Cannabis and other drug use among trauma patients in three South African cities, 1999 - 2001

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Objective. To assess the extent of cannabis and other drug use among patients presenting with recent injuries at trauma units in Cape Town, Port Elizabeth and Durban from 1999 to 2001.

Design. Cross-sectional surveys were conducted during a 4-week period at each of the above sites in 1999, 2000 and 2001. The concept of an idealised week was used to render representative samples.

Outcome measures. Cause of injury and biological markers to assess use of cannabis, methaqualone (Mandrax), opiates, cocaine, amphetamine, and methamphetamine.

Results. Over half of all patients tested experienced violent injuries. Excluding opiates, across sites and over time between 33% and 62% of patients tested positive for at least one drug ($N = 1\,565$). In most cases the drugs were cannabis and/or methaqualone. While no inter-city differences were found, male patients were typically more likely to test positive for drugs in general and specific drugs such as cannabis and the cannabis/methaqualone ('white pipe') combination than female patients. Drug positivity was higher in 2001 than in the previous 2 years in Cape Town, and patients injured as a result of violence in Cape Town and Durban were more likely to test positive for drugs than patients with certain other types of injuries.

Conclusions. Drug use among trauma patients has remained consistently high for each of the 3 study periods. Efforts to combat the abuse of drugs such as cannabis and methaqualone would appear to be paramount in reducing the burden of injuries on health care services. The study has raised numerous issues requiring further research.

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Injuries accounted for 9% of global deaths and 12% of the global burden of disease in 2000.[1] In South Africa injury accounts for 25% of male and 10% of female deaths.[2] The rate of injury-related deaths for males in South Africa (239/100 000) is more than twice the global rate (112.1/100 000).[1] However, non-fatal injuries or injuries that are not immediately fatal are likely to place the greatest burden on the health sector.

A recent quantitative, international review of risk factors for preventing disease and injury suggests that alcohol, and to a lesser extent illicit drugs, are important causes of intentional and unintentional injuries.[3] While there is substantial literature on the association between alcohol and injury, there have been few published studies looking at the role of illicit drug use and injury, especially in developing countries. In the present study annual investigations were conducted from 1999 to 2001 to determine the extent of drug use among patients at trauma units in Cape Town, Durban and Port Elizabeth (PE).

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Methods

Patients presenting with recent injuries (less than 6 hours old) at the trauma units of Groote Schuur and G F Jooste hospitals in Cape Town, Livingstone and Provincial hospitals in PE, and Addington Hospital in Durban were included in each of 3 surveys conducted annually from 1999 to 2001. The concept of an 'idealised week' was used for sampling purposes in order to ensure that each day of the week was adequately represented. Each day was divided into four 6-hour shifts. One shift was randomly selected per day so that over the 4-week study period a complete 24-hour period would be covered for each day. Patients attending during these times were included provided that they gave written consent and did not meet any of the exclusion criteria. Poisonings, non-traumatic attempted suicides and paediatric patients were excluded from the study. Patients who had been referred by other treatment facilities were included if they had not received significant treatment at the first facility they attended.

The Cape Town surveys took place during February and March of the 3 respective years, the Durban surveys during June and July, and the PE surveys during August and September. A total of 1 565 patients were included across the 3 sites and the 3 years. Socio-demographic data were recorded as well as the cause and type of injuries sustained. Participants were asked if they had used any drugs before their injury and a urine specimen was collected and analysed using the Acon Multi Drug kit, which tests for cannabis, opiates, cocaine, amphetamine and methamphetamine. Samples were analysed

Table I. Demographics of sample and urinalysis results for drugs (N and % positive)

