning of the initial assessment. This information was used for both the reliability and validity studies. Data were recorded in the blue coded copies in the protocol binder.

##### **4.8.5.1 Final ODI-UAE Arabic Version**

The physiotherapists provided participants with the final ODI-UAE Arabic version and instructed them to follow the instructions to complete it. They completed it while they waited for their appointment in the waiting area of the Physiotherapy department. The physiotherapists collected the completed questionnaire and invited the participants to the assessment room.

#### **4.8.5.2 VAS Scale**

In the assessment room, the participants were provided with the 10cm VAS translated into Arabic (Appendix 12) and a pen. They were instructed, by the physiotherapist, to indicate their current level of pain intensity experienced at their lower back and down their legs by marking an “X” on the 10 cm line that equated to their pain. The completed VAS was collected by the physiotherapist and placed in the participant’s file.

#### **4.8.5.3 The Squat Test**

The participants were instructed to stand with their feet 15 cm apart and squat until the thighs are horizontal; then return to the upright position; to repeat this until a maximum number of repetitions were achieved or 50 repetitions were done. The physiotherapists observed and recorded the number of repetitions that were achieved by each participant on the squat record form (Appendix 12).

#### **4.8.6 Measurement at 48 Hours follow up**

This measurement was performed 48 hours after the baseline measurement for the purpose of the reliability study. The measurement data were recorded on the blue coded copies part of data collection protocol binder.

The physiotherapists provided the final ODI-UAE Arabic version to the participants and instructed them to follow the written instructions when they complete it in the waiting area of the Physiotherapy department. The physiotherapists then collected the questionnaire and invited the participants to the assessment room.

#### **4.8.7 Measurement at 4 weeks follows up**

The same three measurement tools (final ODI-UAE Arabic version, VAS scale, and squat test) performed at the baseline were repeated 4 weeks after the baseline measurement and the same procedures were used. The yellow coded copies part of data collection protocol binder were used for recording.



## **4.9 PROCESSING OF DATA**

### **4.9.1 Demographic data**

The researcher inserted a coding number beside the name of each participant on the data collection sheets start from 1 to 108. The inserted numbers were used to replace the names of the participants in the data analysis to maintain clients confidentiality and were transferred to Excel spread sheets. Participant age, gender, diagnosis and admission date were entered into the Excel spread sheet. These data were used to describe the sample of participants in this study.

### **4.9.2 Final ODI-UAE Arabic Version**

The participants' score for each question in the 10 sections of the final ODI-UAE Arabic version obtained at baseline, 48 hours, and 4 weeks follow up, were entered into the Excel spread sheet. These data were used to evaluate the internal consistency, test-retest for reliability, and construct validity for validity of the final ODI-UAE Arabic version.

### **4.9.3 VAS scale in Arabic**

The researcher completed the instrument scoring by laying a transparent 10-cm ruler over the line to measure the distance of the x mark from the 0 end of the scale in millimeters. The resulting measure represented the participants' level of pain intensity. The participants scores at baseline and at 4 weeks follow up were transferred to the data Excel spread sheet from 0 to 10. The data were used to evaluate the Construct validity of the ODI-UAE Arabic version.

### **4.9.4 Squat Test**

The Squat Test was measured at baseline (initial assessment) and at 4 weeks follow up post baseline. The maximum numbers of repetitions achieved at baseline and at 4 weeks were entered into the Excel spread sheet. This number

ranged from 0 to 50. The data were used to evaluate construct validity of the ODI-UAE Arabic version.

## **4.10 STATISTICAL ANALYSIS**

All analyses were conducted in Microsoft Excel. Descriptive statistics, such as means, standard deviations, percentages and standard errors with 95% confidence intervals were calculated for the final ODI-UAE Arabic version, VAS, and Squat test.

### **4.10.1 Reliability Testing**

**A)** Test-retest reliability: test-retest reliability of the ODI-UAE Arabic version was determined by evaluating whether the same scores were produced on two consecutive occasions in patients who had not changed in the intervening period. This was evaluated using the intraclass correlation coefficient (ICC) (1.1), and the Bland & Altman mean of the inter-individual differences. The results were considered acceptable if they were similar to those gained in the original English study (ICC >0.70) (CI 95%) Bland & Altman mean = < 1 (Fairbank et al 2000).

**b)** Internal consistency: The degree of homogeneity of the items in the ODI-UAE Arabic version at baseline was evaluated. This was done by evaluating the correlation between each question of ODI-UAE Arabic version at baseline and the total score of the ODI-UAE Arabic version, using the Cronbach's  $\alpha$  (the item-total correlation, reflecting the strength of the relationship between a single question and the total score). The results were acceptable if Cronbach's  $\alpha$  was equal or more than 0.70 as per the results of the original study of the English version (Fairbank et al 2000).

### **4.10.2 Validity Testing**

*Construct validity* indicates the extent to which the instrument's scores relate to those of other instruments in the manner expected.

*Response frequency* which is the proportion of the patients giving the same response to a question and should be less than 80%, otherwise the question

would not be sensitive enough to discriminate between different levels of severity (Osthus et al 2006).

*Longitudinal validity (sensitivity to change)* refers to an outcome measure's ability to detect change without considering whether the change was important (Osthus et al 2006). Standard Response Mean (SRM) and the Effect Size (ES) were used to measure responsiveness. The SRM and ES were conducted for ODI-UAE, VAS, and Squat test. SRM calculated as  $SRM = \frac{\text{score change mean}}{\text{change standard deviation score}}$ . The ES was calculated as  $ES = \frac{\text{Change SD score}}{SRM}$ . Results values were compared; an SRM of 0.2 was considered a small change, 0.5 moderate change, and  $\geq 0.8$  a large change (Osthus et al 2006).

*Floor and Ceiling Effects* referred to whether the tool provides room on the scale for clients to demonstrate improvement and deterioration. Ceiling and floor effects measurements were calculated from the Final ODI-UAE measurements were conducted at baseline, and 4 weeks follow-up.

#### **4.10.4 Data analysis**

Data analysis was performed using STATISTICA 8. Construct validity was assessed by using the Spearman correlation coefficient between the ODI-UAE Arabic version and the VAS. The results were accepted if they were similar to those gained by Fairbank et al 2000 ( $n=94$ ,  $r = 0.62$ ). Between the ODI-UAE Arabic version and SQUAT, the results were considered acceptable if they were similar to those gained by Gronblad (1993) ( $r = - 0.607$ ,  $p < 0.001$ ). These values were used as a reference to ascertain the reliability and validity of the ODI-UAE Arabic version.

## 4.11 RESULTS

### 4.11.1 Sample Description

Of the 108 consecutive, eligible clients, all signed the consent form and participated in this study. Table 4.2 shows the gender and age distribution of the participating clients. There were 80 males and 28 females. Two male clients decided to withdraw from the study after the baseline measurements and therefore were excluded from the analyses. Two other males did not complete the ODI-UAE and VAS measurements correctly and their data were also excluded from analyses. The diagnoses obtained from the referrals of the included participants were, LBP 72%, acute LBP 18% back sprain 6%, lumbago 3%, and back strain 1%. The mean duration of the pain was 1.4 weeks.

Table 4.2 Gender and age of the participants at baseline

	<b>N</b>	<b>Age-Means</b>	<b>Age – Std. Dev</b>
Male	80	41.4	11
Female	28	37	10.3
Total	108	40.2	11

### 4.11.2 Missing Data

Table 4.3 presents the details of the data that was found to be missing during transfer from the data collection protocol binder to the data Excel sheets. The data were missed due to clients not answering the sex life section of the Final ODI-UAE Arabic version. Two thirds of the participants did not complete this question. Information regarding this missing data for this question is provided in Table 4.3

Table 4.3 Details of Missing Data

<b>Variance name</b>	<b>number missing</b>	<b>% missing</b>
Oswestry sex life (4 weeks)	74	69%
Oswestry sex life (48 hrs)	73	68%
Oswestry sex life (baseline)	72	67%

#### **4.11.2.1 Impact of Missing Sex Life Section of the ODI-UAE**

The high percentage of non-responses to the sex life question lead to the conduct of additional reliability analyses, to determine whether this question had an impact on the overall reliability of the ODI-UAE Arabic version. Therefore internal consistency and inter-item correlation calculations were conducted on the full version of ODI-UAE (10 questions) and on the ODI-UAE (9 questions) without the sex life question (9 questions) to determine whether removing the sex life question had any impact on ODI-UAE.

#### **4.11.2.2 Reliability Testing of Missing Data of ODI-UAE**

##### Reliability of ODI-UAE (full version - 10 questions)

Cronbach alpha values were 0.96 at baseline, 0.96 at 48 hours and 0.91 at 4 weeks. Average inter-item correlation values were 0.71 at baseline, 0.72 at 48 hours and 0.53 at 4 weeks.

##### Reliability of ODI-UAE (version without the sex life question - 9 questions)

The reliability of the ODI with the sex life question removed was identical to that gained when this question was retained in the total score. Cronbach's alpha values were 0.96 at baseline, 0.96 at 48 hours, and 0.91 at 4 weeks. Average inter-item correlation values were 0.71 at baseline, 0.72 at 48 hours, and 0.53 at 4 weeks (0.53).

### 4.11.3 Reliability

#### 4.11.3.1 Test-retest Reliability

##### Sample Included

Only the clients who reported that they remained the same were included in the reliability analysis. The 15 clients (15.14%) who reported improvement were excluded, and data for the 90 clients (92.68%) who reported that they remained the same were used in the test-retest reliability analysis. Two clients did not present for their appointment at this time and their baseline data were excluded. Figure 4.2 presents the percentage of participants who improved over the first 48 hours and those who remained the same.

##### ODI-ODI 48 hours

The descriptive values demonstrate no significant differences between the results calculated from the measurements at baseline and 48 hours (see table 4.4).

Table 4.4 Measurement results of the ODI-UAE baseline and 48 hours

	ODI-UAE	
	Baseline	48 hours
N	105	105
Mean	31.2	28.6
Std. Err.	1.3	1.3
± 95%	28.6 - 33.7	26.1 - 31

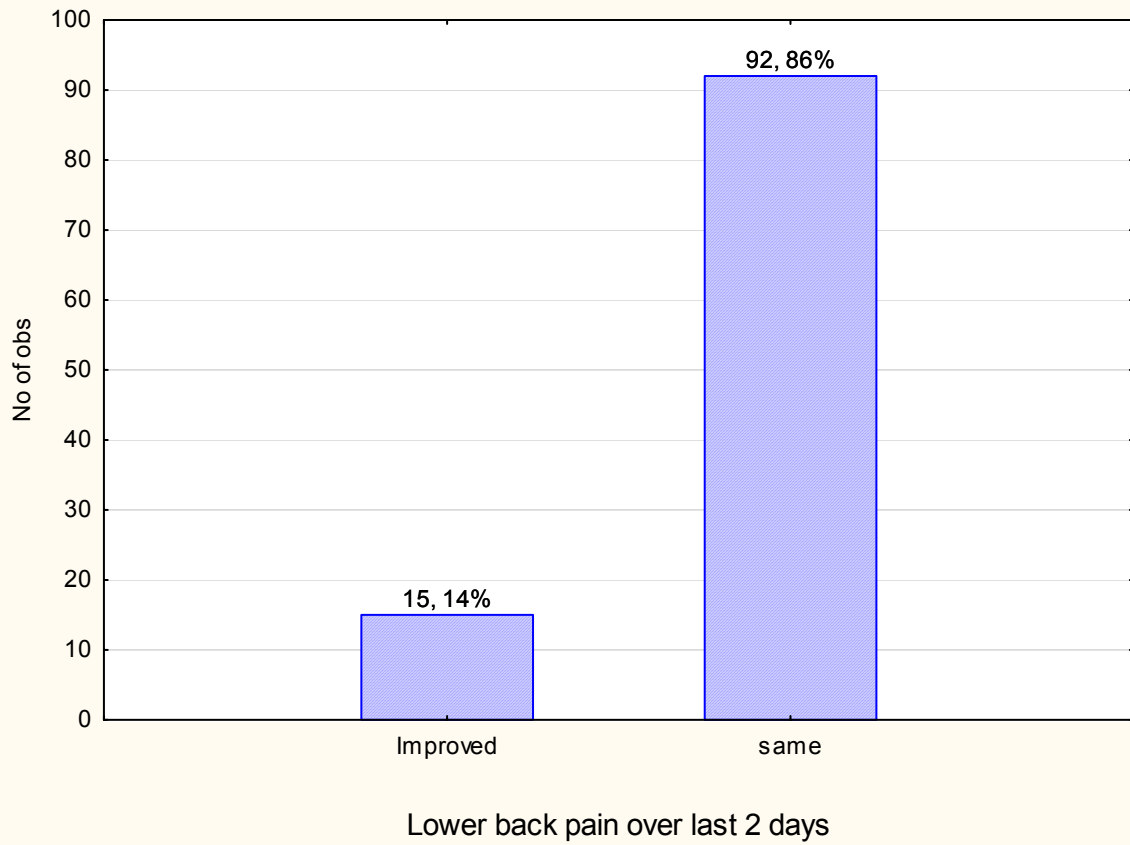


Figure 4.2 Distribution of clients response to LBP question

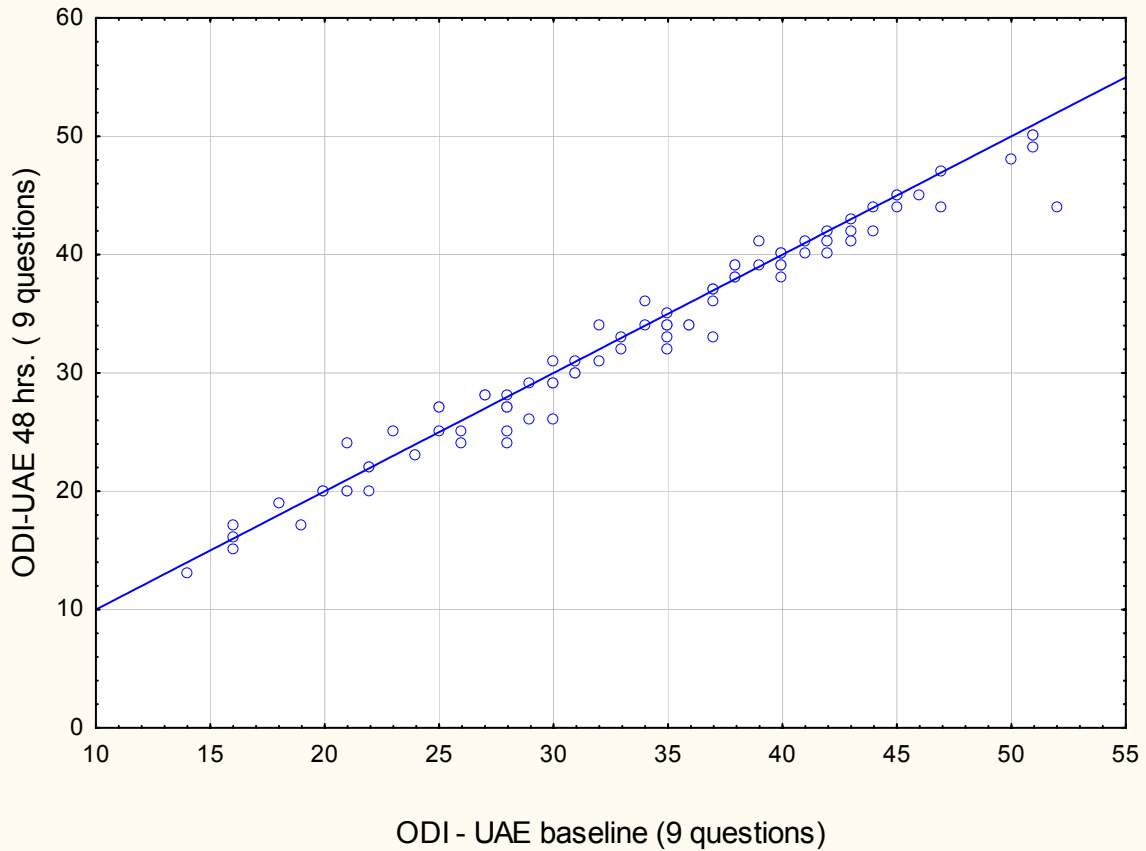


Figure 4.3 Scatter plot diagram for ODI-UAE (9 questions) baseline versus 48 hours

Test-retest reliability of the final ODI-UAE Arabic version showed acceptable results: ICC (agreement) =0.98, ICC (consistency) =0.99,  $p=0.00$ . There were no statistically significant differences between the baseline and the 48 hour completions of the ODI-UAE 9 items. These results were within the range gained in the original study of the English version of the ODI (Fairbank et al 2000).



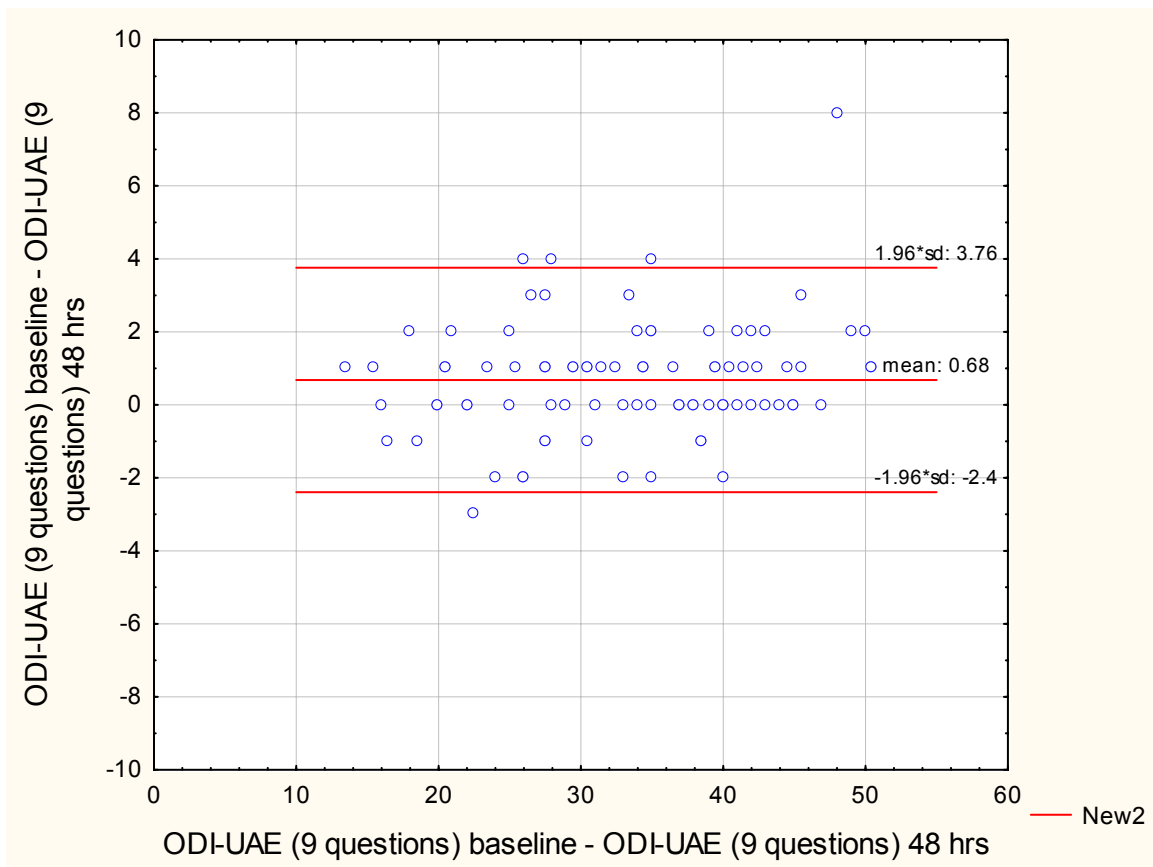


Figure 4.4 Bland & Altman Scatter plot diagram for the average of ODI-UAE (9 questions) baseline versus 48 hours.

