

AMERICAN ACADEMY OF PEDIATRICS

Committee On Environmental Hazards

Effects of Cigarette-Smoking on the Fetus and Child

“For the Health of Our Children, Please Don’t Smoke” was the message on a sign sent recently by the American Academy of Pediatrics to its members to be posted in their waiting-rooms (Fig. 1). Cigarette-smoking by the mother during pregnancy can affect the fetus, and smoking by either parent in the presence of the child may affect his health.

BIRTHWEIGHT AND FETAL BREATHING MOVEMENTS

Many studies have now shown that if the mother smokes during pregnancy the birthweight of the infant is reduced, on the average, by about 200 gm.^{1,2} Yerushalmy protested that the effect was due not to smoking but to constitutional differences in smokers as compared with non-smokers.³⁻⁶ Since Yerushalmy’s death, his argument has been continued by Burch^{7,8} and Hickey *et al.*⁹ in a debate with Goldstein.¹⁰⁻¹² Astrup *et al.*¹³ in Denmark had attempted to resolve the matter in a study which showed that carboxyhemoglobin levels from carbon monoxide exposure of rabbits and from cigarette-smoking in pregnant women were both correlated with reduction in the birthweight of the offspring. This seeming support from animal experimentation and from human laboratory observations did not satisfy Hickey *et al.*¹⁴ who claimed that some smokers may, in using tobacco, compensate for a deficiency in “biogenic amine physiology”—and the carboxyhemoglobin may, for genetic reasons, be more slowly cleared from the blood by smokers than by non-smokers. Hence innate differences in the mothers might account for the correlation between blood levels and birthweight. This rationale seems strained, especially when one considers that the effect, observed in many different races, cultures and geographic areas, is dose-related, independent of factors known or

suspected to influence birthweight, corrected within six months by accelerated growth rate (as if a toxic influence had been removed), and not found if the mother gives up smoking before the start of her pregnancy. The documentation for these findings has been summarized in an excellent review which appeared in the Surgeon General’s report in 1973 on the health consequences of smoking.¹

Recently it has been reported that when women in the 32nd to 38th week of uncomplicated pregnancies smoked two cigarettes in succession fetal breathing movements were diminished. The regularity of these movements, measured by echogram, are beginning to be regarded as an index of fetal well-being.¹⁵ Although the mechanism for this alteration is unknown and the report is preliminary in nature, there appears to be little question here about the cause-and-effect relation of cigarette-smoking.

FETAL WASTAGE

Early studies were about equally divided among those which did and those which did not show increased fetal wastage when the mother smoked during pregnancy.¹⁶ In the last few years, however, the trend has been toward those which show an effect.^{1,17-19} It is currently thought that suboptimal obstetric-pediatric care reduces the margin of safety, and the effect of cigarette-smoking on fetal wastage can then be detected when the sample size is large.^{1,2,18,20}

CONGENITAL MALFORMATIONS

In the aggregate, studies of the teratogenic effects of cigarette-smoking in man have been inconclusive.¹ The subtle manifestations recently described for the fetal alcohol syndrome^{21,22} and the fetal hydantoin syndrome²³ suggest that careful study of neonates whose mothers smoked



FIG. 1. Sign for offices of pediatricians sent by the American Academy of Pediatrics to its members in May 1975.

heavily during pregnancy may reveal previously undetected abnormalities.

HEALTH DURING THE FIRST YEAR OF LIFE

In a study conducted in Jerusalem, it was found that infants of mothers who smoked had significantly more admissions to the hospital for bronchitis or pneumonia during the first year of life than did children whose mothers did not smoke.²⁴ There was also a significantly greater frequency of admissions to the hospital for injuries among children of smokers. The results concerning respiratory infections were confirmed by a study in London, England, in which it was found that the incidence of pneumonia and bronchitis during the first year of life was associated with the smoking habits of either parent, being lowest when both parents were non-smokers, highest when both smoked, and intermediate when only one parent smoked.²⁵ The effect did not persist beyond 1 year of age and was not attributable to overreporting or concurrent respiratory illness in both parent and child.

LATER GROWTH AND DEVELOPMENT

In a study of long-term effects of maternal smoking on physical growth and intellectual development through the first seven years of life, no effect could be demonstrated.²⁶

CONCENTRATION OF TOBACCO SMOKE IN PUBLIC PLACES

The burning of cigarettes between puffs produces 80% to 90% of indoor pollution from tobacco smoke.²⁷ The components of this smoke are quantitatively different from that exhaled by a smoker, in whose respiratory passages 85% of

volatile and particulate matter are removed, along with more than 50% of the carbon monoxide.²⁷ In addition, the components behave differently in the atmosphere. Nicotine settles out, whereas carbon monoxide is removed by ventilation. It has been argued that, for these reasons, smoke that is passively inhaled by the non-smoker cannot be measured in terms of equivalent cigarettes smoked.²⁷ There is disagreement on this point.

In a study of the concentration of nicotine and tobacco smoke in public places, it was found that inhalation by non-smokers was equivalent to smoking 0.001 to 0.009 filtered cigarettes per hour.²⁸ These smoke concentrations were lower than those previously reported, in part at least because of differences in accounting for losses due to evaporation and diffusion. The authors were surprised that such low levels would produce the strong public reaction to tobacco smoke that has developed recently. The annoyance may come, they thought, from gaseous components that include strong irritants and unpleasant odors, as from phenols, aldehydes, and organic acids. Thus, respiratory irritation that occurs when patients with pulmonary ailments (as well as some normal persons) are exposed to cigarette-smoking by others, may be attributable to the physiological action of these gaseous components, whereas the psychological irritation may be attributable to their odor.

Other investigators have reported that, even when ventilation is adequate, the measured level of carbon monoxide exceeded the maximum acceptable ambient level of 9 ppm.²⁷

LATER IN LIFE

Cigarette-smoking is more frequent and begins earlier among children of smokers than among

children of non-smokers.²⁹ There is no doubt that cigarette-smoking increases the risk of cancer of the mouth, throat, larynx, esophagus, lung, kidney, and urinary bladder, as well as the risk of respiratory disorders and coronary heart disease.^{1,2,30} Thus, the range of indisputable effects runs from depression of breathing movements during fetal life to cancer, respiratory disorders, and heart disease in later years. For these reasons, the message is clear: For the Health of Our Children [at least], Please Don't Smoke.

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