	Cape Town			PE			Durban		
	1999	2000	2001	1999	2000	2001	1999	2000	2001
Gender (N (%))									
Male	164 (75.9)	154 (75.5)	86 (86.0)	165 (70.5)	141 (70.1)	117 (68.8)	120 (75.9)	104 (69.8)	113 (85.0)
Female	52 (24.1)	50 (24.5)	14 (14.0)	69 (29.5)	60 (29.9)	53 (31.2)	38 (24.1)	45 (30.2)	20 (15.0)
Mean age (years) (± SD)	32.6 (11.8)	30.1 (12.0)	31.2 (11.5)	32.9 (11.8)	34.3 (13.4)	32.6 (13.0)	29.2 (11.6)	31.8 (13.7)	28.3 (10.6)
Type of injury (N (%))									
Violent	131 (60.6)	122 (59.8)	63 (63.0)	151 (64.5)	137 (68.2)	119 (70.0)	87 (55.1)	82 (55.0)	90 (67.7)
Transport	46 (21.3)	36 (17.6)	22 (22.0)	52 (22.2)	26 (12.9)	24 (14.1)	25 (15.8)	37 (24.8)	16 (12.0)
Other	39 (18.1)	46 (22.6)	15 (15.0)	31 (13.3)	38 (18.9)	27 (15.9)	46 (29.1)	30 (20.1)	27 (20.3)
Positivity by drug of abuse (N (%))									
Cannabis (Acon)	72 (33.3)	66 (32.4)	58 (58.0)	100 (42.7)	40 (19.9)	47 (28.7)	48 (30.4)	50 (33.6)	58 (43.9)
Cannabis (lab)	71 (32.9)	72 (35.3)	59 (59.0)	100 (42.7)	52 (25.9)	41 (25.0)	54 (34.2)	52 (34.9)	52 (39.4)
Methaqualone	47 (21.8)	40 (19.6)	35 (35.0)	31 (13.2)	22 (10.9)	18 (11.0)	18 (11.4)	11 (7.4)	25 (18.9)
Cocaine	7 (3.2)	5 (2.5)	7 (7.0)	0 (0)	27 (13.4)	0 (0)	4 (2.5)	6 (4.0)	4 (3.0)
Methamphetamine	0 (0)	1 (0.5)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0.6)	1 (0.7)	0 (0)
Amphetamine	0 (0)	3 (1.5)	0 (0)	0 (0)	0 (0)	6 (3.7)	0 (0.0)	0 (0)	1 (0.8)
Opiates	16 (7.4)	21 (10.3)	4 (4.0)	0 (0)	13 (6.5)	4 (2.4)	7 (4.4)	10 (6.7)	7 (5.3)
White pipe*	45 (20.8)	35 (17.2)	35 (35.0)	31 (13.2)	21 (10.4)	18 (11.0)	16 (10.1)	11 (7.4)	21 (15.9)
Any drug+	73 (36.5)	68 (37.2)	59 (61.5)	100 (42.7)	70 (37.2)	54 (32.5)	54 (35.8)	51 (36.7)	57 (45.2)
Any drug (males only) +	67 (44.4)	61 (43.9)	53 (63.9)	90 (54.5)	59 (44.4)	38 (33.0)	50 (43.9)	47 (48.0)	54 (50.5)
Any drug (females only) +	6 (12.2)	7 (15.9)	6 (46.2)	10 (14.5)	11 (20.0)	16 (31.4)	4 (10.8)	4 (9.8)	3 (15.8)
Positivity for any drug by type of injury (N (%))									
Violent	53 (42.4)	44 (40.7)	41 (66.1)	67 (44.4)	45 (35.4)	40 (34.2)	39 (45.9)	34 (45.3)	44 (50.0)
Transport	11 (27.5)	15 (46.9)	11 (55.0)	22 (42.3)	11 (45.8)	7 (29.2)	3 (12.0)	8 (21.6)	6 (37.5)
Other unintentional	9 (25.7)	9 (20.5)	7 (50.0)	11 (35.5)	14 (37.8)	7 (28.0)	12 (29.3)	9 (33.3)	7 (31.8)

* A 'white pipe' is a combination of cannabis and methaqualone, usually smoked in a pipe.
+ Excludes opiates because of the possibility of morphine having been taken/administered before arriving at the trauma unit. The laboratory result for cannabis was used in calculating positivity on 'any drug'.

for methaqualone (Mandrax) by the Department of Pharmacology of the University of Cape Town, using a homogeneous enzyme immunoassay technique (EMIT). Subjects were considered to have tested positive if their levels exceeded 300 ng/ml. The cannabis result obtained from the drug kit was verified with laboratory testing. Tests were considered positive for cannabis if levels exceeded 25 ng/ml.