From the diagram (figure 4.4), the mean of the ODI-UAE (9 sections) at baseline and 48 hours was (0.68) which reflect acceptable agreement. Intraindividual differences (n=90) between ODI score on baseline and 48 hours was plotted against the mean of scores. On each plot the central horizontal line represents the mean of the inter-individual differences, and the above and below horizontal lines from the central horizontal line represents the 95% limits of agreement (on figures figure 4.4).

#### 4.11.3.2 Internal Consistency:

Cronbach's alpha value was equal to 0.99 which reflects high homogeneity.

## 4.11.4 Validity Testing

### 4.11.4.1 Construct Validity

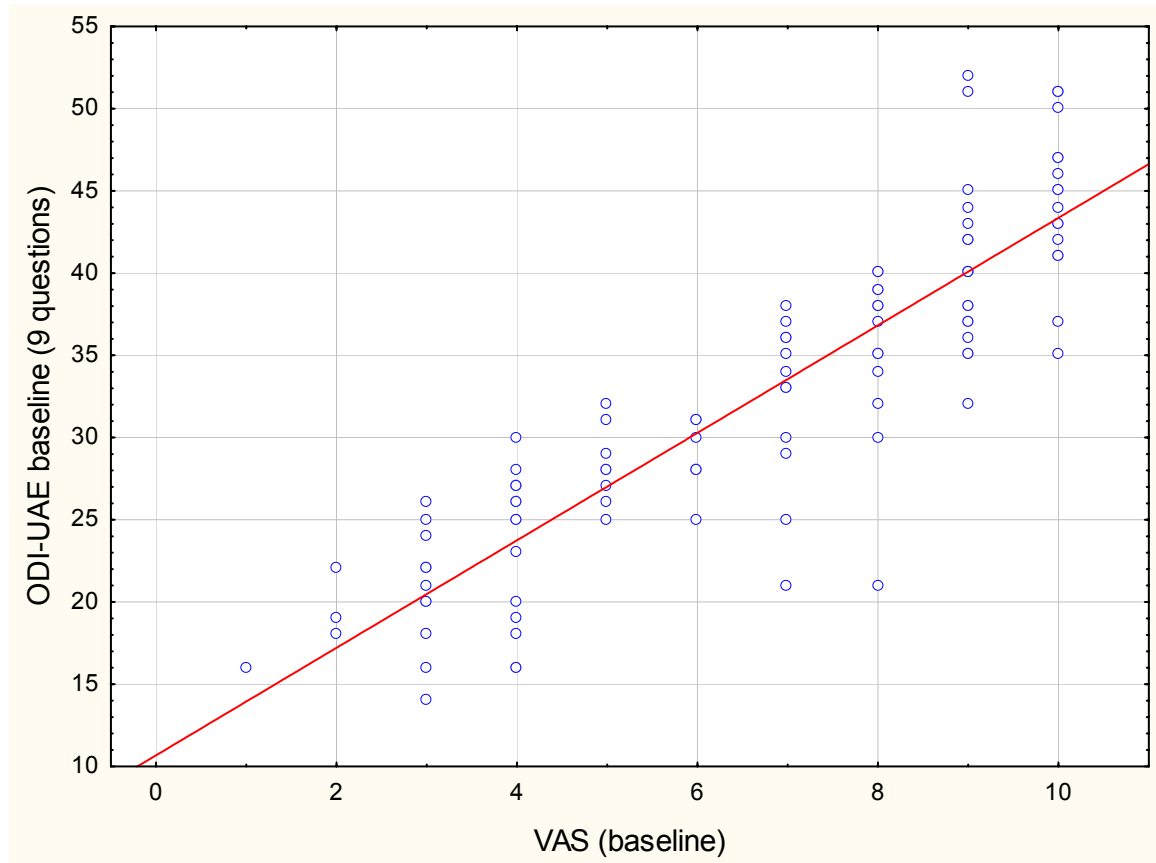


Figure 4.5 Scatter plot diagram for correlation between ODI-UAE (9 questions) and VAS at baseline

The diagram in figure (4.5) shows a strong positive association at baseline between the ODI-UAE (9 questions) and VAS with  $r = 0.90$ . These results were significant ( $p = 0.00$ ).

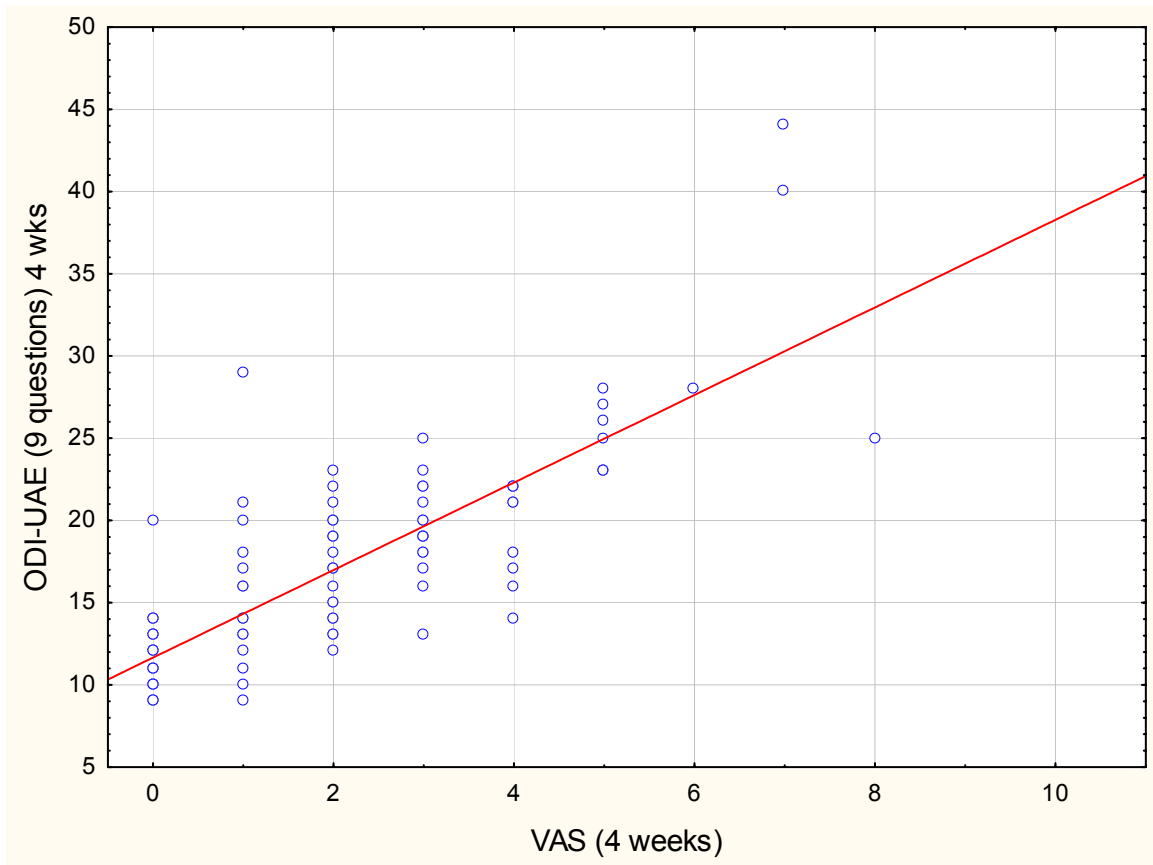


Figure 4.6 Scatter plot diagram for correlation between ODI-UAE (9 questions) and VAS at 4 weeks

The diagram (figure 4.6) shows a strong positive correlation at 4 weeks between the ODI-UAE (9 questions) and VAS as  $r = 0.81$  and result values were significant ( $p = 0.00$ )

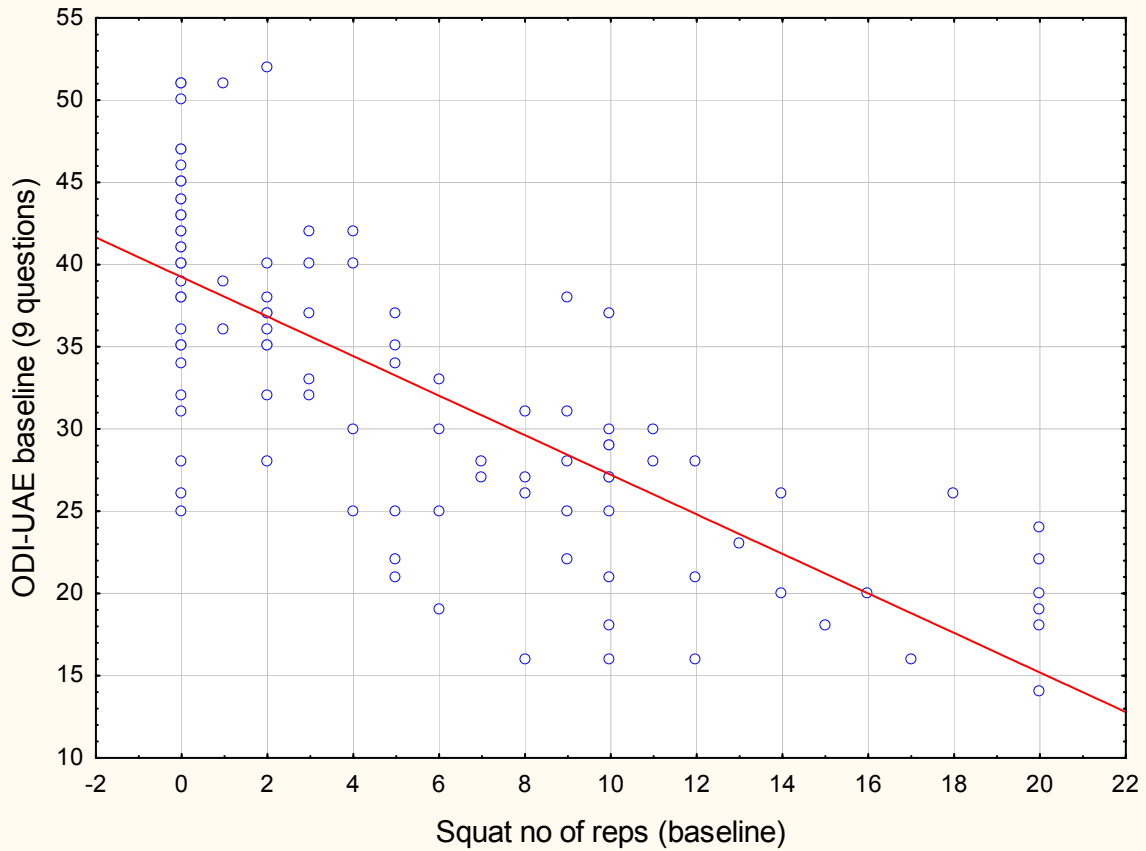


Figure 4.7 Scatter plot diagram for correlation between ODI-UAE (9 questions)

The diagram (figure 4.7) shows a strong inverse correlation at baseline between the ODI-UAE (9 questions) and the squat test with  $r = - 0.77$ . The results were significant (  $p = 0.00$ ).

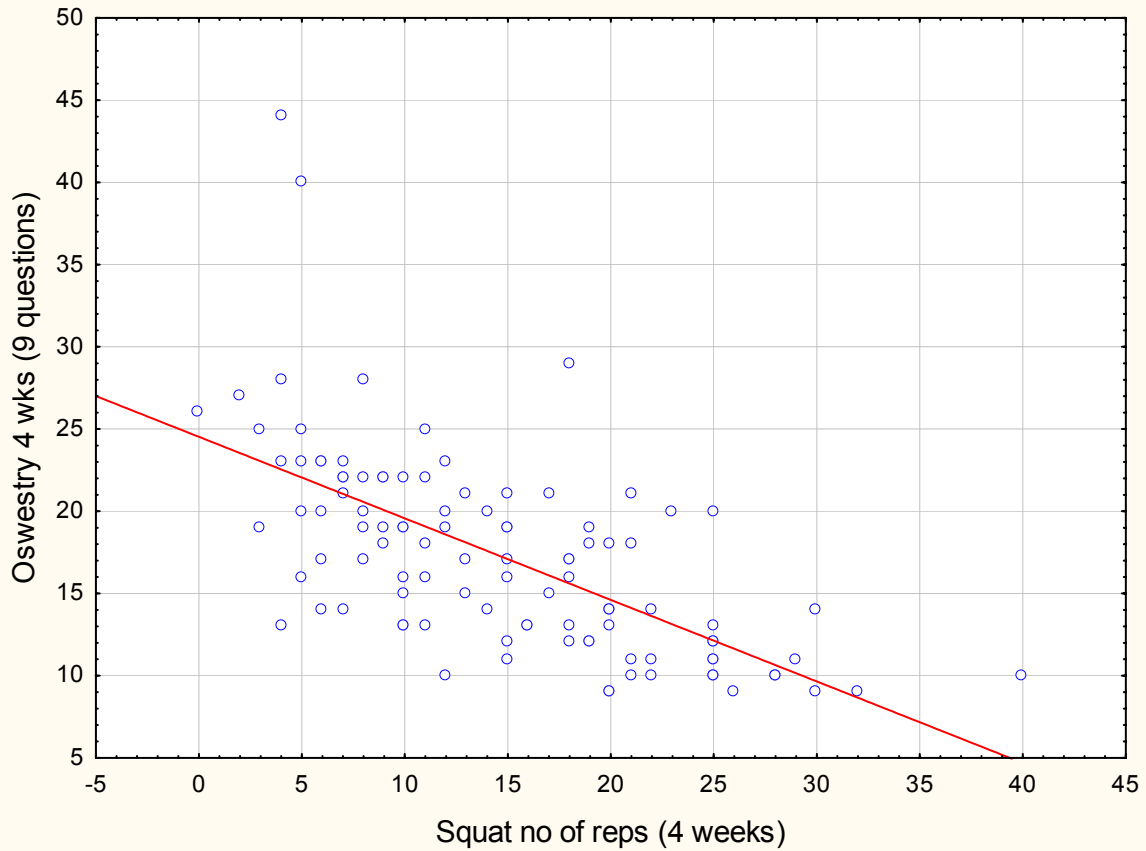


Figure 4.8 Scatter plot diagram for the correlation between the ODI-UAE (9 questions) and Squat test at 4 weeks

The diagram (figure 4.8) shows a moderate inverse correlation at 4 weeks between the ODI-UAE (9 questions) and squat test with  $r = -0.70$ , and result values were significant ( $p = 0.00$ ).

#### 4.11.4.2 ODI-UAE Response Frequency (baseline)

Pain Intensity section:

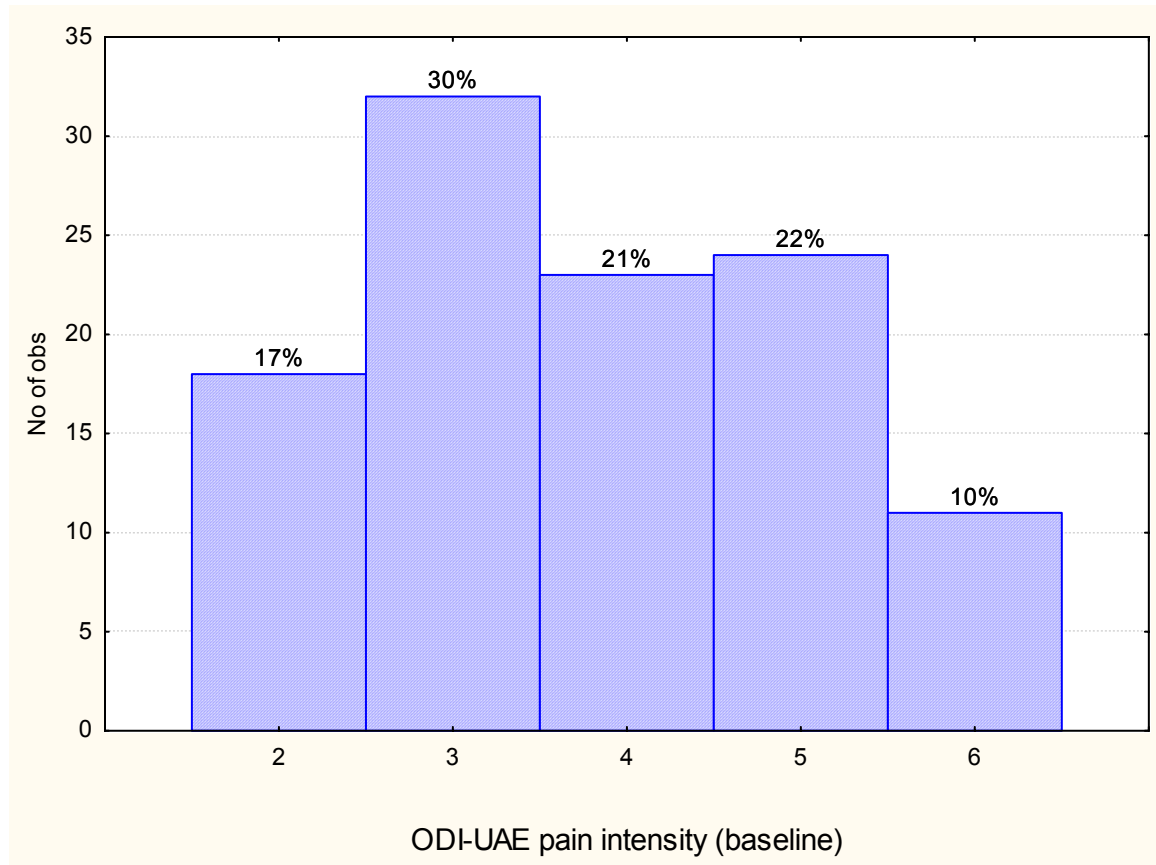


Figure 4.9 Frequency response for each response option for the pain intensity question of ODI-UAE at baseline

The diagram in (figure 4.9). illustrates that the frequency response for each response option of the pain intensity question of the ODI-UAE was less than 80%. The highest frequency response detected was 30% for response option 3 (“the pain is moderate at the moment”).

Personal Care section

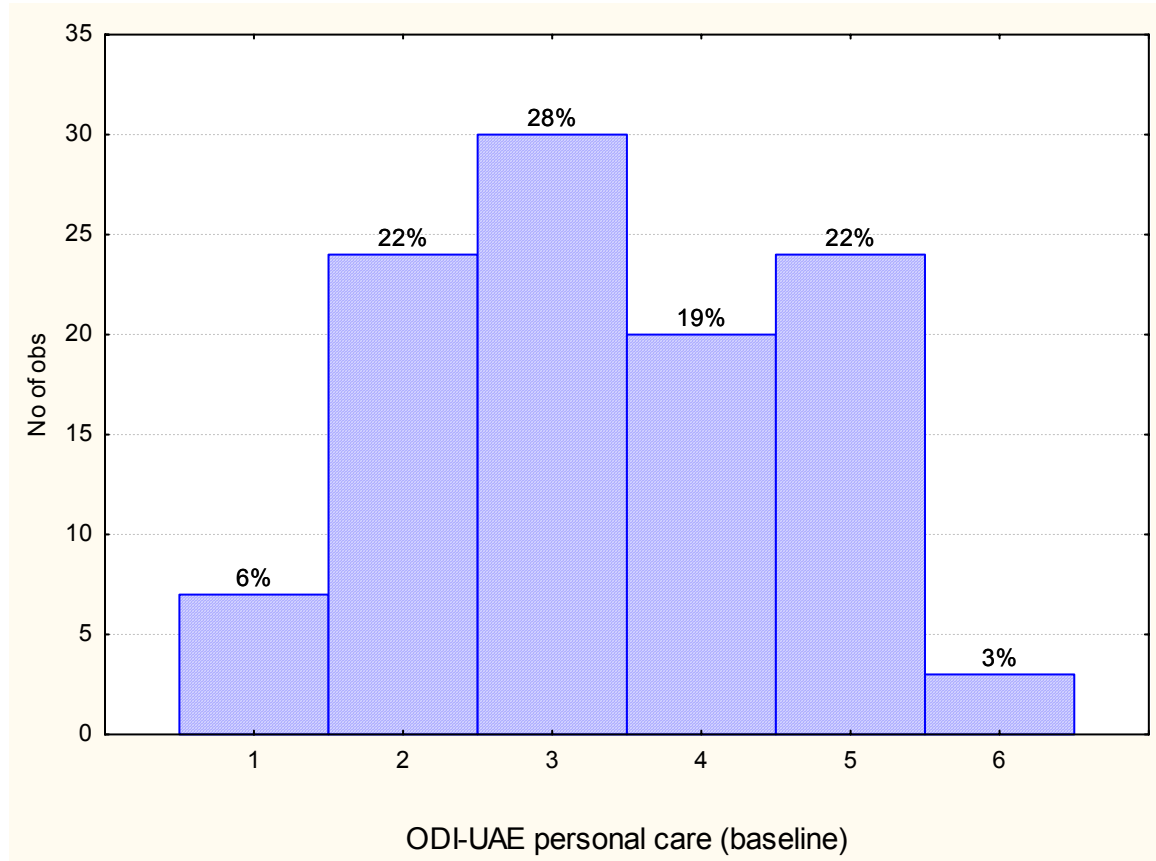


Figure 4.10 Frequency response for each response option for the personal care question of ODI-UAE at baseline

The diagram in (figure 4.10) illustrates that the frequency response for each response option of the personal care question of the ODI-UAE was less than 80%. The highest frequency response detected was 28% for response option 3 (“It is painful to look after myself and I am slow and careful”).

