Harmful effects of smoking in pregnancy

Exposure of the fetus to cigarette smoke is an important, dose-related and preventable risk factor in the quest for optimal pregnancy outcome. It is therefore essential that all health care workers and mothers are fully aware of these adverse effects.

Nicotine, the dominant alkaloid in tobacco smoke, easily crosses the placenta, leading to fetal plasma concentrations on average 15% higher than those of the mother. Nicotine also concentrates in placental tissue, amniotic fluid and breast-milk. Amniotic nicotine levels in the mid-trimester are up to 54% higher than those in maternal serum. The swallowing of amniotic fluid therefore increases fetal intake of nicotine. The consequence is that fetuses of mothers who smoke are exposed to relatively higher levels of nicotine than their mothers. Further risks are added neonatally by maternal smoking during lactation as the plasma/breast-milk nicotine ratio is 2.9.1 Therefore, it is not surprising that nicotine has extensive effects on: (i) maternal and fetal cardiovascular systems; (ii) uterine, umbilical and cerebral blood flow; (iii) the developing cerebral cortex; (iv) developing respiratory epithelium; and (v) fetal growth.

The adverse effect of nicotine is through its vasoconstrictive effects on the uterine and potentially also on the umbilical artery. It is of great concern that nicotine can activate nicotinic receptors in the fetal brain as this may affect brain development and smoking patterns later in life.

As we know today, the endothelium plays a much greater role in health and disease than was ever thought to be the case 10 years ago. It has been shown that the free radical components of cigarette smoke cause much of the damage.3 Even passive smoking is associated with abnormal endothelial function.4 The risk of passive smoking is comparable with that of a light smoker in pregnancy.1

As far as the specific effect on the endothelium is concerned, it seems that smoking during pregnancy is associated with reduced cellular fibronectin and increased intracellular adhesion molecule-1. In addition, it has been found that cigarette smoking is associated with increased circulating levels of lipid peroxidation products, which may contribute to endothelial damage. Carbon monoxide in cigarette smoke inhibits release of oxygen to fetal tissues by creating carboxyhaemoglobin, which induces relative tissue hypoxia. Microscopic examination of placental tissue of smokers reveals thickening of the trophoblastic membrane, hypertrophy and calcifications — evidence of the response to hypoxia. At microvascular level, delayed neutrophil transit has been described, which gives rise to structural lung damage because of accumulation of cells in the interstitium and bronchovascular spaces. Lackman et al. showed transplacental fetal exposure to two tobacco-specific carcinogens, isolated from the urine of in utero exposed neonates. The effects of the other components of cigarette smoke, e.g. hydrogen cyanide, thiocyanates and hydrocarbons, will not be addressed here.

The harmful effects of fetal nicotine exposure are evident in all trimesters of pregnancy. In the first trimester there is a 33% increase in incidence of spontaneous abortion. In the second trimester there is a dose-dependent increase in preterm labour and prematurity; and in the third trimester a doubled risk of low birth weight.

In their five meta-analyses of the adverse effects of maternal smoking, Castles et al. found a statistically significant increase in the risks of abruptio placentae, placenta praevia, ectopic pregnancy and preterm prelabour rupture of membranes. In addition, maternal cigarette smoking has also been implied in the aetiology of congenital defects, e.g. cleft lips and palates, neural tube defects, congenital cardiac defects, limb reduction defects and anencephaly. Furthermore, smoking is associated with an increase in childhood malignancies, including brain tumours, leukaemia and lymphoma.

The complications associated with maternal cigarette smoking during the neonatal period include doubling the risk of sudden infant death syndrome (SIDS) and restriction of pulmonary maturation, leading to increased incidence of asthma and upper respiratory infections in children. Follow-up of children who suffered in utero cigarette smoke exposure showed negative long-term cognitive outcomes, including behavioural disorders, cognitive impairment relating to linguistic skills and comprehensive. Physical manifestations include decreased head circumference in comparison to smoke-free controls.

According to a recent study conducted at Tygerberg Hospital, 39% of pregnant women smoked (in contrast to the 22% of pregnant women in a developed country such as the USA). The 1995 South African national survey found an increase in the general smoking population of 1% per annum. The rate of increase was noted to be highest among the coloured population. Smoking prevalence in the coloured population (59%) is notably higher than among Indians (36%), whites (35%) and blacks (31%). It is of great concern that in an era of preventive medicine the smoking population in South Africa is growing, escalating the adverse effects pointed out in the text. Decreasing the prevalence and initiation of smoking in pregnancy would be the most effective method of reducing the adverse effects of smoking in pregnancy, in this way directly improving perinatal outcome.
Educating medical students about tobacco

The theme for World No Tobacco Day on 31 May 2005 is ‘Health Professionals against Tobacco’. Doctors in South Africa are missing clinical opportunities to help patients who use tobacco, and recognising and taking advantage of these opportunities will require changes in the education of medical students.

In 1979, M A H Russell and his colleagues in London published research that created a sensation in smoking cessation circles. The study demonstrated that following simple but firm advice to stop smoking from their general practitioner, about 5% of smokers would quit. While the impact of an individual GP may be small, collective action by the profession would yield impressive change. Russell et al. calculated that if all GPs in Britain gave anti-smoking advice to their patients on at least one occasion, half a million patients would stop smoking as a direct result – a target unlikely to be matched if the 50 specialised smoking cessation clinics then operating in the UK were increased to 10 000.

In South Africa, if our 200 000 registered health professionals each helped one patient to stop smoking per month this would produce 2.4 million ex-smokers a year and dramatically reduce the numbers of smokers in this country. However, harnessing the power of doctors to turn smokers into ex-smokers remains an elusive goal in public health.

On 31 May, World No Tobacco Day, the World Health Organization once again focuses on the role of health professionals in tobacco control. Health workers, and especially doctors, are in a unique position to help smokers. Patients expect to get information, help and guidance from their doctor on health matters. It is the doctor who is most trusted and whose advice has the most impact upon people’s health.

Yet anecdotal evidence suggests that the average GP seldom raises the issue of smoking during a consultation. GPs frequently do not know which of their patients smoke, and as often fail to advise them to stop even when this should be part of the treatment. There are several reasons why doctors have failed to act. Perhaps the most important is that many doctors, even those deeply concerned about the harm caused by tobacco, feel powerless to influence their patient’s behaviour. Many believe they lack expertise, and that they have little to offer their patients who need help.

This pessimism is misplaced. A doctor can both motivate and help people stop smoking. At the very least a doctor can refer the patient who says ‘I’ve tried everything and nothing works’ to the Tobacco or Health Information Line (on (011) 720-3145) for counselling.

The reluctance of doctors to act points to a deeper problem. There is insufficient education for health professionals in this area. In fact, the whole area of medical training is under challenge. Doctors have been criticised for ‘practising 19th-century medicine in the 21st century’. It is argued that the training of medical students has to change so that over time doctors will move from the reactive care of individual patients with acute illness to the proactive, planned and preventive care of populations. The WHO has suggested that training has to be restructured to include a new set of competencies to help health workers manage today’s most prevalent health problems.

Among the new competencies required is helping people deal with addictions, eating disorders and other lifestyle problems. Currently no school of public health in South Africa has a chair on addictions. The University of the Witwatersrand has a teaching block on tobacco control, but in the others...