Logistical regression analyses were undertaken to assess the differences between the 3 cities and the 3 years in terms of: (*i*) the percentage of patients testing positive for specific drugs; and (*ii*) the percentage testing positive for any drug by type of injury (violence, transport and other unintentional injury). In addition, logistical regression analyses were undertaken to test for city, time and gender effects related to testing positive for any drug.

Results

Sample characteristics

Consistently across the 3 cities and in each year of the survey over two-thirds of the subjects were male (Table I). The mean age across sites and time periods ranged between 28 years and 34 years. Between 55.0% and 70.0% of the injuries sustained across the 3 cities and for each year of the survey were a result of violence. Road traffic and other unintentional injuries (e.g. falls, burns, near-drowning, etc.) constituted the remainder of the injuries.

Urinalysis results

Excluding opiates, as some patients may have received morphine before arriving at the trauma unit, across sites and over time between 32.5% and 61.5% of patients tested positive for at least 1 drug (Table I). For male patients the percentages testing

positive ranged between 33.0% and 63.9%, compared with between 9.8% and 46.2% for female patients. In most cases the drugs were cannabis and/or methaqualone.

The laboratory screening for cannabis showed that across sites and over the 3 time periods between 25.0% and 59.0% of patients tested positive for this drug, and between 7.4% and 35.0% of patients tested positive for methaqualone and cannabis, the so-called 'white pipe' combination. Relatively few patients tested positive for cocaine, generally between 2% and 7%; however there was a 'spike' in PE in 2000 when 13.4% of patients tested positive. Opiates were found among 0% and 10.3% of the urine samples. In addition, very few patients tested positive for amphetamine or methamphetamine, with a maximum of 3.7% for amphetamines in PE in 2001.

For cannabis, a statistically significant interaction was found between city and year of injury ($p < 0.0001$). Specifically for Cape Town, the percentage of patients testing positive was significantly higher in 2001 than in 1999 ($p = 0.0020$) and 2000 ($p = 0.0251$). Conversely, in PE the percentage of patients testing positive for cannabis was significantly higher in 1999 than in 2001 ($p < 0.0001$), and for Durban no differences by year were noted.

For 'white pipes', no statistically significant interaction was found between city and year of injury ($p = 0.1790$), but differences were found in terms of the percentage of patients testing positive by city ($p < 0.0001$) and year of injury ($p = 0.0062$). For Cape Town, the percentage of patients testing positive for 'white pipes' was significantly higher in 2001 than 2000 ($p = 0.0091$). All the other differences were not statistically significant.

For 'any drug', a statistically significant interaction was found between city and year of injury ($p = 0.0013$) year of injury and gender ($p = 0.0141$), but not between city and gender ($p = 0.1849$). Specifically, for Cape Town, no significant year and gender interaction was found ($p = 0.8750$), but significant year ($p = 0.0097$) and gender ($p < 0.0001$) effects were found. The percentage of patients testing positive for any drug at this site was significantly higher in 2001 than in 1999 and 2000 taken together, but the percentages in 1999 and 2000 were not independently less than for 2001 ($p = 0.0613$ and $p = 0.2510$ respectively). The percentage testing positive for any drug was significantly lower for females than for males in Cape Town over all years.

A significant year and gender interaction was found for PE ($p = 0.0014$). Specifically, in 1999 the percentage of females testing positive for any drug in this city was significantly lower than for males. For Durban, no significant interaction was found between the year of injury and gender ($p = 0.7255$). However, a significant gender effect was found ($p = 0.0001$), but no significant year effect ($p = 0.9909$). In this city over the 3 years females were found to be less likely to test positive for any drug than males ($p = 0.0001$).

A statistically significant interaction was also found between city and type of injury ($p = 0.0075$), city and year of injury ($p = 0.0004$), but not between year and type of injury ($p = 0.4720$). For Cape Town, the percentage of patients testing positive for any drug was significantly higher for violent injuries than for 'other unintentional' injuries ($p = 0.0209$). For Durban the percentage of patients testing positive for any drug was significantly higher for violent injures than for transport injuries ($p = 0.0128$). All the other differences were not statistically significant.