## Lifting section

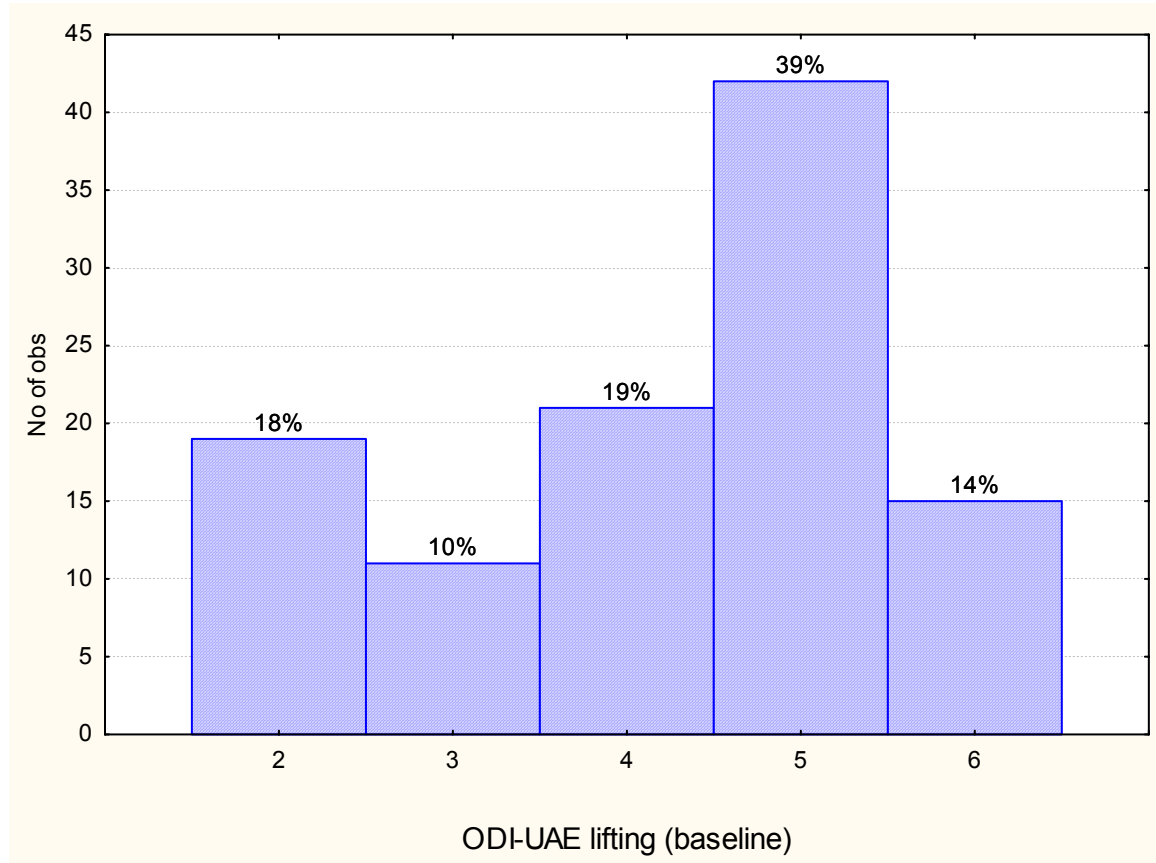


Figure 4.11 Frequency response for each response option for the lifting question of ODI-UAE at baseline

The diagram (figure 4.11) illustrated that the frequency response for each response options of the lifting question of the ODI-UAE was less than 80%. The highest frequency response detected was 39% for response option 5 (I can only lift very light weight).



### Walking section

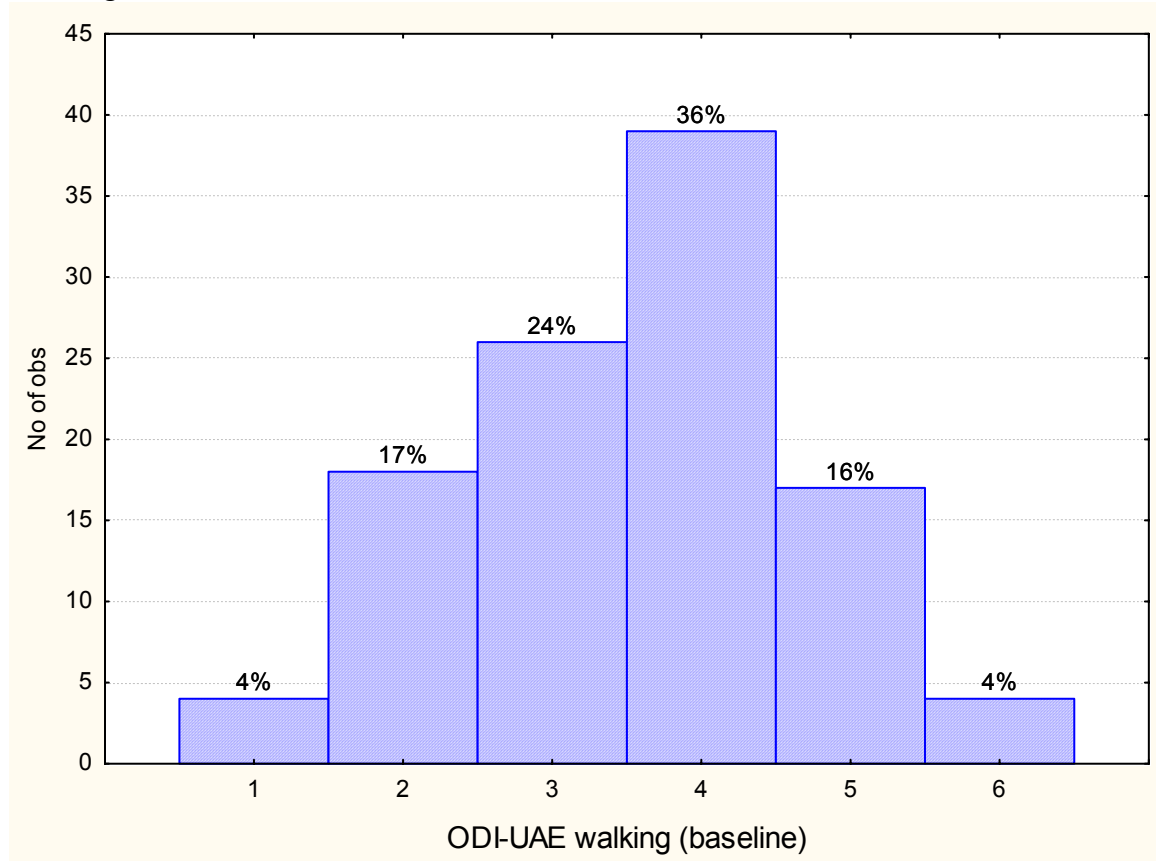


Figure 4.12 Frequency response for each response option for the walking question of the ODI-UAE at baseline

The diagram in (figure 4.12) illustrates that the frequency response for each response option for the walking question of the ODI-UAE was less than 80%. The highest frequency response detected was 36% for choice 4 (“Pain prevents me from walking more than 100 meters”).

## Sitting section

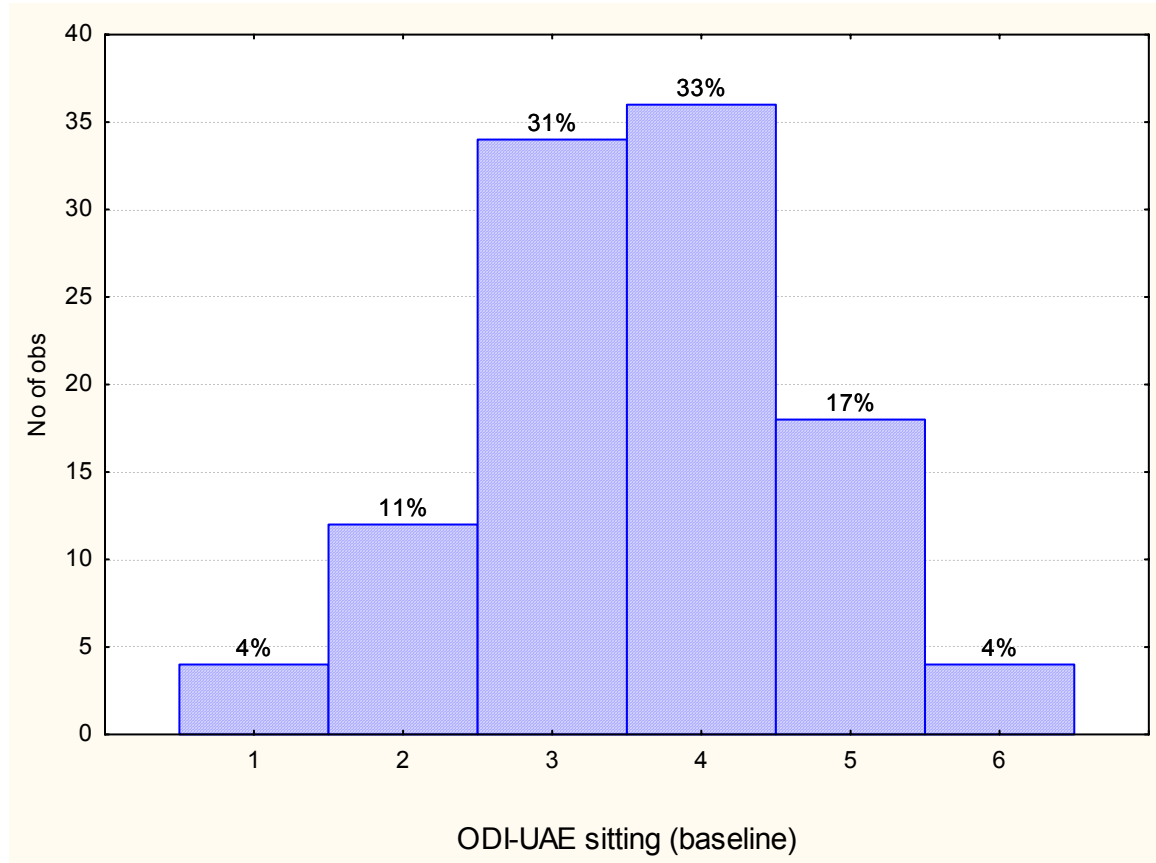


Figure 4.13 Frequency response for each response option for the sitting question of the ODI-UAE at baseline

The diagram in (figure 4.13) illustrates that the frequency response for each response option for the sitting question of the ODI-UAE was less than 80%. The highest frequency response detected was 33% for response option 4 (Quebec “Pain prevents me from sitting more than half hour”).

### Standing section

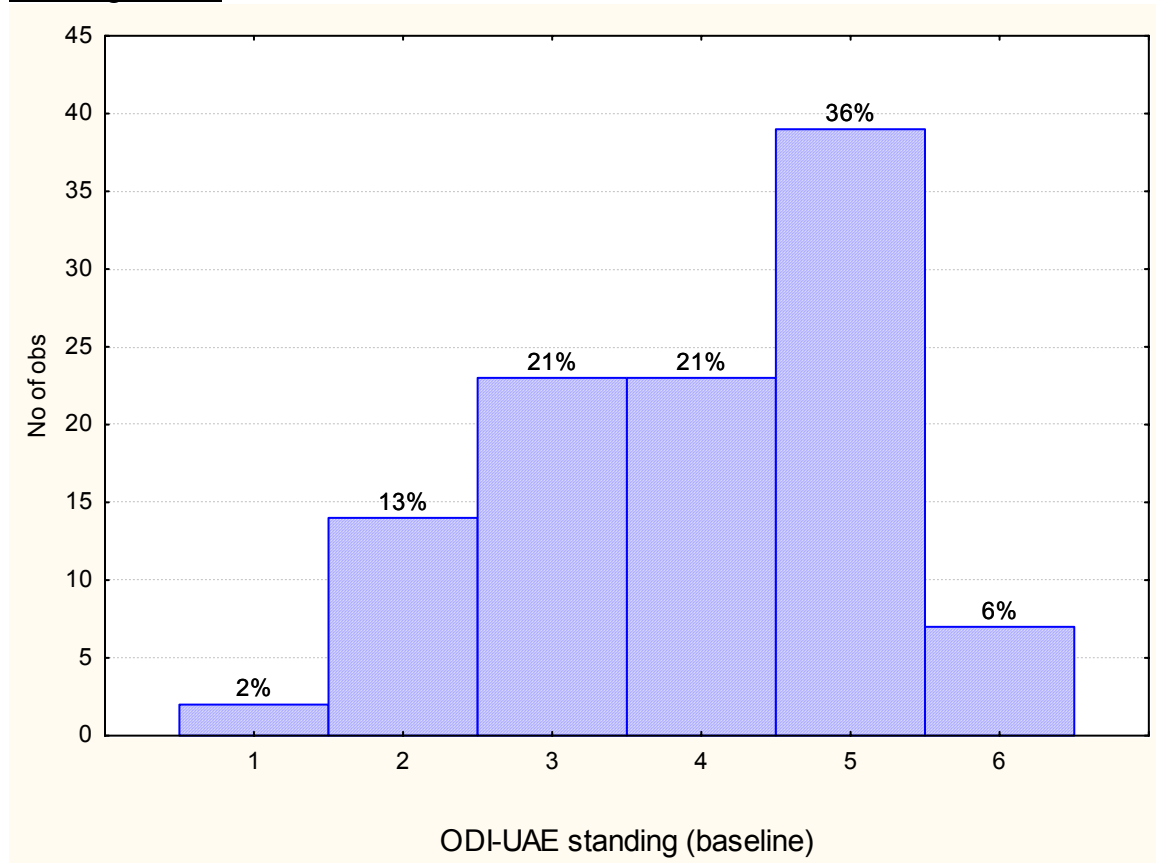


Figure 4.14 Frequency response for each response options for standing question of ODI-UAE at baseline

The diagram in (Figure 4.14) illustrated that the frequency response for each response options of the standing question of the ODI-UAE was less than 80%. The highest frequency response detected was 36% for response option 5 Pain prevents me from standing more than 10 minutes).

### Sleeping section

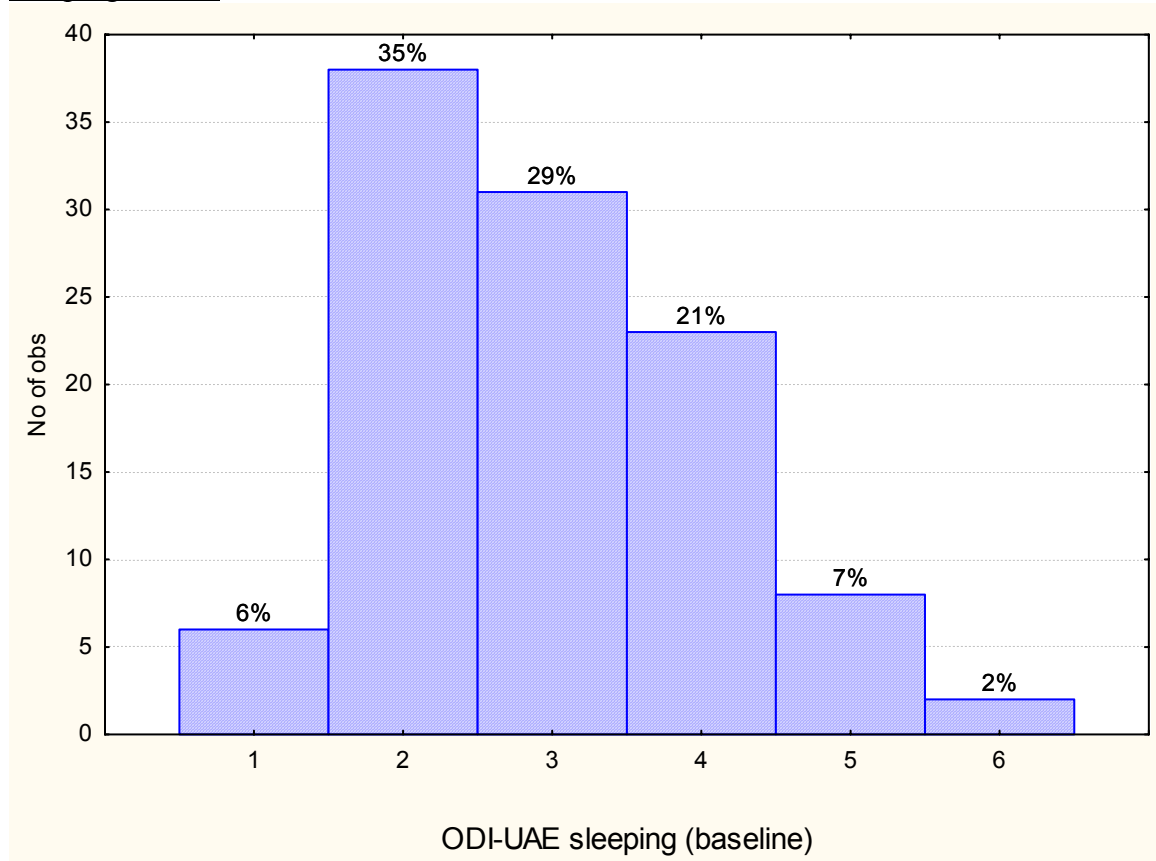


Figure 4.15 Frequency response for each response options for sleeping question of ODI-UAE at baseline

The diagram illustrated that the frequency response for each response options for the sleeping question of the ODI-UAE was less than 80%. The highest frequency response detected was 35% for response option 2 (My sleeping is occasionally disturbed by pain).

