

## MATERNAL PASSIVE SMOKING DURING PREGNANCY AND NEONATAL HEALTH

Artur Wdowiak<sup>1</sup>, Henryk Wiktor<sup>1</sup>, Leszek Wdowiak<sup>2</sup><sup>1</sup>Department of Obstetrics, Gynaecology and Obstetric-Gynaecology Nursing, Medical University of Lublin, Poland<sup>2</sup>Institute of Agricultural Medicine, Lublin, Poland

Wdowiak A, Wiktor H, Wdowiak L: Maternal passive smoking during pregnancy and neonatal health. *Ann Agric Environ Med* 2009, **16**, 309–312.

**Abstract:** The objective of the study was the evaluation of effect of passive smoking among pregnant women on the health condition of their newborn babies. The study covered 150 healthy, non-smoking women from the Lublin Region. Among the total number of respondents, 45.34% were not exposed during pregnancy to passive smoking at their workplace, while 13.33% were passive smokers throughout the whole period of pregnancy. The state of their babies was assessed according to the APGAR Scale. A statistically significant correlation was noted between the maternal exposure to passive smoking during pregnancy and evaluation of the babies according to the APGAR Scale. No statistically significant relationship was noted between the date of delivery, the birth weight of babies, the onset of lactation, the problems with breastfeeding and maternal passive smoking during pregnancy.

**Address for correspondence:** Artur Wdowiak, MD, PhD, Department of Obstetrics and Gynaecology, Medical University, 20-950 Lublin, Jaczewskiego 5.  
E-mail: arturwdowiak@vp.pl

**Key words:** maternal passive smoking, neonatal health.

## INTRODUCTION

According to the data from the WHO report, the percentage of tobacco smokers among the adult Polish population is high, and exceeds the threshold of 30%. This, according to the WHO, is the evidence to a very poor epidemiological situation in this area. In addition, the consumption and production of cigarettes remains on an unchanged level [15]. Thus, the scale of exposure to passive tobacco smoking is tremendous, and concerns various social groups, including pregnant women.

The objective of the study was the evaluation of effect of passive smoking among pregnant women on the health condition of newborn babies.

## MATERIAL AND METHODS

The study covered 150 healthy, non-smoking women from the Lublin Region, who gave birth in the Clinic for Obstetrics and Gynaecology at the Medical University in Lublin, during the period from February–May 2008, and

their newborn babies. Among the total number of the mothers in the study, 8 (5.33%) were aged under 20, 96 (64%) – 20–30, 41 (27.33%) – 31–40, and 5 (3.33%) over 40. Among the total number of respondents 45.34% were not exposed during pregnancy to passive smoking at their workplace, while 13.33% were passive smokers throughout the whole period of pregnancy.

The state of the newborn babies was assessed according to the APGAR Scale [8]. This scale is used to determine the physical status of an infant immediately after childbirth: at 1, 2, 3 and 10 minutes after birth, with the consideration of the following criteria: appearance, pulse, grimace, activity, respiration. The resulting APGAR score ranges from 0–10. An infant ascribed 10–9 scores according to this scale is judged to be in good health, 8–7 scores – as tired during delivery, 6–4 scores – with moderate cyanosis (blueness), while 3–0 scores – with severe cyanotic condition.

The results obtained were subject to statistical analysis. In order to investigate the relationship between the parameters examined, chi-square test for independence was applied. The *p* values *p*<0.05 were considered statistically



**Table 1.** Relationship between maternal passive smoking and date of delivery.

Date of delivery	Passive smoking – Yes		Passive smoking – No		Total	
	n	%	n	%	n	%
Between 33–36 week of pregnancy	11	55.00	95	73.08	106	70.67
Between 37–40 week of pregnancy	6	30.00	28	21.54	34	22.67
After 41 week of pregnancy (overdue delivery date)	3	15.00	7	5.38	10	6.67
Total	20	100.00	130	100.00	150	100.00

$\chi^2=3.75$ ;  $p=0.15$

**Table 2.** Relationship between passive smoking in pregnancy and birth weight of a newborn baby.

Birth weight (g)	Passive smoking – Yes		Passive smoking – No		Total	
	n	%	n	%	n	%
1,500–2,500	2	10.00	12	9.23	14	9.33
2,600–4,000	12	60.00	101	77.69	113	75.33
over 4,001	6	30.00	17	13.08	23	15.33
Total	20	100.00	130	100.00	150	100.00

$\chi^2=3.97$ ;  $p=0.14$

**Table 3.** Relationship between passive smoking during pregnancy and evaluation of a newborn baby according to the APGAR Scale.

