

Alcohol, Tobacco, and Drugs During Pregnancy: Effect on Newborn

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Abstract

495 women were investigated by means of questionnaire concerning alcohol drinking, cigarettes smoking and use of analgetics and tranquilizers before and during pregnancy. Symptoms of imminent abortion and toxemia, short length and low weight were found more often among those who used high quantities of alcohol during pregnancy than among those who abstained. Preterm deliveries and worse than average parameters of newborns were found more frequently among smoking than nonsmoking mothers. During their pregnancy women were more inclined to abstain from alcohol than to quit smoking. Unplanned pregnancies and stressful living conditions were found more often among women who smoked and used alcohol and drugs during pregnancy. The results obtained can provide a basis for planning preventive programs.

Zusammenfassung

495 Frauen wurden mit einer Fragebogenmethode nach Alkoholkonsum, Rauchen und der Einnahme von Schmerzmitteln und Tranquilizern vor und während der Schwangerschaft befragt. Vorzeitige Wehenbestrebungen, Toxaemie, geringere Größe und niedrigeres Gewicht waren umso häufiger, je höher der Alkoholkonsum während der Schwangerschaft war. Frühgeburten und ungünstige Parameter für das Wohlergehen des Neugeborenen waren häufiger unter den rauchenden als unter den nicht rauchenden Müttern. Dabei waren die Frauen während der Schwangerschaft eher geneigt, auf den

Alkohol zu verzichten als auf das Rauchen. Ungeplante Schwangerschaften und belastende Lebenssituationen fanden sich häufiger bei den Frauen die rauchten und Alkohol und Medikamente während der Schwangerschaft nahmen. Diese Ergebnisse können Grundlagen für präventive Maßnahmen bilden.

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It is generally accepted that alcohol drinking, cigarettes smoking and the use of sedatives and tranquilizers bring about an increased risk of pathology during pregnancy and in the development of the fetus¹.

Dependent alcoholic females drinking more than 40.0 g of pure spirit daily are at a serious risk to deliver a baby with Fetal Alcohol Syndrome^{2,3}. Research data concerning the influence of smaller amounts of alcohol consumed daily on the course of pregnancy and the fetus is not conclusive. Some authors reported that a daily consumption between 30.0–40.0 g resulted on lowering the birth weight (about 50 to 160 g)^{4,5}, whereas Brook⁶ did not find such an effect. According to Mills⁴ and Rosett⁷ even 1–2 drinks daily (10–20 g of pure spirit) can affect the newborn's length and weight and, according to Tennes⁸ can also produce fetus abnormalities. In Mills opinion an occasional consumption of alcohol (less than 1 drink per day) does not have any harmful influence on fetal development⁴. However, the latest research indicates that even low consumption like 1–2 drinks twice a week may cause the incidence of bleeding in I and II trimester, spontaneous abortions, fetal abnormalities, placenta abruption, stillbirths and perinatal deaths^{9,10,11,12}. Alcohol drinking in the last period of pregnancy can result in manifestation of withdrawal symptoms¹³ and low Apgar score (less than 10 points¹⁴) in the newborn. Premature births do not appear to occur more frequently to mothers drinking alcohol than to abstinent mothers^{15,4,12,16}. Obviously, when the influence of alcohol on the pregnancy and the condition of the newborn is studied, the potential importance of other factors involved, like constitutional factors, mother's state of health, her nutrition, age and ethnicity should not be forgotten^{6,17}.

A decreased weight and length of the babies born to mothers smoking cigarettes during pregnancy has been observed⁶. The deficit of weight depended on the number of cigarettes smoked daily^{18,17}. Robin¹⁹ and Martin²⁰ stressed that even passive exposition to cigarette smoke resulted in a decreased birth weight; Brooke has not confirmed this association⁶. Cigarettes smoking during pregnancy resulted in more frequent premature deliveries¹⁶, perinatal deaths²¹, an infant congenital malformations²², respiratory disturbances and sudden deaths^{11,21}.

Among newborns of mothers who used during pregnancy benzodiazepines and barbiturates congenital malformations²³, symptoms resembling FAS and, in case of continuous use, withdrawal symptoms were observed more frequently^{24,25,23}.

Rubin¹⁴ studied extensively the incidence of alcohol consumption, cigarettes smoking and drug use among 12444 pregnant women in Glasgow but he did

not analyze the course of pregnancy and the condition of newborns. Schiono in Northern California¹⁶ and Brooke in London⁶ investigated the incidence of alcohol drinking and cigarettes smoking but not drug use among the pregnant.

We have not found a study which would show the impact of these factors combined on the course of pregnancy and the state of newborn. Convincing data presented by Schiono indicate that cigarettes smoking, and not alcohol use, results in a large number of premature deliveries as well as low birth weight according to Brooke⁶.