Sex life section

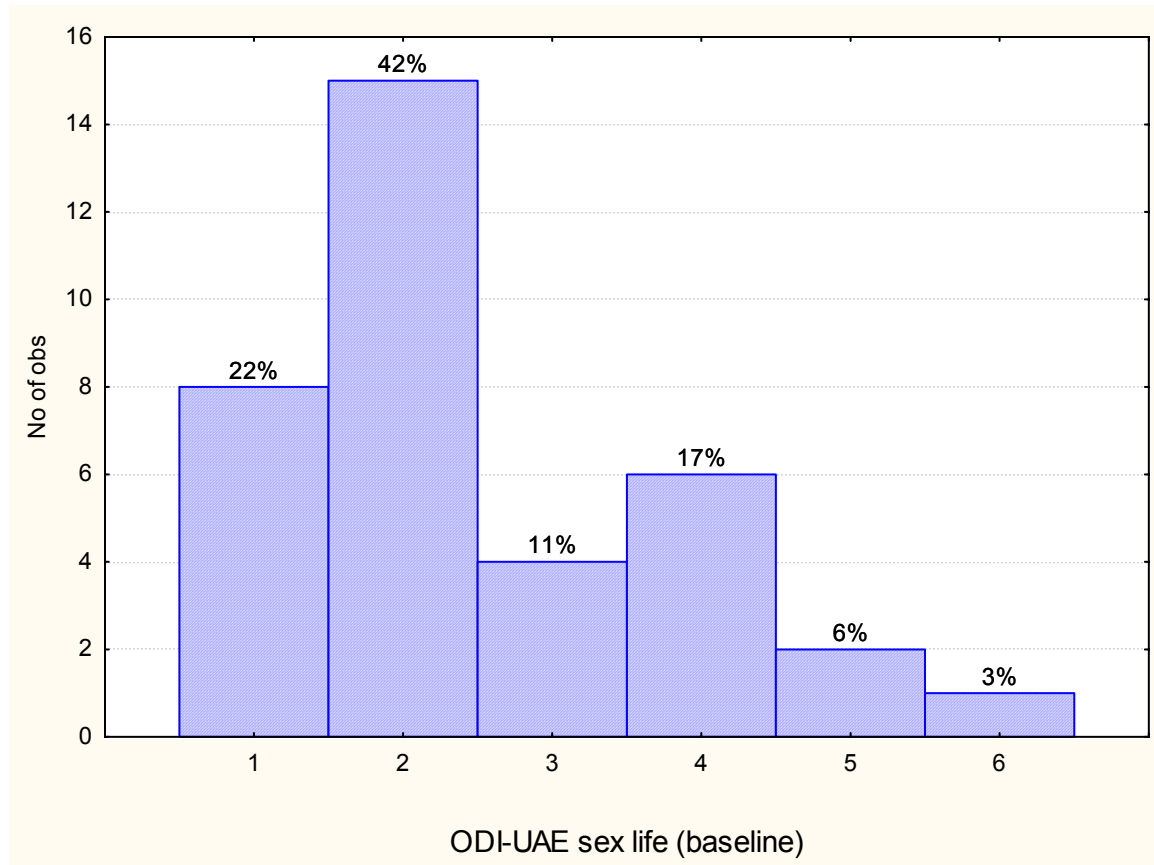


Figure 4.16 Frequency response for each response options for sex life question of ODI-UAE at baseline

The diagram illustrated that the frequency response for each response options for the sex life question of the ODI-UAE was less than 80%. The highest frequency response detected was 30% for response option 2 (My sex life is normal but it causes extra pain).

## Social Life section

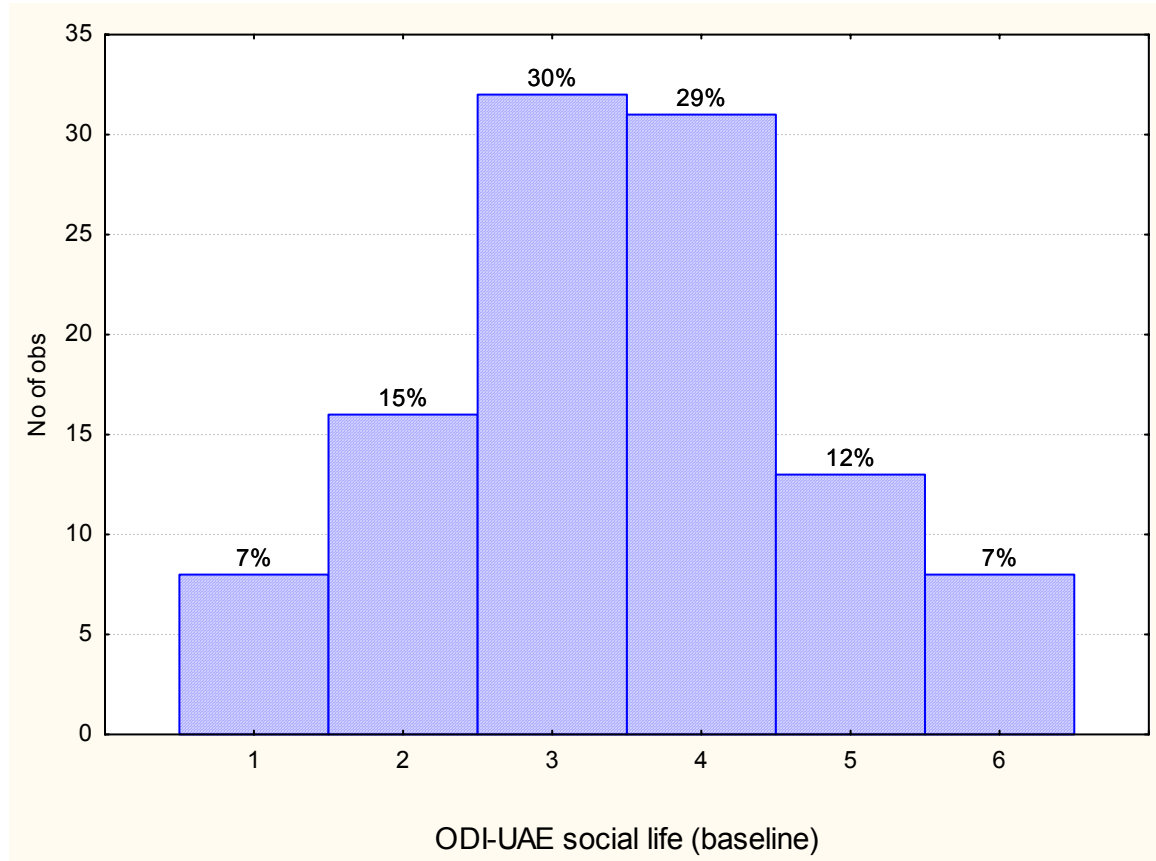


Figure 4.17 Frequency response for response options for social life question of ODI-UAE at baseline

The diagram illustrated that the frequency response for response options for the social life question of the ODI-UAE was less than 80%. The highest frequency response detected was 30% for response option 3 (Pain has no significant effect on my social life apart from limiting my more energetic interests (e.g. dancing, etc...)).

## Traveling section

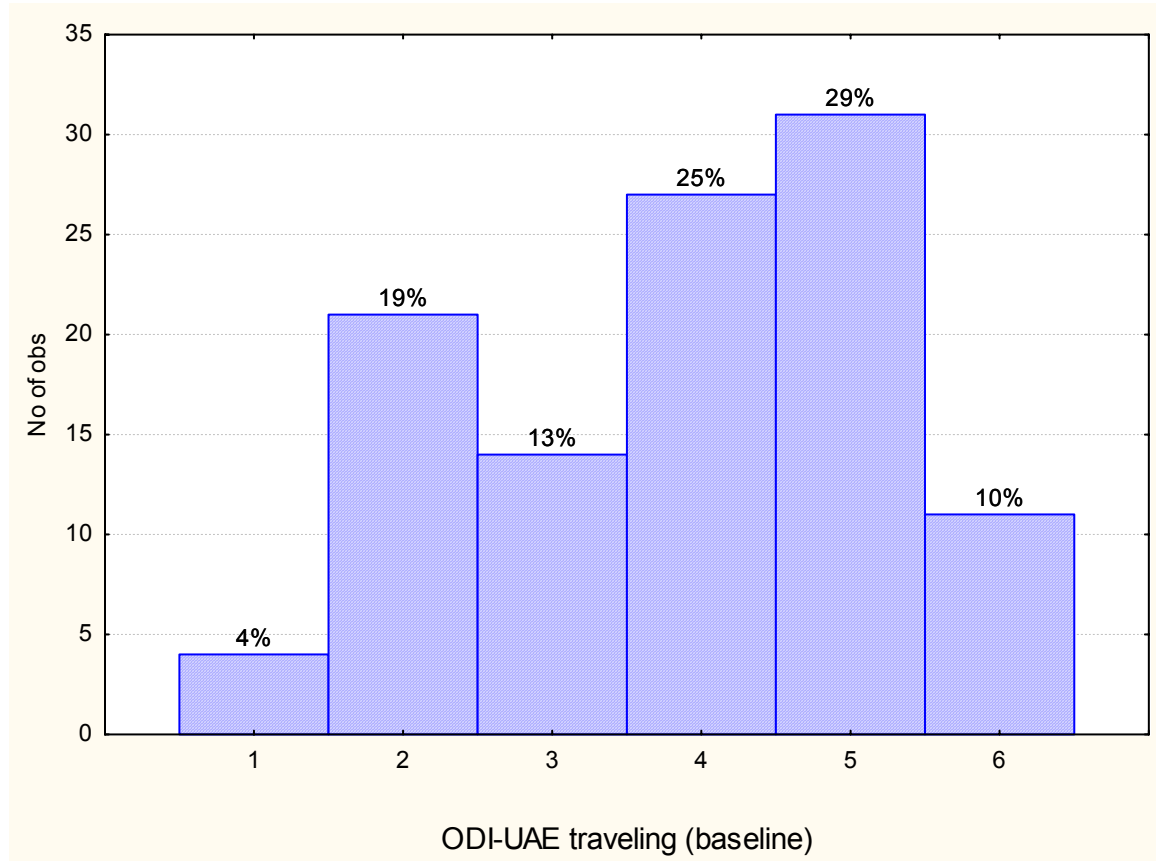


Figure 4.18 Frequency response for each response options for traveling question of ODI-UAE at baseline

The diagram illustrated that the frequency response for the each response options for the social life question of the ODI-UAE was less than 80%. The highest frequency response detected was 29% for response option 5 (Pain restrict me to short necessary journeys under 30 minutes).

Table 4.5 Maximum Response Frequency Results Measurement from baseline Score

Question	Maximum Response Frequency (< 80%)
Pain intensity	30
Personal care	28
Lifting	39
Walking	36
Sitting	33
Standing	36
Sleeping	35
Sex life	42
Social life	30
Traveling	29

#### 4.11.4.3 Sensitivity to Change

To measure sensitivity to change, the standardized response mean (SRM) and effect size were calculated from the measurements of the ODI-UAE, VAS and Squat that was conducted at baseline and 4 weeks follow-up.

Table 4.6 Measurement Results of the ODI-UAE, VAS, and Squat

	ODI-UAE			VAS		Squat	
	Baseline	48 hours	4 weeks follow-up	Baseline	4 weeks follow-up	Baseline	4 weeks follow-up
N	105	105	105	105	105	106	106
Mean	31.2	28.6	16.5	6.2	1.9	5.6	14.3
Std. Err.	1.3	1.3	0.9	0.4	0.3	0.4	1.1
± 95%	28.6 - 33.7	26.1 - 31	14.8 - 18.2	5.5 - 6.9	1.4 - 2.4	3.9 - 7.2	12.1- 16.5



The mean values at the baseline are significantly different compared to the 4 weeks follow-up.

The ODI-UAE mean values conducted at baseline, and over the 4 weeks follow-up period for the ODI-UAE, VAS, and Squat test showed a greater reduction from 30.2 at baseline to 16.5. This reflects what would be anticipated from those clients in demonstrating improvement after they received treatment over the 4 week follow-up period (see tables 4.5 and 4.6). Mean score values of the VAS also had dropped from 6.2 at baseline to 1.6 after 4 weeks of follow up treatment indicating clients had less pain, which associates with the ODI-UAE mean changes. The squat mean repetitions had increased from 5.6 at baseline to 14.3, that is as clients got better they were able to do more repetitions which associated with both the final ODI-UAE and the VAS mean changes.

Table: 4.7 Summary of the effect size and standard response mean values

	Baseline Std. Dev	Change Means	Change Std.Dev.	Standard response mean (SRM)	Effect size (ES)
ODI-UAE	9.44	15.69	7.36	2.13	1.66
VAS	2.53	4.69	2.39	1.96	1.85
Squat	5.96	9.48	5.77	1.64	1.59

The results of the measurement of the ODI-UAE, VAS, and Squat test conducted at baseline, and 4 weeks follow-up are presented in table 4.7

#### 4.11.4.4 Floor and Ceiling Effects

Floor and ceiling effects were evaluated to determine whether the ODI-UAE had enough width to allow clients to demonstrate improvement and deterioration. The floor and ceiling effects were calculated from the Final ODI-UAE measurements conducted at baseline, 48 hours and 4 weeks follow-up. The absence of floor and ceiling effects would be determined if less than 15% of the respondents achieved the lowest or highest possible score respectively (0 -11.5) or (87-100%) (Lauridsen et al 2006).

At baseline

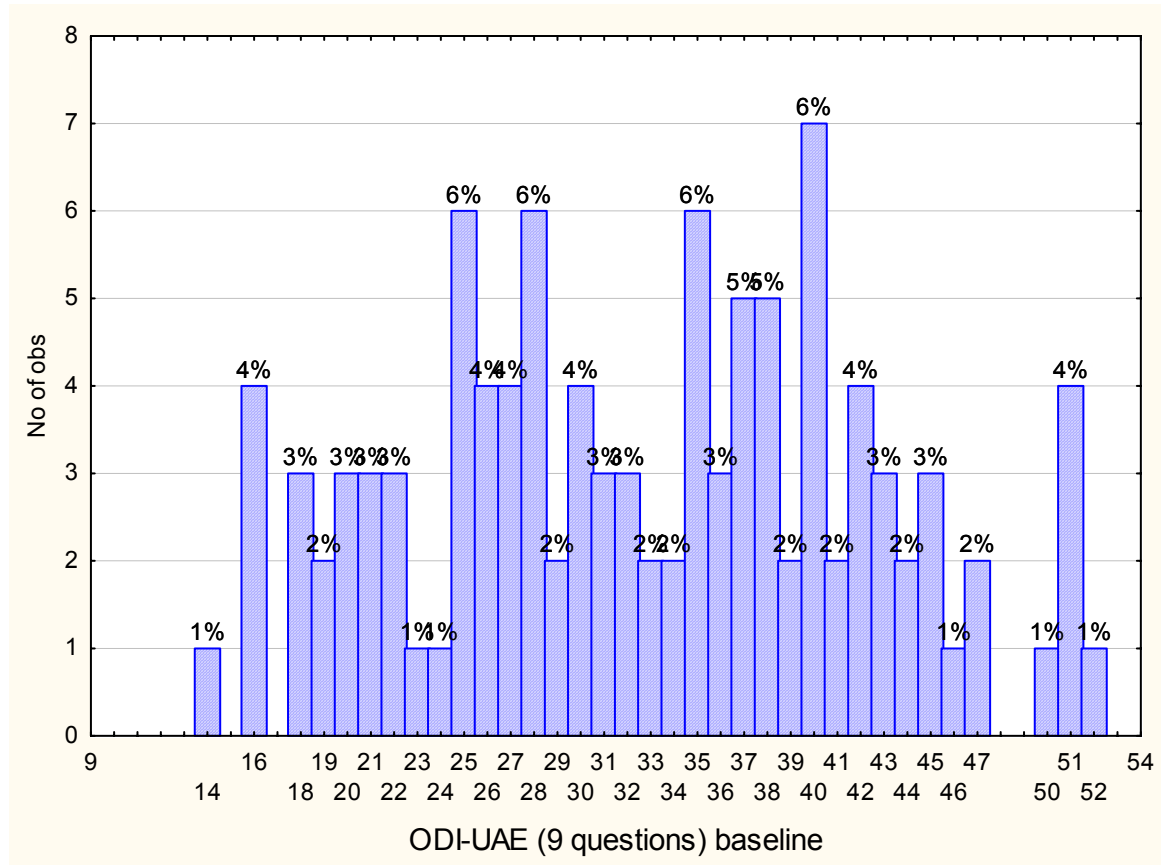


Figure 4.19 Histogram of ODI-UAE (9 questions) baseline

The histogram (figure 4.19) demonstrated an acceptable distribution of client responses across the scale. At baseline there is an absence of floor and ceiling effects as less than 15% of the respondents achieved the lowest or highest possible score respectively (0 -11.5) or (87-100%).

At 48 hours

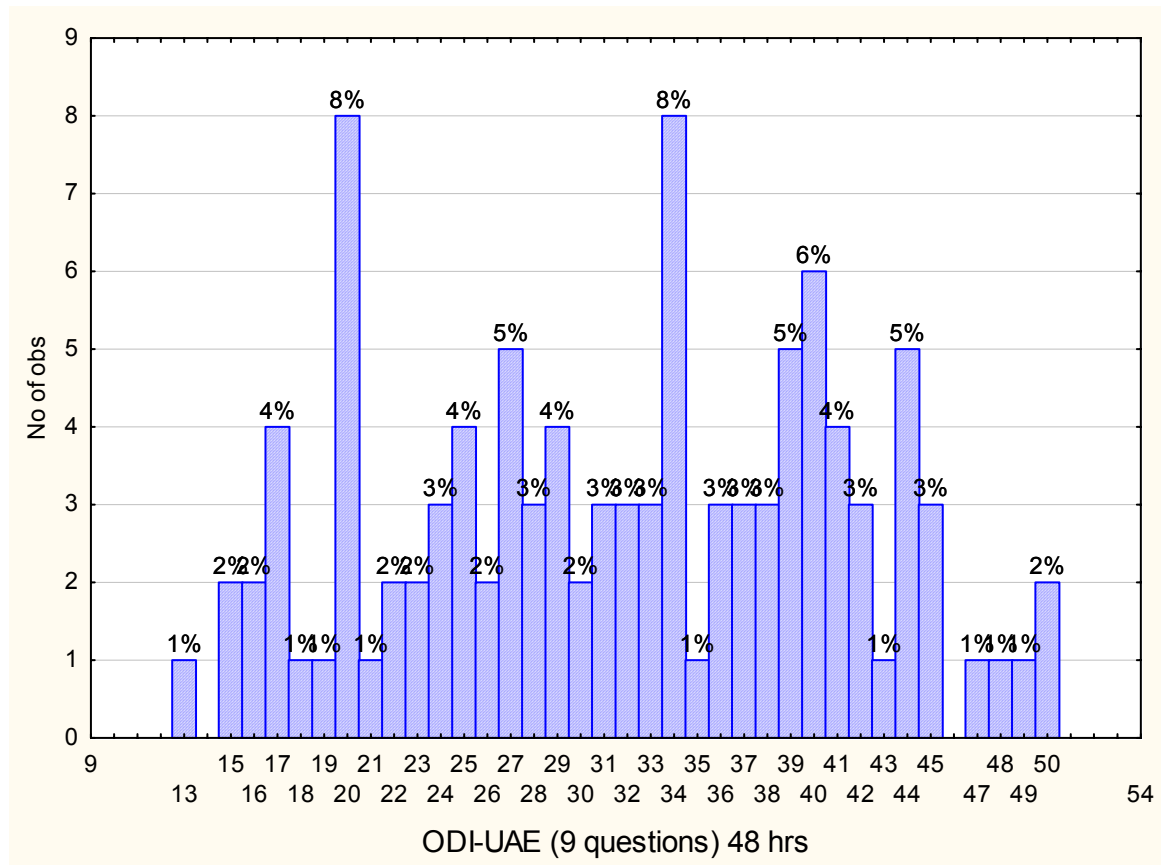


Figure 4.20 Histogram of ODI-UAE (9 questions) 48 hours

The results of the floor and ceiling are presented in histogram (figure 4.20) from the Final ODI-UAE measurement at 48 hours. It shows an absence of floor and ceiling effects at 48 hours as less than 20% of the respondents achieved the lowest or highest possible score respectively (0 -11.5) or (87-100%) and it was identical with the baseline presented in figure 4.20.