Evaluation of a newborn baby according to the APGAR Scale	Passive smoking – Yes		Passive smoking – No		Total	
	n	%	n	%	n	%
4–6	4	20.00	7	5.38	11	7.33
7–10	16	80.00	123	94.62	139	92.67
Total	20	100.00	130	100.00	150	100.00

$\chi^2=5.45$ ;  $p=0.02$

**Table 4.** Relationship between passive smoking during pregnancy and occurrence of lactation.

Occurrence of lactation	Passive smoking – Yes		Passive smoking – No		Total	
	n	%	n	%	n	%
Yes	16	80.00	115	88.46	131	87.33
Amount of milk was very low	3	15.00	13	10.00	16	10.67
Lactation did not occur	1	5.00	2	1.54	3	2.00
Total	20	100.00	130	100.00	150	100.00

$\chi^2=1.59$ ;  $p=0.45$

significant. The database and statistical analysis were performed based on computer software STATISTICA 8.0 (StatSoft, Poland).

## RESULTS

The results of the study showed that among mothers who during pregnancy were exposed to passive smoking at work 3 (15.00%) delivered between 33–36 week of pregnancy, 11 (55.00%) between 37–40 week, while 6 (30.00%) – after 41 week of pregnancy. Among women who were not exposed to passive smoking during pregnancy, 7 (5.38%) delivered between 33–36 week, 95 (73.08%) between 37–40 week, while 28 (21.54%) – over 41 week of pregnancy. No statistically significant relationship was noted between the date of delivery and exposure to tobacco smoke ( $p=0.15$ ) (Tab. 1).

The birth weight of babies of mothers who were passively exposed to smoking was as follows: 2 infants (10.00%) had birth weight from 1,500–2,500 g, 12 (60%) – from 2,600–4,000 g, while 6 newborn children (30%) had a birth weight of over 4,001 g. Women who were not exposed to passive smoking at the workplace during pregnancy delivered babies with the following birth weights: 12 (9.23%) – from 1,500–2,500 g, 101 (77.69%) – from 2,600–4,000 g, and 17 (13.08%) – over 4,001 g. The relationship between birth weight and maternal passive smoking during pregnancy was not statistically significant ( $p=0.14$ ) (Tab. 2).

In own study it was observed that 11 babies (7.33%) obtained 4–6 scores according to the 10-score APGAR Scale, whereas 139 newborn children of the mothers in the study (92.67%) received 7–10 scores. Infants of mothers who were exposed to passive smoking during pregnancy were judged according the APGAR Scale as follows: 4 (20.00%) – from 4–6 scores, 16 (80.00%) – 7–10 scores, whereas from among the babies of mothers not exposed to passive smoking during pregnancy 7 (5.38%) obtained 4–6 scores, and 123 (94.62%) – 7–10 scores. A statistically significant correlation ( $p=0.02$ ) was noted between the maternal exposure to passive smoking during pregnancy and evaluation of the babies according to the APGAR Scale (Tab. 3).

The study showed that lactation after childbirth occurred in 131 (87.33%) of all the mothers in the study – in 16 (10.67%) the amount of milk was very low, while in 3 (2.00%) lactation did not occur. In the group of women who were exposed to passive smoking during pregnancy, in 16 mothers (80.00%) lactation occurred, in 3 (15.00%) – the amount of milk was very low, and in 1 mother (5.00%) lactation did not appear. Among mothers who were not exposed to cigarette smoke during pregnancy these percentages were as follows: in 115 (88.46%) lactation occurred, in 13 (10.00%) the amount of milk was very low, and in 2 (1.54%) lactation did not occur. No statistically significant differences were observed between the onset of lactation and maternal passive smoking during pregnancy ( $p=0.45$ ) (Tab. 4).