There is no data concerning the incidence of drugs usage, alcohol drinking and smoking among pregnant females on Poland. These factors can probably be enumerated among other factors responsible for high (1.83 % in 1991) perinatal mortality rate in our country.

Methods

Between March and July 1991, at the Department of Obstetrics and Gynecology of the Second Medical Faculty of the Medical Academy of Warsaw, 495 mothers were investigated by means of a semistructured questionnaire. The interview took place not earlier than 12 hours after delivery and was carried out by resident in obstetrics.

The following data was collected by the questionnaire:

1. Alcohol drinking, cigarettes smoking and drug use during 6 months preceding pregnancy and during pregnancy.
2. Possible occurrence of physical disease before and during pregnancy
3. Stressful situation during pregnancy (economic status, inadequate living conditions, emotional problems in relation with husband or father of the expected child or other family members. husband's alcohol abuse, the oncoming lonely motherhood).
4. Previous spontaneous and/or induced abortions.
5. Pregnancy planned or not.
6. The numbers of previous deliveries.

From obstetrical case history the following data was taken:

1. Pathology in the course of pregnancy (imminent abortion, occurrence of symptoms of toxemia – hypertension, proteinuria oedema).
2. Preterm delivery.
3. The instrumental labour (vacuum, Caesarean section, forceps).

The data taken from pediatric case history:

1. Birth weight, length and head circumference,
2. The presence of dystrophy and/or congenital malformation.
3. The score in Apgar Scale.

As far as alcohol use during pregnancy is concerned, respondents were divided into three groups: those who did not use it at all, those who used alcohol moderately (less than once per month and not more than 30 g in terms of pure

spirit on one occasion), and those drinking heavily (more frequently than once per month and/or more than 30 g of pure spirit an one occasion).

As far as cigarettes smoking is concerned, respondents were divided into: non-smokers, those smoking less than 5 cigarettes a day, and those smoking more.

The incidence of abnormalities during pregnancy and the condition of the newborn at birth was compared: among women who used alcohol during pregnancy and those abstinent; smokers and nonsmokers; passive smokers and non-smokers: those who used drugs and those who did not.

The incidence of the following twelve factors which could influence condition of the newborn at birth, was taken into consideration: sex of child, age of mother, stressful situations during pregnancy, medical intervention because of mental condition, physical illnesses during pregnancy, previous induced abortions, previous spontaneous abortions, symptoms of toxemia during pregnancy, premature birth (before 37 weeks of pregnancy), instrumental labour, delivery later than in 42 weeks), number of previous deliveries.

Results

Table 1. Alcohol consumption before and during pregnancy.

	nondrinkers	occasional drinkers	moderate and heavy drinkers	all drinkers / occasion. moderate and heavy/
before pregnancy 6 months n=495	265 /53.5%/	145 /29.3%/	85 /17.2%/	230 /46.5%/
during pregnancy n=495	339 /68.5%/	133 /26.9%/	23 /4.6%/	156 /31.5%/

156 mothers (31.5%) used alcohol during pregnancy. Out of them 133 (26.9%) were classified as moderate users and 23 (4.6%) as heavy users.

Table 2. Maternal smoking before and during pregnancy.

	nonsmokers	smokers /less than 5 cigarettes per day /	smokers /more than 5 cigarettes per day/	smokers / all smokers together/
before pregnancy 6 months n=495	310 /62.6%/	51 /10.3%/	134 /27.2%/	185 /37.4%/
during pregnancy n=495	351 /70.9%/	63 /12.7%/	81 /16.4%/	144 /29.1%/

144 mothers were smoking during pregnancy (29.1%): 63 (12.7%) smoked up to 5 cigarettes daily and 81 (16.4%) more than 5.

23 women (4.6%) declared they had analgetic drugs and 13 (2.6%) benzodiazepines and barbiturates.

During 6 months preceding pregnancy, drinking, smoking and drug use were more common than during pregnancy. It was easier to stop drinking (74 respondents – 15%) and withdraw from drugs (75 – 15.1%) than to quit smoking (41 respondents – 8.3%).