At 4 weeks

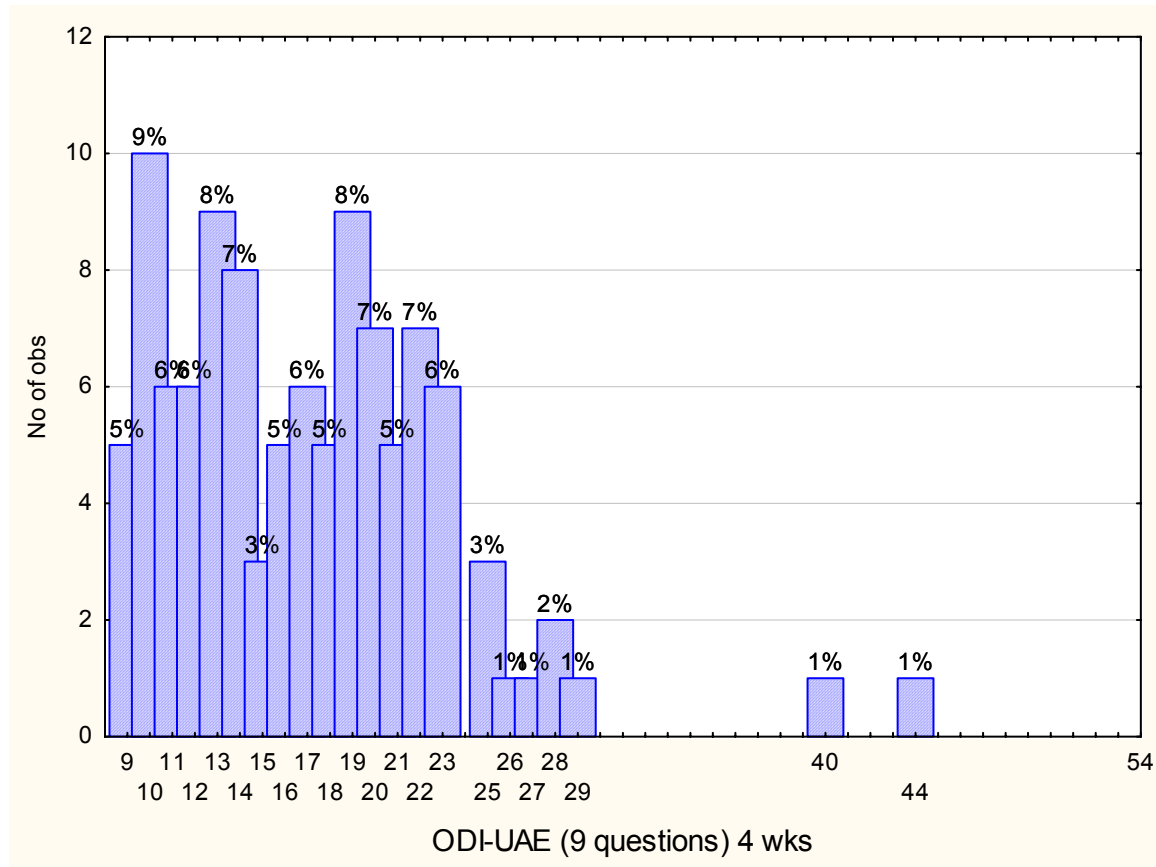


Figure 4.21 Histogram of ODI-UAE (9 questions) 4 weeks

The histogram (figure 4.21) illustrates the results of the floor and ceiling effects measurements from the Final ODI-UAE measurements at 4 weeks and shows an absence of floor and ceiling effects (less than 20% of the respondents achieved the lowest or highest possible score respectively (0 -11.5) or (87-100%). Also from the histogram the distribution of client response was more toward the left side, which reflects that a large number of clients achieved a lower score of the ODI-UAE as they got better over the 4 weeks follow up.

## Appendix 1

### استبانته اوسويستري لقياس العجز (النسخة 2.0)

(صممت هذه الاستبانته لتقدم لنا معلومات عن مدى تأثير أوجاع ظهرك على قدراتك على القيام بأمور حياتك اليومية)

أرجو التكرم بالإجابة عن الأسئلة الآتية بوضع إشارة صح على خيار الأكثر مناسبة من كل مجموعة من الخيارات الآتية. ( اختر إجابة واحدة من كل فقرة من الخيارات الآتية يكون الأكثر مناسبة في وصف حالتك اليوم)

#### الفقرة 1: شدة الأوجاع

0. حاليا لا أشعر بأوجاع.
1. أشعر حاليا بأوجاع خفيفة.
2. أشعر حاليا بأوجاع متوسطة.
3. أشعر حاليا بأوجاع شديدة.
4. أشعر حاليا بأوجاع شديدة جدا.
5. أشعر حاليا بأوجاع أسوأ مما يمكن تصورها .

#### الفقرة 2: العناية الشخصية (كالإغتسال واللباس)

0. يمكنني العناية بنفسي والقيام بأموري الخاصة عادة من غير أن يزيد ذلك في أوجاعي.
1. يمكنني العناية بنفسي والقيام بأموري الخاصة غير أنني أشعر بوجع شديد عند القيام بذلك.
2. يمكنني العناية بنفسي والقيام بأموري الخاصة، ولكن ببطء وحذر.
3. أحتاج إلى بعض المساعدة، ولكن يمكنني القيام بمعظم أموري الخاصة.
4. أحتاج إلى مساعدة يوميا للقيام بأموري الخاصة.
5. أبقى في الفراش ولا يمكنني أن ألبس ثيابي، ولا أغتسل

#### الفقرة 3: رفع الأشياء ونقلها

0. أستطيع رفع الأشياء الثقيلة من غير أن يزيد ذلك من أوجاعي.
1. أستطيع رفع الأشياء الثقيلة ولكن ذلك يزيد من أوجاعي.
2. الأوجاع تمنعني من رفع الأوزان الثقيلة إذا كانت على الأرض لكن يمكنني التعامل معها إذا كانت في وضع مرتفع عال -كالطاولة مثلا.
3. الأوجاع تمنعني من رفع الأشياء الثقيلة ولكن بإمكانني التعامل مع رفع الأشياء الخفيفة ومتوسطة الوزن إذا كانت في وضع مناسب.
4. أستطيع رفع الأشياء خفيفة الوزن فقط.
5. رفع أو حمل أي شي ليس في استطاعتي على الإطلاق

#### الفقرة 4: المشي

0. الأوجاع لا تمنعني من المشي أي مسافة.
1. الأوجاع تمنعني من المشي لأكثر من كيلو متر ونصف.
2. الأوجاع تمنعني من المشي لأكثر من أربع مائة متر.
3. الأوجاع تمنعني من المشي لأكثر من مائة متر.
4. أستطيع المشي فقط باستعمال عصا أو عكاز.
5. أبقى في الفراش معظم الوقت وأزحف للوصول إلى المراض.

#### الفقرة 5: الجلوس

0. يمكنني الجلوس على أي كرسي المدة التي أريدها.
1. يمكنني الجلوس فقط على كرسي المفضل المدة التي أريدها.
2. الأوجاع تمنعني من الجلوس على الكرسي لأكثر من ساعة.
3. الأوجاع تمنعني من الجلوس على الكرسي لأكثر من نصف ساعة.
4. الأوجاع تمنعني من الجلوس على الكرسي لأكثر من 10 دقائق.
5. الأوجاع تمنعني من الجلوس مطلقا .

#### الفقرة 6: الوقوف

0. أستطيع البقاء واقفا المدة التي أريدها دون زيادة أوجاعي.
1. أستطيع البقاء واقفا المدة التي أريدها ولكن ذلك يزيد من أوجاعي.
2. الأوجاع تمنعني من الوقوف لأكثر من ساعة.
3. الأوجاع تمنعني من الوقوف لأكثر من نصف ساعة.
4. الأوجاع تمنعني من الوقوف لأكثر من 10 دقائق.
5. الأوجاع تمنعني من الوقوف مطلقا.

#### الفقرة 7: النوم

0. نومي لا يضطرب أبدا بالأوجاع. (الأوجاع لا تؤثر على نومي على الإطلاق)
1. نومي يضطرب أحيانا بالأوجاع. (الأوجاع تؤثر على نومي أحيانا)
2. أنام أقل من 6 ساعات يوميا بسبب الأوجاع.
3. أنام أقل من 4 ساعات يوميا بسبب الأوجاع.
4. أنام أقل من ساعتين يوميا بسبب الأوجاع.
5. الأوجاع تمنعني من النوم مطلقا (تماما).

#### الفقرة 8: الحياة الجنسية

0. حياتي الجنسية عادية ولا تسبب زيادة في أوجاعي.
1. حياتي الجنسية عادية ولكنها تسبب زيادة في بعض أوجاعي.
2. حياتي الجنسية تكاد تكون عادية ولكنها تسبب لي أوجعا شديدة .
3. حياتي الجنسية مقيدة بشدة بسبب الأوجاع.
4. حياتي الجنسية تقريبا مقطوعة بسبب الأوجاع.

5. الأوجاع تمنعني مطلقا من الحياة الجنسية.

**الفقرة 9: الحياة الاجتماعية (زيارة الأقارب والأصحاب والخروج مع الأصدقاء والمشاركة في أنشطة اجتماعية):**

0. حياتي الاجتماعية عادية ولا تزيد في أوجاعي.
1. حياتي الاجتماعية عادية ولكنها تزيد في أوجاعي.
2. الأوجاع لا تؤثر بفاعلية على حياتي الاجتماعية ولكنها تقلل من أنشطتي التي تتطلب مجهودا كبيرا
3. الأوجاع حددت حياتي الاجتماعية فأنا لا اخرج كالمعتاد كما كنت اخرج من قبل.
4. بسبب الأوجاع أصبحت حياتي الاجتماعية منحصرة في المنزل.
5. بسبب الأوجاع انقطعت حياتي الاجتماعية.

**الفقرة 10: السفر (بالسيارة)**

0. أستطيع السفر إلى أي مكان من غير أن يزيد ذلك في أوجاعي.
1. أستطيع السفر إلى أي مكان ولكنه يزيد في أوجاعي.
2. الأوجاع شديدة ولكن التعامل مع الرحلات في حدود ساعتين
3. الأوجاع تقيد رحلاتي لأقل من ساعة.
4. الأوجاع تقيد رحلاتي القصيرة الضرورية لأقل من نصف ساعة.
5. الأوجاع تمنعني من القيام بالرحلات لأي مكان إلا لتلقي العلاج

## OSWESTRY DISABILITY INDEX (VERSION 2.0)

Could you please complete this questionnaire? It is designed to give us information as to how your back (or leg) trouble has affected your ability to manage in everyday life.

Please answer *every section*. Mark *one box only* in each section that most closely describes you *today*.

### Section 1- Pain Intensity

- I have not pain at the moment.
- The pain is very mild at the moment.
- The pain is moderate at the moment.
- The pain is fairly severe at the moment.
- The pain is very severe at the moment.
- The pain is the worst imaginable at the moment.

### Section 2- Personal Care (Washing, Dressing, etc.)

- I can look after myself normally without causing extra pain.
- I can look after myself normally but it is very painful.
- It is painful to look after myself and I am slow and careful.
- I need some help but manage most of my personal care.
- I need help every day in most aspects of self care.
- I do not get dressed, wash with difficulty and stay in bed.

### Section 3- Lifting

- I can lift heavy weights without extra pain.
- I can lift heavy weights but it gives extra pain
- Pain prevents me from lifting heavy weights off the floor, but I can manage if they are conveniently position, *e.g.*, on a table.
- Pain prevents me from lifting heavy weights but I can manage light to medium weights if they are conveniently positioned.
- I can lift only very light weights.
- I cannot lift or carry anything at all.

### Section 4- Walking

- Pain does not prevent me walking any distance.
- Pain prevents me walking more than 1 mile.
- Pain prevents me walking more than ¼ mile.
- Pain prevents me walking more than 100 yards.
- I can only walk using a stick or crutches.
- I am in bed most of the time and have to crawl to the toilet.

### Section 5- Sitting

- I can sit in any chair as long as I like.
- I can only sit in my favourite chair as long as I like.
- Pain prevents me from sitting more than 1 hour.
- Pain prevents me from sitting more than half an hour.
- Pain prevents me from sitting more than 10 mins.
- Pain prevents me from sitting at all.

### Section 6- Standing

- I can stand as long as I want without extra pain.
- I can stand as long as I want but it gives me extra pain.
- Pain prevents me from standing for more than 1 hour.
- Pain prevents me from standing for more than half and hour.
- Pain prevents me from standing for more than 10minutes.
- Pain prevents me from standing at all.

### Section 7- Sleeping

- My sleep is never disturbed by pain.
- My sleep is occasionally disturbed by pain.
- Because of pain I have less than 6 hours' sleep.
- Because of pain I have less than 4 hours sleep.
- Because of pain I have less than 2 hours sleep.
- Pain prevents me from sleeping at all.

### Section 8- Sex Life

- My sex life is normal and causes no extra pain.
- My sex life is normal but causes some extra pain.
- My sex life is nearly normal but is very painful.
- My sex life is severely restricted by pain.
- My sex life is nearly absent because of pain
- Pain prevents any sex life at all.

### Section 9- Social Life

- My social life is normal and causes me no extra pain.
- My social life is normal but increases the degree of pain.
- Pain has no significant effect on my social life apart from limiting my more energetic interests, *e.g.*, dancing, *etc.*
- Pain has restricted my social life and I do not go out as often.
- Pain has restricted my social life to my home.
- I have no social life because of pain.

### Section 10- Travelling

- I can travel anywhere without extra pain.
- I can travel anywhere but it gives extra pain.
- Pain is bad but I manage journeys over 2 hours.
- Pain restricts me to journeys of less than 1 hour.
- Pain restricts me to short necessary journeys under 30 minutes.
- Pain prevents me from travelling except to receive treatment.



## Appendix 2

Letter to: Rashid hospital  
Dubai hospital  
Quassimmi hospital

Dear Sir/Madam

### **Validation of the Arabic Version of the Oswestry Disability Index for low back pain patients in the United Arab Emirates.**

The above research project is part of the MSc course in Physiotherapy, at the Stellenbosch University in Cape Town, South Africa. The aim of this study is to determine whether the Oswestry Disability Index (ODI) (version 2.0) is valid and reliable for United Arab Emirate (UAE) nationals.

Low back pain (LBP) is a major public health problem. The prevalence of LBP in the UAE is estimated to be about 57% in males and 64% in females. LBP is commonly treated by physiotherapists in the UAE. The restoration of normal function is considered a key outcome of physiotherapy. The implementation of best practice in the clinical setting also requires the importance of clinicians monitoring patient progress using standard outcome measures, in order to demonstrate and reflect on, the effectiveness of intervention. The physiotherapist routinely assesses and collects information in the course of their intervention. The self-reported standardized questionnaire will provide a convenient method of collecting and synthesizing a large amount of information on activity and functional outcome of the service provided within 5 minutes.

We are hereby seeking permission to conduct the study at your hospital. Implementation of the functional outcome tool that results from this study will help to improve the quality of services and quality assurance in clinical settings.

Thank you for your time and participation.

Lt. Raafat Ramzy  
BSc Physio (UAE)

Prof. Quinette Louw  
Dr Andrea Bailocerkowski  
(Melbourne University)

## Appendix 3

# GOVERNMENT OF DUBAI

DEPARTMENT OF HEALTH AND MEDICAL SERVICES

## RASHID HOSPITAL

P.O.Box : 4545

Dubai - United Arab Emirates

Tel. : 3371111 & 3374000

Fax : 3113222

Website : [www.dohms.gov.ae](http://www.dohms.gov.ae)

e-mail: [rh@dohms.gov.ae](mailto:rh@dohms.gov.ae)



حكومة دبي  
دائرة الصحة والخدمات الطبية

مستشفى راشد

ص. ب : 4545

دبي - الإمارات العربية المتحدة

تليفون : 3371111 / 3374000

فاكس : 3113222

الموقع : [www.dohms.gov.ae](http://www.dohms.gov.ae)

البريد الإلكتروني : [rh@dohms.gov.ae](mailto:rh@dohms.gov.ae)

July 19, 2007

Dear Mr. Raafat Ramzy,

**Subject: Approval of Research Project titled "Validation of the Arabic Version of the Oswestry Disability Index for low back pain patients in the UAE"**

Thank you for submitting the above project to the Medical Research Committee, DOHMS. The Medical Research Committee has been organized and operates according to the Good Clinical Practice (GCP) Guidelines.

Your protocol was discussed by the Medical Research Committee at its meeting held on 19/7/07. I am pleased to advise you that the Committee has granted ethical approval of the above research proposal. However we would like to enquire as to if you have already been granted approval by the research ethics committee of the Ministry of Health? If you kindly forward us a copy of the approval letter.

Please note that it is the MRC's policy that the principal investigator should report to the committee of the following:

1. Anything which might warrant review of ethical approval of the project in the specified format, including:
  - any serious or unexpected adverse events; and
  - unforeseen events that might affect continued ethical acceptability of the project.
2. Any proposed changes to the research protocol or to the conduct of the research.
3. Any new information that may affect adversely the safety of the subjects
4. If the project is discontinued before the expected date of completion (reason to be specified).
5. Annual report to the MRC about the progress of the study.
6. A final report of findings on completion of the study.

Please note that this approval is valid for one year from the date of this letter. It is your responsibility to ensure that an application for continuing review approval has been submitted by the required time.

The MRC wishes you every success in your research

Yours faithfully

Dr. Azan BinBrek

Chairman

Medical Research Committee



## Appendix 4

17 September 2007

Mr RR Ramzy  
Dept of Physiotherapy

Dear Mr Ramzy

**RESEARCH PROJECT : "VALIDATION OF THE ARABIC VERSION OF THE  
OSWESTRY DISABILITY INDEX DEVELOPED IN TUNISIA FOR  
LOW BACK PAIN PATIENTS IN THE UAE"**  
**PROJECT NUMBER : N07/08/177**

My letter dated 13 August 2007 refers.

At a meeting that was held on 5 September 2007 the Committee for Human Research ratified the approval of the abovementioned project.

Yours faithfully

**CJ VAN TONDER**  
**RESEARCH DEVELOPMENT AND SUPPORT (TYGERBERG)**  
Tel: +27 21 938 9207 / E-mail: cjvt@sun.ac.za

CJVT/pm

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## Appendix 5



27 June 2007

To: Mr. Raafat Ramzy, PT

Dear Mr. Ramzy,

Greetings!

I would like to let you know that your research project titled "Validation of an Arabic Version of the Oswestry Disability Index (ODI) for low back pain patients in the UAE", which was submitted to the College of Health Sciences/Research Development Committee (CHS/RDC) for ethical review has been approved.

On behalf of the committee I would like to wish the best of luck in your research project

Best regards,

Ra'ed Abu Odeh, PhD  
CHS/RDC Chair

**UNITED ARAB EMIRATES**

MINISTRY OF HEALTH  
Sharjah Medical District



وزارة الشؤون الصحية  
وزارة الصحة  
منطقة الشارقة الطبية

AQH/REC/07.  
25 October 2007

**To :** Mr. Raafat Ramzy  
Lecturer  
University of Sharjah  
United Arab Emirates

**Ref :** Approval of Research Project

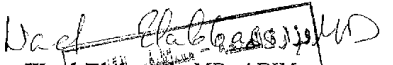
Dear Mr. Ramzy:

We would like to inform you that the research project named;  
"Validation of the Arabic Version of Oswestry Disability Index for Low  
Back Pain in the U. A. E." is approved by the Research Ethics  
Committee.

We stress the need for anonymous collecting of data which means that  
you cannot collect any information that hints to the identity of patient in  
your research.

Please submit to us a copy of the format of your data collection sheet in 3  
months.

Thank you.