**Table 5.** Relationship between passive smoking during pregnancy and problems with breastfeeding.

Problems with breastfeeding	Passive smoking – Yes		Passive smoking – No		Total	
	n	%	n	%	n	%
No	10	50.00	74	56.92	84	56.00
• with latching the baby on to the breast	9	45.00	46	35.38	55	36.67
• insufficient amount of milk	1	5.00	10	7.69	11	7.33
Total	20	100.00	130	100.00	150	100.00

$\chi^2=0.77$ ;  $p=0.68$

As many as 84 mothers (56.00%) had no problems with breastfeeding after delivery, 55 (36.67%) had a problem with latching the baby on to the breast, and in 11 (7.33%) the amount of milk was insufficient. In the group of mothers who during pregnancy were exposed to tobacco smoke at the workplace, 10 (50.00%) did not have problems with breastfeeding, 9 (45.00%) had problems with latching their baby on to the breast, whereas in 1 mother (5.00%) the amount of milk was insufficient. Among mothers who were not exposed to passive smoking during pregnancy, 74 (56.92%) had no problems with breastfeeding, 46 (35.38%) had problems with latching their baby on to the breast and in 10 (7.69%) the amount of milk was insufficient. No statistically significant difference was noted between the problems with breastfeeding after delivery and passive smoking during pregnancy ( $p=0.68$ ) (Tab. 5).

## DISCUSSION

Active tobacco smoking by pregnant women results in the shortening of the duration of pregnancy, an increase in the risk of spontaneous abortion, low birth weight of the newborn baby, perinatal death due to cot death – sudden infant death syndrome (SIDS), and congenital defects. Duncan *et al.* [5] reported that exposure to nicotine and other components of smoked tobacco results in a 2–5-fold increase in SIDS. Distant effects of active nicotine during pregnancy are disorders in psychomotor development of a child [11], occurrence of respiratory system disorders, as well as educational problems [7, 12].

Passive smoking means a passive exposure to the tobacco smoked in the presence of an active smoker. A passive smoker inhales both the tobacco smoke from the lateral stream of a cigarette and that inhaled by a person actively smoking tobacco. During smoking, approximately 4,000 chemical substances are released into the atmosphere. Passive smoking of pregnant women is usually associated with cigarette smoking by members of the household, very frequently by spouses or colleagues at work. The latter aspect has been considered in own studies.

The scale of the problem of maternal passive smoking is reflected, for instance, by the result of the studies conducted in Turkey among 1,020 pregnant women, which showed that the percentage of passively smoking women reached 69.2% [9]. In own studies, the percentage of women exposed to passive smoking was more than 5 times lower. The respondents were asked about exposure to passive smoking at their workplace. Undoubtedly, the relations at work are different from those in a family. Possibly, the coworkers are more rarely aware of the effect of smoking in the presence of future mothers on their health than are their family members at home.

The researchers dealing with this problem agree that a passive exposure of pregnant women to tobacco smoke creates a very high health risk, and this risk is inversely proportional to age [1, 2, 3, 4]. The studies concerning passive smoking among pregnant women, and its effect on the birth weight of a baby, indicate that in the group of passively smoking mothers the percentage of infants who were too small in relation to their foetal age was higher, compared to the group of non-smoking mothers [13, 14]. The relationship was also observed between the passive exposure of pregnant women to environment tobacco smoke (ETS) and asthma and/or allergic symptoms in the nursery school age children of these mothers, this relationship being especially close when passive exposure occurred mainly during the third trimester of pregnancy [16].

On the basis of the 20-year literature review, it may be presumed that active and passive smoking among pregnant women is conducive to respiratory disorders in children at birth [6], which was also observed in own studies.

The evaluation of both active and passive smoking of a pregnant woman on the health status of the foetus and a newborn baby is extremely difficult, because it is not possible to unequivocally isolate the hazardous agent, that is smoking, from other factors exerting a simultaneous effect. Genetic conditioning may affect the development of abnormalities, the cause of which is being sought for in smoking [10]. In own studies, the effect of maternal passive smoking on the development and status of a newborn child was not observed.

Undoubtedly, the problem of nicotine among pregnant women and its effect on the health status of a baby requires further studies, and the creation of a new model for these studies seems a necessity. At the same time, prevention of passive maternal smoking should be the highest priority, even more so, that a considerable percentage of women are conscious of the hazardous effect of smoking in general [9].