Discussion

Over time between 33% and 62% of patients tested positive for at least 1 drug. Research conducted at the 3 study sites at the same time to assess acute alcohol intoxication[4] found that across sites and over time between 36% and 79% of trauma unit patients tested positive for alcohol, suggesting that the association with drug use comprises a substantial part of the total association between substance use and trauma. Studies in other countries have found similar proportions of trauma patients testing positive for drugs. For example, a study of 516 patients admitted to a level I trauma centre in Los Angeles, California,[5] found that 42% of the patients tested positive for drugs, mostly cocaine and opiates. The Los Angeles study also found much higher levels of drug use among males.

The levels of cannabis and methaqualone use found in this study in Cape Town in 2001 (59.0%, 95% confidence interval (CI): 48.7 - 68.7% for cannabis, and 35.0%, CI: 25.7 - 45.2% for methaqualone) are significantly higher than those reported in earlier research conducted in Cape Town in 1997 (22.8%, CI: 17.6 - 28.0%, and 9.4%, CI: 5.8 - 13.0% respectively).[6] The increase in cannabis/methaqualone use over time in Cape Town reflected in the trauma unit data is in line with increases noted in specialist treatment demand for problems associated with these substances in Cape Town between 1996 and 2000.[7] This may reflect a more widespread burden experienced by the health community resulting from abuse of these substances.

While there is still debate about the precise effects of cannabis on driving,[8] no research has been conducted on the effect of methaqualone or the combination of cannabis and methaqualone on cognitive or psychomotor skills, including driving and other forms of road use. Methaqualone tablets are almost always smoked. The tablets are crushed and used together with cannabis and tobacco in a broken-off bottle neck. The combination, known as a 'white pipe', is usually smoked by a group of people rather than alone.[9] The extent to which this drug combination may also directly foster violent behaviour, especially during withdrawal states, is also unknown. The high prevalence of methaqualone use among gangsters, especially in Cape Town, complicates this issue as violent behaviour and the use of methaqualone may simply be occurring simultaneously without there being any causal

association.

While the study did not find any inter-city differences, it did generally find that: (*i*) male patients were more likely to test positive for drugs in general and for specific drugs such as cannabis and the 'white pipe' combination than female patients; (*ii*) drug positivity was higher in 2001 than in the previous 2 years in Cape Town; and (*iii*) patients injured as a result of violence in Cape Town and Durban were more likely to test positive for 'any drug' than patients having certain other types of injuries. Research conducted in Canada[10] also found associations between the use of certain drugs and injury type and indicated, for example, that a higher proportion of patients who sustained intentional injuries tested positive for cocaine than for transport-related injuries. However, it found no differences between injury groups in terms of the proportion of patients testing positive for cannabis.

The high incidence of drug use, in general, among trauma patients in South Africa and elsewhere is of concern. However, as this study did not investigate the causal links between the use of drugs and sustaining a fatal or non-fatal injury, further investigation is required in this regard. Another limitation of this study was the small number of patients who tested positive for drugs when broken down by injury type, making the drawing of conclusions about such linkages difficult. Furthermore, the sample size did not facilitate making comparisons of the association between specific drugs and specific injury types. The time period studied (3 years) also posed limits on making strong inferences regarding any changes over time. These topics warrant further research. In terms of the current situation, the recent increase in methamphetamine use that has been shown in Cape Town[11] may well be impacting on the demand for trauma services in this city and requires further investigation. Epidemiological research has also shown that combined use of cannabis and alcohol sharply increases crash risk.[12] Given the high levels of alcohol and drug-related trauma in South Africa this is also an area warranting further aetiological and intervention research.

From a public health perspective the study raises important implications for the management of patients in trauma units (physically, medically and psychologically) and for reducing the burden of drug abuse on trauma services. For example, should trauma unit staff be given more training in identifying and handling patients who are under the influence of illicit drugs? Should trauma units be more involved in referring patients who are identified or suspected of using drugs to treatment services, particularly those who are frequent users of trauma services? The study also raises questions about the level of drug-related trauma attended to by general practitioners, who as a group probably deal with more traumatic injuries than specialist trauma units.

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