  
Dr. Wael Elabbassi MD, ABIM  
Head of Research & Ethics Committee  
Al Qassimi Hospital - Sharjah

WE/jll

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الشارقة - ص.ب. ٢٠٧٢ ، تليفون : ٥٧٢٢٢٢٢ ، فاكس : ٥٧٤٨٨٨٠  
Sharjah - P.O. Box : 2072 - Tel. : 5722222, Fax : 5748880

## **DATA COLLECTION PROTOCOL**

- 1. Write patient Name & date of admission on this cover sheet**
- 2. On admission (1<sup>st</sup> visit) use the white color papers attached:**
  - a. Instruct the patient to answer the Oswestry Disability Index (ODI)**
  - b. Instruct the patient to score his pain intensity on the VAS sheet**
  - c. Instruct the patient to perform the squat test and score his repetitions**
- 3. 48 hours from admission (1<sup>st</sup> visit) use the blue color papers**  
**Instruct the patient to answer the ODI and make sure that he answers the discriminating question at the end of the blue papers**
- 4. 4 weeks from the admission (1<sup>st</sup> visit) use the yellow papers**
  - a. Instruct the patient to answer the Oswestry Disability Index (ODI)**
  - b. Instruct the patient to score his pain intensity on the VAS sheet**
  - c. Instruct the patient to perform the squat test and score his repetitions**

**Patient Name:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Diagnosis:** \_\_\_\_\_ **Age:** \_\_\_\_\_

**Patient Inform Consent form in Arabic Language**

\_\_\_\_\_

\_\_\_\_\_ :

27272 :

-

(9716) 5057513 (971650) 7473004 :

**The Committee for Human Research at Stellenbosch )**

**(University**

ما أهمية هذا البحث العلمي وعن ماذا يبحث؟

(120)



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*Stellenbosch University, Cape Town, )*

*(South Africa, at 011-2721-938 9207*

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أتعهد أنا الموقع أدناه ..... بالمشاركة في هذا البحث العلمي تحت عنوان توثيق استنباه  
اوسويستري لقياس العجز للمرضى المصابين بأوجاع الظهر في دولة الإمارات العربية المتحدة العربية المتحدة. وبناء  
على ذلك أقر بما يلي:

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## **PARTICIPANT INFORMATION LEAFLET & CONSENT FORM**

**TITLE OF THE RESEARCH PROJECT:** Accuracy of the Oswestry Disability Index for low back pain patients in the United Arab of Emirates

**REFERENCE NUMBER:**

**PRINCIPAL INVESTIGATOR:** Lt. Raafat Ramzy

**ADDRESS:** P.O. Box 27272 Sharjah  
United Arab Emirates

**CONTACT NUMBERS:** (9716) 505-7513 or (97150) 747-3004

You are hereby invited to participate in the above mentioned research project. Please take some time to read the information presented here, which will explain the details of this project. Please ask the study staff any questions about any part of this project that you do not fully understand. It is very important that you are completely satisfied and that you clearly understand what this research entails and how you could be involved. Your participation is **entirely voluntary** and you are free to decline to participate. If you decline participation, you will not be affected negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you initially do agree to take part.

This study has been approved by the **Committee for Human Research at Stellenbosch University** and will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki's common rule.

### ***What is this research study all about?***

- *A group of 120 patients referred to physiotherapy for low back pain at Rashid, Quassimi, Sheikh Khalifa Medical Center, and Zayed Military hospitals will be invited to participate in this study.*
- *Low back pain is described as pain, or muscle stiffness localized in the lower area of the back with or without referred leg pain. The aim of this study is to adapt a questionnaire used in many other countries to evaluate how low back pain influences the daily activities of people. The questionnaire will be adapted according to the culture and activities of low back pain sufferers in the United Arab Emirates.*

### ***Why have you been invited to participate?***

- *Hospitals with physiotherapy departments where United Arab Emirates nationals with low back pain receive physiotherapy treatment have been selected for this study. Four hospitals in the United Arab Emirates have been invited and agreed to participate in this study. You have been chosen as the physiotherapy at the hospital you are attending has agreed to participate in the study.*

**What will your responsibilities be?**

- *By agreeing to participate in this study, you will be asked to complete a 2-page questionnaire. The questionnaire will ask how your experience of low back pain influences your daily activities such as walking, driving your car, etc. Your physiotherapist will present the questionnaire to you as well as instructions explaining how to complete the questionnaire. You should not take longer than 10 minutes to complete the questionnaire.*

**Will you benefit from taking part in this research?**

- *There are no personal benefits by participating in this study. The aim of this study is to provide a meaningful questionnaire which will improve the evaluation of low back pain sufferers in the United Arab Emirates.*

**Who will have access to your personal records?**

- *No personal data will be recorded for this study.*

**Will you be paid to take part in this study and are there any costs involved?**

- *No you will not be paid to take part in the study. There will also be no costs involved for you, if you do take part.*

**Is there any thing else that you should know or do?**

- *You can contact the Committee for Human Research, Stellenbosch University, Cape Town, South Africa, at 011-2721-938 9207 if you have any concerns or complaints that have not been adequately addressed by your study doctor.*
- *You will receive a copy of this information and consent form for your own records.*

**Declaration by participant**

By signing below, I ..... agree to take part in a research study entitled Validation of the Arabic Version of the Oswestry Disability Index Developed in Tunisia for low back pain patients in the United Arab Emirates

I declare that:

- I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable.
- I have had an opportunity to ask questions and all my questions have been adequately answered.

- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- I may choose to leave the study at any time and will not be penalised or prejudiced in any way.
- I may be asked to leave the study before it has finished, if the study doctor or researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.

Signed at (*place*) ..... on (*date*) .....  
2005.

.....  
**Signature of participant**

.....  
**Signature of witness**

## On the day of admission (assessment)

### استبانه اوسويستري لقياس العجز (النسخة 2.0)

(صممت هذه الاستبانه لتقدم لنا معلومات عن مدى تأثير أوجاع ظهرك على قدراتك على القيام بأمر حياتك اليومية) أرجو التكرم بالإجابة عن الأسئلة الآتية بوضع إشارة صح على خيار الأكثر مناسبة من كل مجموعة من الخيارات الآتية. ( اختر إجابة واحدة من كل فقرة من الخيارات الآتية يكون الأكثر مناسبة في وصف حالتك اليوم)

#### الفقرة 1: شدة الأوجاع

0. حاليا لا أشعر بأوجاع.
1. أشعر حاليا بأوجاع خفيفة.
2. أشعر حاليا بأوجاع متوسطة.
3. أشعر حاليا بأوجاع شديدة.
4. أشعر حاليا بأوجاع شديدة جدا.
5. أشعر حاليا بأوجاع أسوأ مما يمكن تصورها .

#### الفقرة 2: العناية الشخصية (كالاغتسال واللباس)

0. يمكنني العناية بنفسي والقيام بأموري الخاصة عادة من غير أن يزيد ذلك في أوجاعي.
1. يمكنني العناية بنفسي والقيام بأموري الخاصة غير أنني أشعر بوجع شديد عند القيام بذلك.
2. يمكنني العناية بنفسي والقيام بأموري الخاصة، ولكن ببطء وحذر.
3. أحتاج إلى بعض المساعدة، ولكن يمكنني القيام بمعظم أموري الخاصة.
4. أحتاج إلى مساعدة يوميا للقيام بأموري الخاصة.
5. أبقى في الفراش ولا يمكنني أن ألبس ثيابي، ولا أعتسل

#### الفقرة 3: رفع الأشياء ونقلها

0. أستطيع رفع الأشياء الثقيلة من غير أن يزيد ذلك من أوجاعي.
1. أستطيع رفع الأشياء الثقيلة ولكن ذلك يزيد من أوجاعي.
2. الأوجاع تمنعني من رفع الأوزان الثقيلة إذا كانت على الأرض لكن يمكنني التعامل معها إذا كانت في وضع مرتفع عال -كالطاولة مثلا.
3. الأوجاع تمنعني من رفع الأشياء الثقيلة ولكن بإمكانني التعامل مع رفع الأشياء الخفيفة ومتوسطة الوزن إذا كانت في وضع مناسب.
4. أستطيع رفع الأشياء خفيفة الوزن فقط.
5. رفع أو حمل أي شي ليس في استطاعتي على الإطلاق

#### الفقرة 4: المشي

0. الأوجاع لا تمنعني من المشي أي مسافة.
1. الأوجاع تمنعني من المشي لأكثر من كيلو متر ونصف.
2. الأوجاع تمنعني من المشي لأكثر من أربع مائة متر.
3. الأوجاع تمنعني من المشي لأكثر من مائة متر.
4. أستطيع المشي فقط باستعمال عصا أو عكاز.
5. أبقى في الفراش معظم الوقت وأزحف للوصول إلى المرحاض.

#### الفقرة 5: الجلوس

0. يمكنني الجلوس على أي كرسي المدة التي أريدها.
1. يمكنني الجلوس فقط على كرسي المفضل المدة التي أريدها.
2. الأوجاع تمنعني من الجلوس على الكرسي لأكثر من ساعة.
3. الأوجاع تمنعني من الجلوس على الكرسي لأكثر من نصف ساعة.
4. الأوجاع تمنعني من الجلوس على الكرسي لأكثر من 10 دقائق.
5. الأوجاع تمنعني من الجلوس مطلقا .

#### الفقرة 6: الوقوف

0. أستطيع البقاء واقفا المدة التي أريدها دون زيادة أوجاعي.
1. أستطيع البقاء واقفا المدة التي أريدها ولكن ذلك يزيد من أوجاعي.
2. الأوجاع تمنعني من الوقوف لأكثر من ساعة.
3. الأوجاع تمنعني من الوقوف لأكثر من نصف ساعة.
4. الأوجاع تمنعني من الوقوف لأكثر من 10 دقائق.
5. الأوجاع تمنعني من الوقوف مطلقا.

#### الفقرة 7: النوم

0. نومي لا يضطرب أبدا بالأوجاع. (الأوجاع لا تؤثر على نومي على الإطلاق)
1. نومي يضطرب أحيانا بالأوجاع. (الأوجاع تؤثر على نومي أحيانا)
2. أنام أقل من 6 ساعات يوميا بسبب الأوجاع.
3. أنام أقل من 4 ساعات يوميا بسبب الأوجاع.
4. أنام أقل من ساعتين يوميا بسبب الأوجاع.
5. الأوجاع تمنعني من النوم مطلقا (تماما).

## الفقرة 8: الحياة الجنسية

0. حياتي الجنسية عادية ولا تسبب زيادة في أوجاعي.
1. حياتي الجنسية عادية ولكنها تسبب زيادة في بعض أوجاعي.
2. حياتي الجنسية تكاد تكون عادية ولكنها تسبب لي أوجعا شديداً .
3. حياتي الجنسية مقيدة بشدة بسبب الأوجاع.
4. حياتي الجنسية تقريبا مقطوعة بسبب الأوجاع.
5. الأوجاع تمنعني مطلقا من الحياة الجنسية.

## الفقرة 9: الحياة الاجتماعية (زيارة الأقارب والأصحاب والخروج مع الأصدقاء والمشاركة في أنشطة اجتماعية):

0. حياتي الاجتماعية عادية ولا تزيد في أوجاعي.
1. حياتي الاجتماعية عادية ولكنها تزيد في أوجاعي.
2. الأوجاع لا تؤثر بفاعلية على حياتي الاجتماعية ولكنها تقلل من أنشطتي التي تتطلب مجهودا كبيرا
3. الأوجاع حددت حياتي الاجتماعية فأنا لا اخرج كالمعتاد كما كنت اخرج من قبل.
4. بسبب الأوجاع أصبحت حياتي الاجتماعية منحصرة في المنزل.
5. بسبب الأوجاع انقطعت حياتي الاجتماعية.

## الفقرة 10: السفر (بالسيارة)

0. أستطيع السفر إلى أي مكان من غير أن يزيد ذلك في أوجاعي.
1. أستطيع السفر إلى أي مكان ولكنه يزيد في أوجاعي.
2. الأوجاع شديدة ولكن التعامل مع الرحلات في حدود ساعتين
3. الأوجاع تقيد رحلاتي لأقل من ساعة.
4. الأوجاع تقيد رحلاتي القصيرة الضرورية لأقل من نصف ساعة.
5. الأوجاع تمنعني من القيام بالرحلات لأي مكان إلا لتلقي العلاج.

Visual Analogue Scale (VAS)

التحليل المرئي لقياس الألم

أ سوء ألم ممكن  
(Worst Pain)

لا يوجد ألم  
(No Pain)

هذا الخط طولة 10 سنتيمترات من أجل قياس شدة الألم  
ملاحظات: ارجو أن تضع علامة علي الخط تبين مقدار شدة الألم بالنسبة للحالتين المذكورتين علي جانبي الخط  
قيس من جهة يدك اليمني إلي العلامة التي وضعها المريض

This line is 10 cm for the VAS scale

Directions: Ask the patient to indicate on the line where the pain is in relation to the two extremes.

Measure will be from the right hand side to the mark.

### Squat Instruction & Record

Patient position: The patient stands with feet shoulder-width apart (Fig. A).

Technique: The patient squats until thighs are horizontal (Fig B) and returns to upright position. Each repetition rate is 1/2-3 seconds. Repeat to maximum.

Observer: Count number of repetitions (max. 50).



Figure A



Figure B

SQUAT	No. of Repetition	Remarks
Baseline Score		
4 weeks post baseline		



## 48 hours from admission (assessment)

### استبانه اوسويستري لقياس العجز (النسخة 2.0)

(صممت هذه الاستبانه لتقدم لنا معلومات عن مدى تأثير أوجاع ظهرك على قدراتك على القيام بأمر حياتك اليومية) أرجو التكرم بالإجابة عن الأسئلة الآتية بوضع إشارة صح على خيار الأكثر مناسبة من كل مجموعة من الخيارات الآتية. ( اختر إجابة واحدة من كل فقرة من الخيارات الآتية يكون الأكثر مناسبة في وصف حالتك اليوم)

#### الفقرة 1: شدة الأوجاع

0. حاليا لا أشعر بأوجاع.
1. أشعر حاليا بأوجاع خفيفة.
2. أشعر حاليا بأوجاع متوسطة.
3. أشعر حاليا بأوجاع شديدة.
4. أشعر حاليا بأوجاع شديدة جدا.
5. أشعر حاليا بأوجاع أسوأ مما يمكن تصورها .

#### الفقرة 2: العناية الشخصية (كالاغتسال واللباس)

0. يمكنني العناية بنفسى والقيام بأموري الخاصة عادة من غير أن يزيد ذلك في أوجاعي.
1. يمكنني العناية بنفسى والقيام بأموري الخاصة غير أنني أشعر بوجع شديد عند القيام بذلك.
2. يمكنني العناية بنفسى والقيام بأموري الخاصة، ولكن ببطء وحذر.
3. أحتاج إلى بعض المساعدة، ولكن يمكنني القيام بمعظم أموري الخاصة.
4. أحتاج إلى مساعدة يوميا للقيام بأموري الخاصة.
5. أبقى في الفراش ولا يمكنني أن ألبس ثيابي، ولا أغتسل

#### الفقرة 3: رفع الأشياء ونقلها

0. أستطيع رفع الأشياء الثقيلة من غير أن يزيد ذلك من أوجاعي.
1. أستطيع رفع الأشياء الثقيلة ولكن ذلك يزيد من أوجاعي.
2. الأوجاع تمنعني من رفع الأوزان الثقيلة إذا كانت على الأرض لكن يمكنني التعامل معها إذا كانت في وضع مرتفع عال -كالطاولة مثلا.
3. الأوجاع تمنعني من رفع الأشياء الثقيلة ولكن بإمكانني التعامل مع رفع الأشياء الخفيفة ومتوسطة الوزن إذا كانت في وضع مناسب.
4. أستطيع رفع الأشياء خفيفة الوزن فقط.
5. رفع أو حمل أي شي ليس في استطاعتي على الإطلاق

#### الفقرة 4: المشي

0. الأوجاع لا تمنعني من المشي أي مسافة.
1. الأوجاع تمنعني من المشي لأكثر من كيلو متر ونصف.
2. الأوجاع تمنعني من المشي لأكثر من أربعمئة متر.
3. الأوجاع تمنعني من المشي لأكثر من مائة متر.
4. أستطيع المشي فقط باستعمال عصا أو عكاز.
5. أبقى في الفراش معظم الوقت وأزحف للوصول إلى المراض.

#### الفقرة 5: الجلوس

0. يمكنني الجلوس على أي كرسي المدة التي أريدها.
1. يمكنني الجلوس فقط على كرسي المفضل المدة التي أريدها.
2. الأوجاع تمنعني من الجلوس على الكرسي لأكثر من ساعة.
3. الأوجاع تمنعني من الجلوس على الكرسي لأكثر من نصف ساعة.
4. الأوجاع تمنعني من الجلوس على الكرسي لأكثر من 10 دقائق.
5. الأوجاع تمنعني من الجلوس مطلقا .

#### الفقرة 6: الوقوف

0. أستطيع البقاء واقفا المدة التي أريدها دون زيادة أوجاعي.
1. أستطيع البقاء واقفا المدة التي أريدها ولكن ذلك يزيد من أوجاعي.
2. الأوجاع تمنعني من الوقوف لأكثر من ساعة.
3. الأوجاع تمنعني من الوقوف لأكثر من نصف ساعة.
4. الأوجاع تمنعني من الوقوف لأكثر من 10 دقائق.
5. الأوجاع تمنعني من الوقوف مطلقا.

#### الفقرة 7: النوم

0. نومي لا يضطرب أبدا بالأوجاع. (الأوجاع لا تؤثر على نومي على الإطلاق)
1. نومي يضطرب أحيانا بالأوجاع. (الأوجاع تؤثر على نومي أحيانا)
2. أنام أقل من 6 ساعات يوميا بسبب الأوجاع.
3. أنام أقل من 4 ساعات يوميا بسبب الأوجاع.
4. أنام أقل من ساعتين يوميا بسبب الأوجاع.
5. الأوجاع تمنعني من النوم مطلقا (تماما).

#### الفقرة 8: الحياة الجنسية

0. حياتي الجنسية عادية ولا تسبب زيادة في أوجاعي.
1. حياتي الجنسية عادية ولكنها تسبب زيادة في بعض أوجاعي.
2. حياتي الجنسية تكاد تكون عادية ولكنها تسبب لي أوجاعا شديدة .
3. حياتي الجنسية مقيدة بشدة بسبب الأوجاع.
4. حياتي الجنسية تقريبا مقطوعة بسبب الأوجاع.
5. الأوجاع تمنعني مطلقا من الحياة الجنسية.

**الفقرة 9: الحياة الاجتماعية (زيارة الأقارب والأصحاب والخروج مع الأصدقاء والمشاركة في أنشطة اجتماعية):**

0. حياتي الاجتماعية عادية ولا تزيد في أوجاعي.
1. حياتي الاجتماعية عادية ولكنها تزيد في أوجاعي.
2. الأوجاع لا تؤثر بفاعلية على حياتي الاجتماعية ولكنها تقلل من أنشطتي التي تتطلب مجهودا كبيرا
3. الأوجاع حددت حياتي الاجتماعية فأنا لا اخرج كالمعتاد كما كنت اخرج من قبل.
4. بسبب الأوجاع أصبحت حياتي الاجتماعية منحصرة في المنزل.
5. بسبب الأوجاع انقطعت حياتي الاجتماعية.

**الفقرة 10: السفر (بالسيارة)**

0. أستطيع السفر إلى أي مكان من غير أن يزيد ذلك في أوجاعي.
1. أستطيع السفر إلى أي مكان ولكنه يزيد في أوجاعي.
2. الأوجاع شديدة ولكن التعامل مع الرحلات في حدود ساعتين
3. الأوجاع تقيد رحلاتي لأقل من ساعة.
4. الأوجاع تقيد رحلاتي القصيرة الضرورية لأقل من نصف ساعة.
5. الأوجاع تمنعني من القيام بالرحلات لأي مكان إلا لتلقي العلاج.

**استبيان عن حالتك**

**كيف حال آلام ظهرك خلال اليومين الماضيين**

**ضع إشارة صح أمام الإجابة المناسبة**

صارت أسوأ

مثل ما هي

لقد تحسنت

**4 weeks from admission (assessment)**

## استبانته اوسويستري لقياس العجز (النسخة 2.0)

(صممت هذه الاستبانته لتقدم لنا معلومات عن مدى تأثير أوجاع ظهرك على قدراتك على القيام بأمر حياتك اليومية )  
أرجو التكرم بالإجابة عن الأسئلة الآتية بوضع إشارة صح على خيار الأكثر مناسبة من كل مجموعة من الخيارات الآتية. ( )  
اختر إجابة واحدة من كل فقرة من الخيارات الآتية يكون الأكثر مناسبة في وصف حالتك اليوم)

### الفقرة 1: شدة الأوجاع

0. حاليا لا أشعر بأوجاع.
1. أشعر حاليا بأوجاع خفيفة.
2. أشعر حاليا بأوجاع متوسطة.
3. أشعر حاليا بأوجاع شديدة.
4. أشعر حاليا بأوجاع شديدة جدا.
5. أشعر حاليا بأوجاع أسوأ مما يمكن تصورها .