Therefore, it seems very important to promote the discontinuation of cigarette smoking in general, especially by pregnant women. Pregnancy is a period in the life of a woman when she can do much for her child's good. This is the time when it is possible to influence health behaviours and change the style of life, among other things, by the imparting of knowledge concerning the hazardous effect

of passive smoking, and the prevention of passive smoking should be the highest priority [9].

## CONCLUSIONS

1. Maternal passive smoking exerts an effect on the health status of a newborn baby. Pregnant women exposed to passive smoking during pregnancy bear children obtaining lower scores according to the APGAR scale.

2. No effect of maternal passive smoking was confirmed on the date of delivery, birth weight of a newborn baby, occurrence of lactation and breastfeeding.

## REFERENCES

- Berthiller J, Sasco AJ: Smoking (active or passive) in relation on fertility, medically assisted procreation and pregnancy. *J Gynecol Obstet Biol Reprod (Paris)* 2005, **34 (Spec No 1)**, 3S47-3S54.
- Cournot MP, Assari-Merabte F, Vauzelle-Gardier C, Elefant E: Maternal cigarette smoking during pregnancy and malformation. *J Gynecol Obstet Biol Reprod (Paris)* 2005, **34 (Spec No 1)**, 3S124-3S129.
- Dekeyser-Boccaro J, Milliez J: Smoking and ectopic pregnancy: is there a casual relationship? *J Gynecol Obstet Biol Reprod (Paris)* 2005, **34 (Spec No 1)**, 3S119-3S123.
- Ducret L: What are the epidemiological data on smoking and co-addictions during pregnancy? *J Gynecol Obstet Biol Reprod (Paris)* 2005, **34 (Spec No 1)**, 3S55-3S66.
- Duncan JR, Garland M, Myers MM, Fifer WP, Yang M, Kinney HC, Stark RI: Prenatal nicotine-exposure alters fetal autonomic activity

and medullary neurotransmitter receptors: implication for sudden infant death syndrome. *J Appl Physiol* 2009, **107**, 1579-1590.

6. Einarson A, Riordan S: Smoking in pregnancy and lactation: a review of risks and cessation strategies. *Europ J Clin Pharmacol* 2009, **65(4)**, 325-330.

7. Fergusson D, Woodward L, Horwood L: Maternal smoking during pregnancy and psychiatric adjustment in late adolescence. *Arch Gen Psychiatry* 1998, **55**, 721-727.

8. Finister M, Wood M: The Apgar score has survived the test of time *Anaesthesiology* 2005, **102(4)**, 855-857.

9. Karcaaltincaba D, Kandemir O, Yalvac S, Güven ES, Yildirim BA, Haberal A: Cigarette smoking and pregnancy: results of survey at Turkish women's hospital in 1,020 patients. *J Obstet Gynaecol* 2009, **29(6)**, 480-486.

10. Knopik VS: Maternal smoking during pregnancy and child outcomes: real or spurious effect? *Develop Neuropsychol* 2009, **34(1)**, 1-36.

11. Polańska K, Hanke W, Sobala W, Ligocka D: Exposure to environmental tobacco smoke and psychomotor development of children. *Med Pr* 2009, **60(1)**, 15-20 (in Polish).

12. Williams G, O'Callaghan M, Najman J, Bor W, Andersen M, Richards D, Chinlyn U: Maternal cigarette smoking and child psychiatric morbidity: A longitudinal study. *Pediatrics* 1998, **102**, 133-134.

13. Windham G, Eaton A, Hopkins B: Evidence for an association between environmental tobacco smoke exposure and birthweight. *Ped Perinat Epidemiol* 1999, **13**, 35-37.

14. Windham G, Hopkins B, Fenster L, Swan S: Prenatal active or passive tobacco smoke exposure and the risk of preterm delivery or low birth weight. *Epidemiology* 2000, **11**, 427-433.

15. World Health Organization: *WHO Report on the Global Tobacco Epidemic, 2008: The MPOWER Package*. World Health Organization, Geneva, 2008.

16. Xepapadaki P, Manios Y, Liarigkiovins T, Grammatikaki E, Douladiris N, Kortsalioudaki C, Papadopoulos NG: Association of passive exposure of pregnant women to environmental tobacco smoke with asthma symptoms in children. *Pediatr Allergy Immunol* 2009, **20(5)**, 423-429.

