

Smoking and Pregnancy

A. Huch, J. Danko, R. Huch

The obstetrician as a primary care physician, is increasingly confronted with the problems of health related to smoking. It remains his responsibility to provide a type of comprehensive care which includes an accurate and complete information about the extent of the risk of smoking.

A smoker today should be aware that 80% of lung cancer, 80% of emphysema, 75% of chronic bronchitis, and 30% of all coronary diseases is related to smoking.

In the United States it is only smoking that causes (based on figures of 1978 in the USA) more than 320 000 deaths per year (14).

When one includes the cost of medical care and the loss of work time cigarette smoking costs the USA \$ 18 billion every year and there are no reasons to assume that these figures are different in Europe.

While in 1930 about 2% women were smoking in the western world (at that time 30% of men were smoking), figures of today show that almost 40% of women are now smoking. There is a current world-wide trend for women to start smoking at an early age, and the actual tobacco consumption in these women is also increasing. We now have the situation where we see young women who smoke both frequently and heavily so that a large number are smoking at the time of conception. A representative study in Switzerland showed that in the most fertile age group of 20 - 35 years, 52 - 56% of all young women have to be considered as smokers (3) of whom nearly 50% are heavy smokers. Only 50% do reduce or give up smoking during pregnancy.

As well as the question of the risks associated with smoking in general, and its ill effects on fertility in women there is now evidence that heavy smoking in men can also effect the spermogram with a decrease in mobility and density (6).

One is now aware of increasing evidence that tobacco smoking creates a considerable amount of biological hazards.

Everson (12) gave support to this opinion in an article published in The Lancet 1980, where he suggested that smoke constituents act initially as transplacental carcinogens and can also later increase sensitivity to subsequent carcinogenic exposures.

Furthermore there is some evidence, that cigarette smoking is an aetiological factor in the causation of cleft lip and palate and there are some other studies that indicate that tobacco smoking may be strongly related to closure defects of the central nervous system (10,11).

Apart from the fact that the conceptus of a smoking mother has a higher incidence of malformation, the likelihood of survival of the conceptus without miscarriage during the first and second trimester is significantly lower even when the child is desired (15).

Should the conceptus of the smoking mother be lucky enough to survive the first and second term, he is then confronted with the problem of increased prematurity. Furthermore the smoking mother has a greater likelihood of suffering from placenta praevia, placental abruption, bleeding in pregnancy and premature rupture of membranes (17).

Since Sontag and Wallace in 1935 (19) expressed concern about the deletari-

ous effects of maternal smoking on reproductive performance during pregnancy there is considerable proof that there are early effects on fetal growth which can lead to a reduction in length, body proportion, and in head and chest circumference. One of the latest publications showed not only a significant weight difference of 441 gr. but also a significantly lower weekly increase in BPD (18).

Maternal smoking is related to a significantly higher perinatal mortality rate (4,7).

As well as these somatic phenomena it would appear there are more emotional disturbances between the smoking mother and her child; it has been noted for example that mothers who smoke find it difficult to breast feed their babies sufficiently (and for a long enough time).

Follow-up studies in Great Britain in infants until the 11 th year of childhood show that children whose mothers were smokers during pregnancy were smaller at school age, less intelligent and emotionally less balanced than those children whose mothers were non-smokers (6,9).

Among the numerous substances which are produced with smoking, nicotine and CO are those whose pharmacological and biological potentials are of greatest significance. These substances have been studied extensively in relation to the above mentioned effects on the fetus during pregnancy. It would seem that there are 3 possible mechanism by which nicotine and CO can reduce blood supply and gas transport to the fetus:

1. Vasoconstriction
2. Consequent changes of the vascular bed of fetal vessels
3. Reduction of oxygen transport capacity in maternal and fetal blood

Blood flow to the pregnant uterus is reduced by the circulating nicotine. Nicotine, is a powerful vasoconstricting agent, which, when injected into animals, reduced the birth weight of the litters (2).

Suzuki et al (20) suggested that nicotine caused vasoconstriction of the uterine vessels, reduced perfusion of the intervillous space and relative fetal hypoxia. Nicotine also readily crosses the placenta and exerts vasoconstriction also in the fetal organs and brain. The reduction in blood flow effected by the nicotine is furthermore potentiated by other hypotensive substances present in tobacco smoke.

The vasoconstrictive effect of smoking leads to a characteristic enhanced thickness of the basal membrane of the umbilical arteries and to an oedema of the intima (1).

Carbon monoxide is responsible for a reduced capacity for hemoglobin to carry oxygen. It is now well known that passive smoking can raise Co to levels comparable with those in smokers (13) and that with increasing number of cigarettes smoked per day, the HbCO increases, sometimes as high as 8 - 10%. These values are known significantly to influence O₂ transport and hence its supply to the tissues.

There is no dispute that fetal CO values increase when the mother smokes; disagreement only concerns whether and to what extent the fetal values are higher than the maternal ones. More reliable data on the quantitative and time relationship between maternal and fetal blood CO values have been obtained from animal experiments carried out by Longo et al. (16). Longo and our own results both show that the O₂ availability in the fe-

tus is considerably compromised by typical CO concentrations that were found in smoking mothers. The amount of O₂ delivered to the tissues is influenced adversely by an increasing HbCO content through two mechanisms. The O₂ transport capacity of the blood is reduced by the presence of HbCO and there is also an increase in O₂ affinity of maternal haemoglobin which parallels the levels of HbCO.

Smoking during pregnancy should be considered as one of the biggest hazards to health and survival of the fetus. Obstetricians and midwives have to remind the pregnant woman of this constantly. It is possible to do this with the slogan of the "AKTION SORGENKIND":



Sie können auf manches verzichten,
aber nicht
auf die Gesundheit Ihres Kindes.

References:

1. Asmussen, I., et al: Circ. Res. 36;1975:579.
2. Berber RF, Am.J. Obstet. Gynecol. 100,1968,957
3. Biener K, Frau und Sucht Hoheneck Verlag GmbH, 1981
4. Butler NR et al, Br. Med. J. 2, 1972, 127
5. Butler NR et al, Br. Med. J. 4, 1973, 573
6. Campbell JM et al, Medical J. Austr.i, 1979,342
7. Comstock GW et al. Am. J. Obstet.Gynecol. 111, 1971, 53
8. Danko J et al, - unpublished data
9. Dunn HC et al, Can, J. Public Health 68, 1977, 43
10. Ericson A, Am. J. Obstet. Gynecol. 135, 1979, 348
11. Evans DR et al, Brit. med. J. 3,1979,171
12. Everson KB, The Lancet II, 1980, 123
13. Huch R et al, The Lancet ii, 1980, 1376
14. Kretzschmar RM, Obstetrics & Gynecology 55, 1980, 403
15. Kullander S et al, Acta Obstet. Gynec. Scand. 50, 1971, 83
16. Longo LD, Am.J.Physiol. 232, 1977, H324
17. Meyer MB et al, Am. J. Obstet, Gynecol. 128, 1977, 494
18. Murphy JF et al, J Irish. Med. Ass. 67, 1974, 309
19. Sontag LW et al, Am. J. Obstet Gynecol. 29, 1935, 77
20. Suzuki K et al, Am. J. Obstet. Gynecol. 111, 1971, 1092

Huch, Albert, Prof. Dr.,
Dept. of Obstetrics, University of Zürich
Frauenklinikstr. 10, 8091 Zürich/Schweiz