### الفقرة 2: العناية الشخصية (كالاغتسال واللباس)

0. يمكنني العناية بنفسى والقيام بأموري الخاصة عادة من غير أن يزيد ذلك في أوجاعي.
1. يمكنني العناية بنفسى والقيام بأموري الخاصة غير أنني أشعر بوجع شديد عند القيام بذلك.
2. يمكنني العناية بنفسى والقيام بأموري الخاصة، ولكن ببطء وحذر.
3. أحتاج إلى بعض المساعدة، ولكن يمكنني القيام بمعظم أموري الخاصة.
4. أحتاج إلى مساعدة يوميا للقيام بأموري الخاصة.
5. أبقى في الفراش ولا يمكنني أن ألبس ثيابي، ولا أغتسل

### الفقرة 3: رفع الأشياء ونقلها

0. أستطيع رفع الأشياء الثقيلة من غير أن يزيد ذلك من أوجاعي.
1. أستطيع رفع الأشياء الثقيلة ولكن ذلك يزيد من أوجاعي.
2. الأوجاع تمنعني من رفع الأوزان الثقيلة إذا كانت على الأرض لكن يمكنني التعامل معها إذا كانت في وضع مرتفع عال -كالطاولة مثلا.
3. الأوجاع تمنعني من رفع الأشياء الثقيلة ولكن بإمكانني التعامل مع رفع الأشياء الخفيفة ومتوسطة الوزن إذا كانت في وضع مناسب.
4. أستطيع رفع الأشياء خفيفة الوزن فقط.
5. رفع أو حمل أي شيء ليس في استطاعتي على الإطلاق

#### الفقرة 4: المشي

0. الأوجاع لا تمنعني من المشي أي مسافة.
1. الأوجاع تمنعني من المشي لأكثر من كيلو متر ونصف
2. الأوجاع تمنعني من المشي لأكثر من أربعمئة متر.
3. الأوجاع تمنعني من المشي لأكثر من مائة متر.
4. أستطيع المشي فقط باستعمال عصا أو عكاز.
5. أبقى في الفراش معظم الوقت وأزحف للوصول إلى المراض.

#### الفقرة 5: الجلوس

0. يمكنني الجلوس على أي كرسي المدة التي أريدها.
1. يمكنني الجلوس فقط على كرسي المفضل المدة التي أريدها.
2. الأوجاع تمنعني من الجلوس على الكرسي لأكثر من ساعة.
3. الأوجاع تمنعني من الجلوس على الكرسي لأكثر من نصف ساعة.
4. الأوجاع تمنعني من الجلوس على الكرسي لأكثر من 10 دقائق.
5. الأوجاع تمنعني من الجلوس مطلقا .

## الفقرة 6: الوقوف

0. أستطيع البقاء واقفا المدة التي أريدها دون زيادة أوجاعي.
1. أستطيع البقاء واقفا المدة التي أريدها ولكن ذلك يزيد من أوجاعي.
2. الأوجاع تمنعني من الوقوف لأكثر من ساعة.
3. الأوجاع تمنعني من الوقوف لأكثر من نصف ساعة.
4. الأوجاع تمنعني من الوقوف لأكثر من 10 دقائق.
5. الأوجاع تمنعني من الوقوف مطلقا.

## الفقرة 7: النوم

0. نومي لا يضطرب أبدا بالأوجاع. (الأوجاع لا تؤثر على نومي على الإطلاق)
1. نومي يضطرب أحيانا بالأوجاع. (الأوجاع تؤثر على نومي أحيانا)
2. أنام اقل من 6 ساعات يوميا بسبب الأوجاع.
3. أنام اقل من 4 ساعات يوميا بسبب الأوجاع.
4. أنام اقل من ساعتين يوميا بسبب الأوجاع.
5. الأوجاع تمنعني من النوم مطلقا (تماما).

## الفقرة 8: الحياة الجنسية

0. حياتي الجنسية عادية ولا تسبب زيادة في أوجاعي.
1. حياتي الجنسية عادية ولكنها تسبب زيادة في بعض أوجاعي.
2. حياتي الجنسية تكاد تكون عادية ولكنها تسبب لي أوجاعا شديدة.
3. حياتي الجنسية مقيدة بشدة بسبب الأوجاع.
4. حياتي الجنسية تقريبا مقطوعة بسبب الأوجاع.
5. الأوجاع تمنعني مطلقا من الحياة الجنسية.

الفقرة 9: الحياة الاجتماعية (زيارة الأقارب والأصحاب والخروج مع الأصدقاء والمشاركة في أنشطة اجتماعية):

0. حياتي الاجتماعية عادية ولا تزيد في أوجاعي.
1. حياتي الاجتماعية عادية ولكنها تزيد في أوجاعي.
2. الأوجاع لا تؤثر بفاعلية على حياتي الاجتماعية ولكنها تقلل من أنشطتي التي تتطلب مجهودا كبيرا
3. الأوجاع حددت حياتي الاجتماعية فأنا لا اخرج كالمعتاد كما كنت اخرج من قبل.
4. بسبب الأوجاع أصبحت حياتي الاجتماعية منحصرة في المنزل.
5. بسبب الأوجاع انقطعت حياتي الاجتماعية.

### الفقرة 10: السفر (بالسيارة)

0. أستطيع السفر إلى أي مكان من غير أن يزيد ذلك في أوجاعي.
1. أستطيع السفر إلى أي مكان ولكنه يزيد في أوجاعي.
2. الأوجاع شديدة ولكن التعامل مع الرحلات في حدود ساعتين
3. الأوجاع تقيد رحلاتي لأقل من ساعة.
4. الأوجاع تقيد رحلاتي القصيرة الضرورية لأقل من نصف ساعة.
5. الأوجاع تمنعني من القيام بالرحلات لأي مكان إلا لتلقي العلاج.

Visual Analogue Scale (VAS)

التحليل المرئي لقياس الألم

أسوأ ألم ممكن  
(Worst Pain)

لا يوجد ألم  
(No Pain)

هذا الخط طولة 10 سنتيمترات من أجل قياس شدة الألم  
 ملاحظات: ارجو أن تضع علامة علي الخط تبين مقدار شدة الألم بالنسبة للحالتين المذكورتين علي جانبي الخط  
 قيس من جهة يدك اليمنى الي العلامة التي وضعها المريض

This line is 10 cm for the VAS scale

Directions: Ask the patient to indicate on the line where the pain is in relation to the two extremes.  
 Measure will be from the right hand side to the mark.

### Squat Instruction & Record

Patient position: The patient stands with feet shoulder-width apart (Fig. A).

Technique: The patient squats until thighs are horizontal (Fig B) and returns to upright position. Each repetition rate is 1/2-3 seconds. Repeat to maximum.

Observer: Count number of repetitions (max. 50).



Figure A

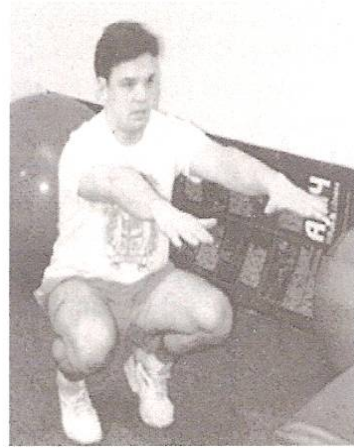


Figure B

SQUAT	No. of Repetition	Remarks
Baseline Score		
4 weeks post baseline		



# CHAPTER 5

## DISCUSSION

### 5.1 INTRODUCTION

The study was conducted to validate the Arabic version of the ODI developed in Tunisia for use amongst UAE nationals. The study aims were: first, to cross-culturally adapt the Arabic version of the ODI developed in Tunisia to devise a pre-final ODI-UAE Arabic version; second, to pre-test the pre-final ODI-UAE Arabic version in a target group of patients to devise the final ODI-UAE Arabic version; third, to evaluate test-retest reliability, internal consistency, and to determine the reliability of the final ODI-UAE Arabic version; fourth, to evaluate construct validity, effect size, responsiveness to change, floor and ceiling effects, and item frequency response (item sensitivity) to determine the validity of the final ODI-UAE Arabic version.

Most of the self-report outcome measures for low back pain have been developed in the English language and had been validated in English speaking populations. ODI has been adapted and validated for 12 different cultures and languages. A Tunisian Arabic version of the ODI has been published; however there are more than twelve Arabic cultures. Therefore ODI adaptation and validation is required for them. Further adaptation and validation studies of the ODI in specific and other self-reported outcome measures across culture are needed to produce instruments that can be used in different populations for: clinicians to evaluate intervention outcomes; compare responses across samples and/or cultures; and establish normative data. This information would be invaluable for clinicians and researchers.

## 5.2 Cross-culture Adaptation

The cross-culture adaptation process comprises of two stages, translation and culture adaptation. Application of the parameters described by Beaton et al. (2000) (in "*Possible Scenarios Where Some Form of Cross-Culture Adaptation is Required*"), to our study indicated that the translation process was not required, and the culture adaptation process was the only part of cross-culture that was required for this study (see table 3.1 chapter 3). During the culture adaptation procedures we followed the guidelines described by Beaton et al (2000) (see table 3.1, chapter 3). Necessary modifications (see table 3.1, chapter 3) of the current ODI Arabic version were made for UAE culture by the expert committee; they added one sentence to the instructions to make it clear to the clients; reconstructed the sentences of the choices for questions from 2 to 7 to correct the meaning and adding words (e.g. 'more than' to question 4, choice 2 and 3) to clarify the meaning for the clients; and produced the pre-final ODI-UAE Arabic version. The modifications were appropriate for UAE culture. The pre-final ODI-UAE Arabic version was pretested in a Delphi study for a group of 20 clients with LBP (stakeholders); the target results were obtained from the first round. The pre-final ODI-UAE appeared to be easily administered and clearly understood by the clients participating in this study. The problem encountered during the process was the presence of two different opinions among the expert committee members after they reviewed the pretesting results (see chapter 3, table 3.3) regarding the low response to the sex life question. It had been found on the pretest results that only 5 participants out of 20 responded to the ODI-UAE sex life item. That was considered a low response rate by the two methodologists of the expert committee; their opinion was to remove the sex life question from the final ODI-UAE Arabic version as it looks like an offensive question to UAE culture. Their opinion was in line with the results of three studies; however the opinion of the other committee members was to keep the sex life question of the final ODI-UAE for further testing in a larger population of the validity study. Apart from that problem just mentioned, the expert committee consensus was reached and all members agreed to keep the sex life question in the final ODI-UAE Arabic

version for further testing, and they approved the pre-final ODI-UAE to be the final ODI-UAE Arabic version that was used in the validity study. The process of culture adaptation that was used for this study was also used in 10 of the 12 reviewed studies (see figure 3.1 in chapter 3). In this way, face and content validity of the final ODI-UAE Arabic version was regarded as satisfactory.

The psychometric properties of the final ODI-UAE Arabic version were tested for UAE nationals with LBP in a validation study to determine its reliability and validity in the UAE. The psychometric properties of the final ODI-UAE Arabic version that were evaluated will now be discussed in the following order: test-retest reliability and internal consistency to determine its reliability; construct validity, effect size, response frequency (item sensitivity), and floor and ceiling effects to determine its validity in UAE Arabic nationals.

### **5.3 Reliability of the ODI-UAE 9 Questions**

It was hypothesized that the final ODI-UAE Arabic version would be reliable for UAE Nationals with LBP if test-retest results that were calculated from the baseline and 48 hours measurements showed an ICC  $>0.70$ , and the Bland & Altman mean of the inter-individual differences was  $= < 1$ ; if internal consistency results that were calculated from the baseline measurement showed a Cronbach's alpha between 0.7 and 0.95.

#### **5.3.1 Reliability of Missed Data**

There were data missed due to a high percentage of clients' non-responses (69% at baseline) to the sex life question (see table 4.3 Chapter 4). This led to the conduct of additional reliability analyses, to determine whether this question had an impact on the overall reliability of the ODI-UAE Arabic version. Therefore internal consistency, inter-item correlation were conducted on the full ODI-UAE (10 questions) and on the ODI without the sex life question (9 questions). The reliability of the ODI with the sex life question removed was identical to that gained when this question was retained in the total score. Based on these

reliability results the sex life question was omitted in this ODI-UAE Arabic version. This is in line with the observation that the sex life question is unacceptable in some cultures, and has been omitted in some studies: the ODI Arabic version developed in Tunisia (Guermazi et al 2004), Validation of the Korean Version (Kim et al 2004), and the development of a German version of the ODI (Mannion et al 2006). We omitted question 8 (sex life) from the final ODI-UAE Arabic version to make ODI-UAE acceptable to the UAE clients, administration smoother, and less compounded by the lower response rate of this question.

### **5.3.2 Test-Retest of the ODI-UAE**

A self-reported outcome measure's test-retest reliability indicates how stable it is over a predefined time interval, with the ICC indicating the strength of agreement between measurements recorded on two occasions. In the present study, we calculated the ICC from the measurements that were conducted at baseline and 48 hours interval; high correlation between baseline and retest measurement of the ODI-UAE (9 questions) with (ICC of 0.99) represent a high level of test-retest reliability, allowing for clinical use (see figure 4.3, Chapter 4). The mean of the ODI-UAE (9 sections) at baseline and 48 hours was (0.68) (see figure 4.4 in chapter 4) which reflects acceptable agreement and stability in the light of our hypotheses.

The ICC reported in the present study for the ODI-UAE strongly corresponded to previous studies of the original version of the ODI and the modified versions. Fairbank et al (2000) reported the test-retest of the original (English) version of the ODI with ICC 0.99 over 24 hours (see table 2.5, chapter 2).

The time interval was chosen to minimize the possible memory effect; the follow-up treatment sessions in the physiotherapy departments at the hospitals are scheduled every other day, therefore we selected 48 hours to follow the physiotherapy schedule policy and made it viable for the clients as they were

coming for their treatment. The 48 hours interval was convenient for the physiotherapists who had heavy work loads. Also it maintained the response of the participants at the 48 hours measurement as they were coming not only to complete the ODI-UAE, but also for treatment; 98% of the participants who completed the ODI-UAE at baseline showed at the 48 hours. This time interval were used by Chow, Chan (2005), Guermazi et al (2005), Kim et al (2004), Grotle et al (2003). The discrepancies among the reliability indices could be due to the differences in the period of time between the baseline (first assessment) and retest (second assessment). The longer the period is, the more the results are confounded by other factors such as natural recovery or the intervention effect (Chow, Chan (2005)).

### **5.3.2 Internal Consistency of the ODI-UAE**

The internal consistency of the ODI-UAE was examined using Cronbach's alpha, an item correlation test that reflects the homogeneity of all the items. Cronbach's alpha was calculated from the baseline measurement score of the ODI-UAE. For the presented study the whole Cronbach's alpha was 0.99, which is higher than the majority of coefficients previously reported (refer to table 2.7 chapter 2), Cronbach's alpha of greater than 0.8 are generally recommended for the psychometric scales (Mannion et al 2006), although for individual client assessment in clinical situations, an alpha coefficient of at least 0.9 is recommended (Mannion et al 2006). Thus, in this sense, the ODI-UAE should be suitable not only for group analysis but also for interpretation of individual scores.

### **5.4 Validity of the ODI-UAE**

For validity it was hypothesized that the final ODI-UAE Arabic version would be valid for UAE Nationals with LBP if:

a) The construct validity results calculated from the baseline score and 4 weeks measurements for the final ODI-UAE, VAS and Squat test demonstrated strong positive correlation between ODI-UAE and VAS  $r \Rightarrow 0.70$  ( $p = <0.01$ ), and moderate inverse correlation between ODI and Squat  $r \Rightarrow 0.65$  ( $p = <0.01$ ).

b) The results of the maximum frequency response of the options under the 10 questions of the final ODI-UAE calculated from the baseline score measurements were less than 80% for the option under the 10 questions.

c) The sensitivity to change results of the standardized response mean (SRM) and effect size calculated from the measurements of the ODI-UAE, VAS and Squat test at baseline and 4 weeks follow-up were comparable values (SRM of 0.2 is considered a small change, 0.5 moderate, and  $\geq 0.8$  a large change) (Osthus et al 2006).

d) The results of the floor and ceiling effects calculated from the measurements of final ODI-UAE at baseline, 48 hours and 4 weeks demonstrated that less than 20% of the respondents achieved the lowest or highest possible score respectively (0-11.5) or (87-100%) of all the options under the 10 questions of ODI-UAE, thus determining an absence of floor and ceiling effects (Lauridsen et al 2006).

#### **5.4.1 Construct Validity of the ODI-UAE**

With some notable exceptions, head-to-head comparisons between different scales are relatively rare (Mousavi et al 2006). The correlation of the ODI, Roland-Morris Disability Questionnaire and VAS scale with various other tests has been assessed as a measure of construct validity. Construct validity means that an instrument relates to other tests or measurement in a way one would expect. Construct validity is based on logical relationships among variables and never is complete but it is cumulative over the number of studies that take place (Boscainos et al 2003). Construct validity is a more general notion than other forms of validity and, accordingly, there are more ways of assessing it. Due to the lack of a “golden standard” and a valid head to head self-reported outcome measure in Arabic, we examined the correlation of the ODI-UAE change score against the VAS scale and the Squat test score to evaluate the construct validity of the ODI-UAE. To evaluate the construct validity we compared the ODI-UAE results with the VAS and the Squat results by using the Pearson’s correlation coefficient. The results of the Pearson’s correlation coefficient calculation were

that the ODI-UAE showed strong positive correlation with the VAS and for the final ODI-UAE and the Squat indicated a moderate inverse correlation among them. The results also were significant in both measurement times. The results of the correlation between the ODI-UAE and the VAS are exceeding the results reported in the previous adapted ODI studies that ranged from  $r=0.39 - 0.52$  (Grotle et al 2003) to  $r= .83$  (Vigatto et al 2007) (see figure 4.6, and figure 4.7 in chapter 4). The results of the correlation between the ODI-UAE and the Squat are in line with the results reported by Gronblad et al (1997).

#### **5.4.2 Frequency Response**

The results of the maximum frequency response calculated from the baseline score were less than 80% for all the response options of the ODI-UAE 10 questions. Maximum frequency response scored was 42 for the sex life question and the minimum frequency scored was for 28 for the personal care question (see table 4.5 chapter 4). That indicates that the 10 questions of ODI-UAE seem to be sensitive enough to discriminate between the level of severity of activity limitations and participation restrictions of clients with LBP. Our results correspond with the results of Osthus et al (2006) as the only study conducting the measurement. Further testing of the ODI-UAE in two different populations with LBP is needed to confirm this property. The results support our hypothesis for this property as the maximum response was less than 80% for all the questions. These results will help in the clinical setting to differentiate between clients having different severity of LBP or help to group clients with the same severity of LBP.

#### **5.4.3 Sensitivity to change**

Sensitivity to change refers to the ability of the ODI-UAE to detect changes over the course of intervention. As in this study we examined one group of clients that is presumed to have changed over the course of the study which means the changes occurred over the period of the initial assessment (baseline measurement score) and the 4 weeks follow-up measurement score. To

measure sensitivity to change, the standardized response mean (SRM) and effect size were calculated from the measurements of the ODI-UAE, VAS and Squat that were conducted at baseline and 4 weeks follow-up. The SRM results values of the ODI-UAE, VAS, and Squat were 2.13, 1.96, and 1.64 respectively, which are considered a large change as Osthus et al (2006) categorize (SRM of 0.2 is considered a small change, 0.5 moderate, and  $\geq 0.8$  a large change). As the SRM values of the ODI-UAE, VAS, and Squat are comparable and fall in the same category change that indicates that all of them detect the anticipated changes the clients had over the 4 weeks period. This is a useful property of the ODI-UAE to be used to measure changes in clients' functional limitation and participation restriction over the course of the intervention. The results were comparable to what was reported by Osthus et al (2006) for the ODI-UAE and Gronblad et al (1997) for the Squat.

The calculated results of effect size from the measurements of the ODI-UAE, VAS and Squat test at baseline and 4 weeks follow-up were 1.66, 1.85, and 1.59 and there is no upper limit associated with this coefficient. These results are identical and comparable which reflect acceptable association among the three instruments. The results are in line with Lauridsen et al (2006) which is the only study that calculated the SRM and ES for the validation of the adapted Danish ODI that was included in the review (chapter 2). There are other studies which measured the responsiveness and sensitivity to change in two groups of clients using the area under a receiver operating characteristic curve analysis (ROC) as a longitudinal validity coefficient which is different from our study as we used a single group. Our results for sensitivity to change support our hypothesis under validity in chapter 4 section 4.2.

#### **5.4.4 Floor and Ceiling effects**

The lowest and highest possible scores of a scale are known as the "floor" and "ceiling." If a high proportion of patients score at or very close to the floor or ceiling, no further improvement or deterioration can be detected resulting in biased results (Lauridsen et al 2006).



Traditionally floor and ceiling effects describe the percentage of clients scoring maximal or minimal points. It has been suggested that self-reported outcome measures with more than 15% of the respondents scoring at the floor or ceiling initially should not be used. It was hypothesized that the absence of floor and ceiling effect would be determined if less than 15% of the respondents achieved the lowest or highest possible score respectively (0 -11.5) or (87-100%) (Lauridsen et al 2006). Floor and ceiling effects were evaluated to determine whether the ODI-UAE had enough width to allow clients to demonstrate improvement and deterioration. The results of the floor and ceiling effects were calculated from the measurements of final ODI-UAE at baseline, 48 hours and 4 weeks. We did not find any floor or ceiling effect of the ODI-UAE. Mannion et al (2006) determined floor and ceiling effects by calculating the number of individuals obtaining the lowest (0) or the highest (100). This indicates the proportion of clients for whom it would not be possible to measure a meaningful deterioration or improvement of their condition; this criteria is different from Lauridsen et al 2006 that has been used in our study.

In summary, the ODI-UAE has been successfully adapted for the UAE culture, furthermore it has been shown to have overall good to excellent psychometric properties in a UAE population with LBP.

## **5.6 Limitation**

The findings of this study are limited by the characteristics of the participants, who suffered from non-specific low back pain. The results therefore are not readily applicable to those who had specific low back pain or had surgical operation in UAE. Also there is a lack of a “gold standard”, head-to-head and well validated instruments that were available in Arabic language purporting to measure the construct of the ODI (e.g. domains of pain, functional limitation and participation restriction) for correlation evaluation. The moderate correlation was obtained for the construct validity between the ODI and the Squat.

## CHAPTER 6

### RECOMMENDATIONS for FURTHER STUDIES and CONCLUSION

#### 6.1 Recommendations

Currently there is a lack of self administered outcome measures valid in Arabic to enhance evidence based outcomes practice. This study is the first to culturally adapt and validate the ODI Arabic version developed in Tunisia in an UAE culture population with LBP. Previous studies determined a high incidence of low back pain in the UAE population (Bener et al 2004). A recent systematic review (Chapter 2) revealed that of all the self-reported outcome measures for LBP developed in English, only the ODI had been translated to Arabic and only validated in Tunisia in a female population (Guermazi et al 2005). The authors recommended further studies to confirm the validation of the ODI in other Arabic countries and culture. This is the first study to validate the ODI in an Arabic culture (Tunisia). Future studies are needed internationally to validate the available self-reported outcome measures in different languages to allow comparability studies between countries and cultures and to provide a pool of data for researchers.

Further research should focus on gathering more evidence on applications of the instrument to different types of low back pain clients.

Further studies should explore the reasons behind the lack of response to the sex life question in Arabic cultures.

Future validation studies of self reported outcome measures for back pain are also needed in other Arabic cultures and to develop modified versions for clinical use to measure intervention outcomes.

## **6.2 Conclusion**

This study has validated the ODI-UAE Arabic version in UAE culture. Our findings have provided more evidence of the psychometric properties of the ODI-UAE Arabic version. In conclusion the results of this suggest that the ODI-UAE Arabic version is an easy to understand, reliable and valid condition-specific outcome measure for the measurement of the limitation of functional ability cause by LBP in the United Arab Emirates national population.

To the authors' knowledge, the ODI-UAE Arabic version is the only condition-specific outcome measure for low back pain in UAE. In addition, as far as we know, this study describes the first attempt at validation of the ODI-UAE in UAE and the second attempt in Arabic countries; the first attempt carried out in Tunisia by Guermazi et al (2005). The literature has identified and suggested the need for international standardization of measuring instruments that evaluate low back pain. The ODI is a simple and rapid scale that is easy to score and has become one of the main instruments used to evaluate back pain disorders. We demonstrated acceptable reliability and validity in the target population. The culture adaptation of the ODI-UAE was carried out in accordance with the recommended guidelines of the cross culture adaptation.

## **6.3 Clinical and research implications**

LBP is a common disorder in UAE that is treated primarily by physiotherapists (Bener et al 2004). LBP is a significant condition that results in a range of impairments, participation restrictions and activity limitations (Ghaffari et al 2006). The implementation of best practice in the clinical setting requires the clinicians monitoring patient progress using standard outcome measures, in order to demonstrate and reflect on the effectiveness of an intervention (Grimmer et al 2005). The ODI has become one of the main self-reported outcome instruments used to evaluate disorders of back pain. A prerequisite to conducting a sound trial into the effectiveness of low back pain interventions are valid and reliable outcome measures relevant to the specific study culture and population.

Our findings reflect that overall, the ODI-UAE Arabic version is easy to conceive, quick to complete, highly accepted, and allows patients to grade limitation of activity and participation restriction. Because of its easy scoring toward change, and wide acceptance by clients, the ODI-UAE is recommended for clinical trials investigating the effectiveness of a therapy program as well as outcome measurement in LBP in a clinical routine. Furthermore, showing good correspondence with the English original as to wording and statistical tests, the ODI-UAE Arabic version allows for intercultural comparisons.

The findings of this study strongly support the application of the ODI-UAE Arabic version in a clinical sitting to measure treatment outcomes. This is going to help the therapist to monitor the clients functional status as a result of the treatment program provided. Furthermore it can demonstrate the treatment outcomes to the client in an objective and logical way to encourage clients' active participation in the treatment plan.

## REFERENCES

Amick BC, Lerner D, Rogers WH, Rooney T, Katz JN 2000, 'A review of health-related work outcome measures and their uses, and recommended measures, Spine, vol. 25, no. 24, pp 3152-3160.

Atlas SJ, Deyo RA 2001, 'Evaluation and Managing Acute Low Back Pain in the Primary Care Setting', J Gen Intern Med, vol. 16, pp. 120-131.

Bayar K, Bayar B, Yakut E, Yakut Y 2003, 'Reliability and construct validity of the Oswestry Low Pack Pain Disability Questionnaire in the elderly with low pack pain', The Pain Clinic, vol. 15, no. 1, pp 55-59.

Beaton DE, Bombardien C, Guillemin F, Ferraz MB 2000. 'Guide Lines for Cross-Culture Adaptation of Self-Reported Outcome', Spine, vol. 35, no. 24, pp. 3188-3191.

Bener A, Alwash R, Gaber T, Lovasz G 2003, 'Obesity and low back pain', Coll Antropol, vol. 27, no. 1, pp. 95-104.

Bener A, Al-Rufaie OF, Siyam A, Abuzeid MSO, Toth F, Lovasz G 2004, 'Epidemiology of low back pain in the United Arab Emirates', Aplar J of Rheumatology, vol. 7, pp. 189-195.

Bland JM, Altman DG 1995, 'Comparing methods of measurement: why plotting difference against standard method is misleading, Lancet, vol. 346, pp. 1085-1087.

Boscainos PJ, Sapkas G, Stillanessi E, Prouskas K, Papadakis SA 2003. 'Greek versions of the Oswestry and Roland-Morris disability questionnaires', Clin Orthop Relat Res, vol. Jun, no. 411, pp. 40 – 53.

Ceran F; Ozcan A 2006, 'The relationship of the Functional Rating Index with disability, pain, and quality of life in patients with low back pain', *Med Sci Monit*, vol. 12, no. 10, pp. 435-439.

Childs JD, Piva SR 2005, 'Psychometric properties of the functional rating index in patients with low back pain', *Eur Spine J*, vol. 14, no. 10, pp. 1008-1012.

Chow, JH, Chan CC 2005, 'Validation of the Chinese version of the Oswestry Disability Index', *Work*, vol. 24, no. 4, pp. 307-314.

Cole L, Houston S 1999, 'Linking outcomes management and practice improvement. Structured care methodologies: evolution and use in patient care delivery', *Outcomes Manag Nurs Pract*, vol. 3, no. 2, pp. 53-59.

Davidson M, Keating JL 2002, 'A comparison of Five Low Back Disability Questionnaires: Reliability and Responsiveness', *Physical Therapy*, vol. 82, no. 1, pp. 8-24.

Fairbank JC, Couper J, Davies JP, O'Brien JP 1980, 'The Oswestry low back pain disability questionnaire', *Physiotherapy*, vol. 66, no. 8, pp. 271-273.

Fairbank J, Pynsent P 2000, 'The Oswestry Disability Index: Literature Review', *Spine*, vol. 25, no. 22, pp. 2940-2952.

Felicity Hasson, Sinead Keeney, Hugh McKenna 2000, 'Research guidelines for the Delphi survey technique', *Advanced Nursing*, vol. 32, no. 4, pp.1008-1015.

Fritz JM, Irrgang JJ 2001, 'A Comparison of a Modified Oswestry Low Back Pain Disability Questionnaire and the Quebec Back Pain Disability Scale', *Physical Therapy*, vol. 81, no. 2, pp. 776-788.

Ghaffari M, Alipour A, Farshad AA, Yensen I, Vingard E 2006, 'Incidence and recurrence of disabling low back pain and neck-shoulder pain', *Spine*, vol. 31, no. 2, pp. 2500-2506.

Grimmer K, Bialocerkowski 2005, 'A Survys', *Aust J Physiother*, vol. 51, no. 3, pp. 185-187.

Gronblad M, Wennerstrand P, Jarvinen E, Lukinmaa A, Kouri JP, Karaharju EO 1993, 'Intercorrelation and test-retest reliability of the Pain Disability Index (PDI) and the Oswestry Disability Questionnaire (ODQ) and Their correlation with pain intensity in low back pain patients', *Clin J Pain*, vol. 9, no. 3, pp. 89-95.

Gronblad M, Jarvinen E, Hurri H, Hupli M, Karaharju EO, 'Relationship of the Pain Disability Index (PDI) and the Oswestry Disability Questionnaire (ODQ) with three dynamic physical tests in group of patients with chronic low back pain and leg pain', *Clin J Pain*, vol. 10, no. 3, pp. 97-203.

Gronblad M, Hurri H, Kouri JP 1997, 'Relationship of the Pain Disability Index (PDI) and the Oswestry Disability Questionnaire (ODQ) with three dynamic physical tests in group of patients with chronic low back pain and leg pain', *Scand J Rehabil Med*. vol. 29, no. 1, pp.17-24.

Grotle M, Brox JI, Vollestad NK 2003, ' Cross-cultural adaptation of the Norwegian versions of the Roland-Morris Disability Questionnaire and the Oswestry Disability Index', *J Rehabil Med*, vol. 35, no. 5, pp. 241-247.

Grotle M, Brox JI, Vollestad NK 2004, 'Concurrent Comparison of Responsiveness in pain and Functional Status Measurements Used for Patients With Low Back Pain', *Spine*, vol. 29, no. 21, pp. 492-501.

Grotle M, Brox JI, Vollestad NK 2005, 'Functional Status and Disability Questionnaires: What Do They Assess?: A Systematic Review of Back-Specific Outcome Questionnaires', *Spine*, vol. 30, no. 1, pp. 130-140.

Guermazi M, Mezghani M, Ghroubi M, Elleuch M, Med AO, Poiraudau S, Marbet F, Demmak J, Fermanian J, Baklouti S, Sellami S, Revel M, Elleuch MH 2005, 'The Oswestry Index for low back pain translated into Arabic and validation in an Arab population', *Ann Readapt Med Phys*, vol. 48, no. 1, pp. 1-10.

Guyatt GH, Kirshner B, Jaeschke R 1992, 'Measuring health Stats: what are the necessary measurement properties?', *J Clin Epidemiology*, vol. 45, no. 12, pp. 1341-1345.

Hideki H, Masahi K, Osamu N, Masutaro M, Yasuaki T, 2006, 'Discriminative validity and responsiveness of the Oswestry Disability Index among Japanese outpatients with lumbar conditions', *Eur Spine J*, vol. 15, pp. 1645 – 1650.

Kim DY, Lee SH, Lee HY, Lee HJ, Chang SB, Chung SK, Kim HJ 2005, 'Validation of the Korean Version of the Oswestry Disability Index', *Spine*, vol. 30, no. 5, pp. E123-E127.

Kopec JA, Esdaile JM 1995, 'Functional disability scales for back pain', *Spine*, vol. 20, no. 3, pp. 1943-1949.

Kovacs FM, Abraira V, Zamora J, Fernandez C 2005, 'Spanish Back Pain Research Network. The transition from acute to subacute and chronic low back pain: a study based on determinants of quality of life and prediction of chronic disability', *Spine*, vol. 30, no. 15, pp. 1786-1792.



Lauridsen HH, Hartvigsen J, Manniche C, Korsholm L, Grunnet-Nilsson N 2006, 'Danish version of the Oswestry disability index for patients with low back pain Part 1: Cross-cultural adaptation, reliability and validity in two different populations', *Eur Spine J*, vol. 15, no. 11, pp. 1705-1716.

Lauridsen HH, Hartvigsen J, Manniche C, Korsholm L, Grunnet-Nilsson N 2006, 'Responsiveness and minimal clinically important difference for pain and disability instruments in low back pain patients', *BMC Musculoskeletal Disorders*, vol. 7, no. 10, pp. 82- 85.

Lauridsen HH, Hartvigsen J, Manniche C, Korsholm L, Grunnet-Nilsson N 2006, 'Danish version of the Oswestry disability index for patients with low back pain Part 2: Sensitivity, specificity and clinically significant improvement in two low back pain populations', *Eur Spine J*, vol. 15, no. 11, pp. 1717-1728.

Leonardo O P Costa, Chris G Maher, Jane Latimer 2007, 'Self-Reported Outcome Measures for Low Back Pain, Searching for International Cross-Culture Adaptation', *Spine*, vol. 32, no. 9, pp. 028-1037.

Liebenson G, Yoemons S 1997, 'Outcomes assessment in musculoskeletal medicine', *Man Therap*, vol. 2, no. 2, pp. 67-74

Liebenson G, Yoemons S, 1996, 'Quantitative Functional Capacity Evaluation: The Missing Link To Outcomes Assessment', *Top Clin Chiro*, vol. 3, no. 1, pp. 32 – 43.

Lurie J 2000, 'A Review of Generic Health Status Measures in Patients With Low Back Pain', *Spine*, vol. 25, no. 24, pp. 3125-3129.

Mannion AF, Junge A, Fairbank JC, Dvorak J, Grob D 2006, 'Development of a German version of the Oswestry Disability Index. Part 1: cross-cultural adaptation, reliability, and validity', *Eur Spine J*, vol. 15, no. 1, pp. 55-65.

Mannion AF, Junge A, Fairbank JC, Dvorak J, Grob D 2006, 'Development of a German version of the Oswestry Disability Index. Part 2: cross-cultural adaptation, reliability, and validity', *Eur Spine J*, vol. 15, pp. 66 – 73.

Mousavi SJ, Parnianpour M, Mehdian H, Montazeri A, Mobini B 2006, 'The Oswestry Disability Index, the Roland-Morris Disability Questionnaire, and the Quebec Back Pain Disability Scale: Translation and Validation Studies of the Iranian Version', *Spine*, vol. 31, no. 41, pp. 454-459.

Müller U, Duetz M, Roeder C, Greenough C 2004, 'Condition-Specific outcome measures for low back pain. Part 1: Validation', *Eur Spine J*, vol. 13, no. 4, pp. 301-313.

Oksuz E 2006, 'Prevalence, Risk Factors, and Preference-Based Health States of Low Back Pain in a Turkish Population', *Spine*, vol. 31, no. 25, pp. 968-972.

Osthus H, Cziske R, Jacobi E 2006, 'Cross-Cultural Adaptation of a German Version of the Oswestry Disability Index and Evaluation of Its Measurement Properties', *Spine*, vol. 31, no. 14, pp. 448-453.

Reneman MF, Jorritsma W, Schellekens JM, Goeken LN 2002, 'Concurrent validity of questionnaire and performance-based disability measurements in patients with chronic nonspecific low back pain', *J Occup Rehabil*, vol. 12, no. 3, pp. 119-129.

Rocchi MB, Sisti D, Benedetti P, Valentini M, Bellagamba S, Federici A 2005, 'Critical comparison of nine different self-administered questionnaires for the evaluation of disability caused by low back pain', *Eura Medicophys*, vol. 41, no. 4, pp. 275-281.

Schünemann HJ, Akl EA, Guyatt GH 2006, 'Interpreting the results of patient reported outcome measures in clinical trials: The clinician's perspective', *Health and Quality of Life Outcomes*, vol. 4, pp. 62-70

Shoukri MM, Asyali MH 2004, 'A Donner Sample size requirements for the design of reliability study: review and new results', *Statistical Methods in Medical Research*, vol. 13, no. 4, pp. 251-271

Tosteson AN 2000, 'Preference-based outcome measure in low back pain', *Spine*, vol.25, no. 34, pp. 3161-3166

Terwee B. Caroline, Bot D. M. Sandra, Boer R. Michel, Windt A. W. M. Danielle, Knpl L. Dirk, Dekker Joost, Bouter M. Lex, Vet C. W Henrica 2007, 'Quality criteria were proposed for measurement properties of health status questionnaires', *Clinical Epidemiology*, vol. 60, pp. 34-42.

Osthus h, Czisk R, Jacobi E 2006, 'Cross-culture adaptation of a German version of the Oswestry Disability Index and evaluation of its measurement properties', *Spine*, vol. 31, no. 14, pp. E448-E453.

Vagatto R, Alexandre NM, Correa Fiho HR 2007, 'Development of a Brazilian Portuguese version of the Oswestry Disability Index: cross-cultural adaptation, reliability, and validity', *Spine*, vol. 32, no.4, pp. 481-486.

Wagner K, Gandek B, Aaronson KN, Acquadro C, Alanso J, Apolone G, Bullinger M, Bjorner J, Fukuhara S, Kaasa S, Lepage A, Sullivan M, Wood-Dauphinee S,

Ware EJ 1998, 'Cross-Culture Comparison of the Content of the SF-36 Translations across 10 Countries: Results from the IQOLA Project', *Clinical Epidemiology*, vol. 51, no.11, pp. 925-932.

Walter DS, Eliasziw M, Donner A 1998., 'Sample size and optimal design for reliability studies', *Statistics in Medicine*, vol. 17, pp. 101-110.

Yakut E, Duger T, Oksuz C, Yorukan S, Ureten K, Turan D, Frat T, Kiraz S, Krd N, Kayhan H, Yakut Y, Guler C 2004, 'Validation of the Turkish Version of the Oswestry Disability Index for Patients With Low Back Pain', *Spine*, vol. 29, no. 5, pp. 581-585.