Table 3. Pregnancy events, delivery characteristics and infant outcome within categories of alcohol consumption during pregnancy.

	nondrinkers		all drinkers together		moderate and heavy drinkers	
	n	%	n	%	n	%
PREGNANCY EVENTS & DELIVERY CHARACT.						
1. symptoms of toxemia	84	24.8%	47	30.1%	11	47.8%*
no symptoms	225		109		12	
2. impending miscarriage	32	9.4%	32	20.5%***	5	21.7%
no symptoms	37		124		8	
3. instr. labour	61	18%	23	14.7%	3	13.0%
non instr. labour	278		133		20	
4. birth before 37th week	43	12.7%	21	13.5%	6	26.0%
after 37th week	296		135		17	
INFANT OUTCOME						
1. dystrophic	31	9.1%	17	10.9%	4	17.4%
nondystrophic	308		139		9	
2. Apgar score <7	21	6.2%	16	10.3%	3	13.0%
more than 7	318		140		20	
3. birth length <48 cm	12	3.5%	10	6.4%	4	17.4%**
more than 48	327		146		19	
4. head circumfer. less than 32cm	33	9.7%	20	12.8%	2	8.7%
more than 32cm	303		136		21	
5. congenital malform. present	7	2.1%	4	2.6%	3	13.0%
6. mean birth weight /test T/	3363.0 g 617.6		3362.0 g 530.9		3043.5g* 830.3	

The level of significance: *** p<0.0006, ** p<0.007, * p<0.002; test chi² or T.

Among those women who used alcohol during pregnancy symptoms of imminent abortion were more frequent than among abstinent (20.5% and 9.4% respectively). Among heavy drinkers symptoms of toxemia were more common than among abstinent (47.8% and 24.8% respectively). Newborns of heavy drinkers had lower length (in 17.4% cases length below 48 cm) than those of abstinent (3.5%) and lower weight (an average difference between groups was about 318.5 g).

Out of twelve factors other than alcohol, tobacco and drugs, five have proved to affect the average birth weight (test chi²). They were the baby's sex, mother's

somatic illnesses during pregnancy, spontaneous and induced abortion on previous pregnancies, imminent abortion during that pregnancy, preterm birth of newborn.

The number of mothers that remained after eliminating those who indicated one or more of the five factors mentioned above was too small to prove relationship between alcohol drinking and newborn's length. As far as the weight of newborns is concerned, after eliminating the five factors an analysis of variance did not show any relationship with alcohol drinking of mothers. However, an indirect influence of alcohol drunk during pregnancy seems possible, as shown in Table 4.

Table 4. Mean birth weight and frequency of birth length less than 48 cm according to symptoms of toxemia and impending miscarriage during pregnancy.

	symptoms of toxemia				impending miscarriage			
	yes		no		yes		no	
	n	%	n	%	n	%	n	%
	131	100	364	100	64	100	431	100
mean birth weight /1/	3349.1 665.0		3367.2 316.5		3239.2* 739.3		3380.7 529.6	
birth length < 48 cm	10** 7.6%		12 3.3%		8*** 12.5%		14 3.2%	

The level of significance: *** $p < 0.003$, ** $p < 0.043$, * $p < 0.059$.

Symptoms of toxemia and symptoms of impending abortion during pregnancy – which means two factors connected with higher frequency of delivering newborns with deficit of weight and length – were also more common among mothers who drank high quantities of alcohol. It seems that alcohol tends to increase a possibility of obstetrician pathology which could result in shorter length and/or lower weight at birth.

Among smokers instrumental deliveries and preterm births were more common than among nonsmokers.

All parameters of newborns born by smokers were worse than of those born by nonsmokers:

Average weight of newborns born by women smoking less than 5 cigarettes daily was 161 g lower and smoking more than 5 cigarettes was 239.9 g lower than average weight of children born by nonsmoking mothers.

There were, however, factors other than smoking involved in producing deficits in newborns. The relationship between dystrophia on one side and somatic diseases in pregnancy and preterm births on the other was found. Low scoring in the Apgar Scale was more common in newborns born by mothers being under stressful situation during pregnancy; having symptoms of toxemia and/or imminent abortion; and in newborns born from first delivery or by instrumental labour. Those born by mothers who had a somatic disease during pregnancy and born by preterm delivery had a small head circumference. When cases with the factors mentioned above were eliminated, the group became too small to eval-

Table 5. Pregnancy events, delivery characteristics and infant outcome within categories of smoking during pregnancy.

	nonsmokers		all smokers together		more than 5 cigarettes	
	n	%	n	%	n	%
PREGNANCY EVENTS & DELIVERY CHARACT.						
1. symptoms of toxemia	88	25.1%	43	29.9%	23	28.4%
no symptoms	263		101		58	
2. impending miscarriage	72	20.5%	19	13.2%	9	11.1%
no symptoms	279		125		72	
3. instr. labour	51	14.5%	33*	22.9%	19*	23.4%
non instr. labour	300		111		62*	
4. birth before 37th week	38	12.0%	26*	20.5%	14	19.2%
after 37th week	313		118		67	
INFANT OUTCOME						
1. dystrophic	27	7.7%	21*	14.6%	10	12.3%
nondystrophic	324		123		71	
2. Apgar score <7	16	4.6%	21***	14.6%	13**	16.05%
more than 7	335		123		68	
3. birth length <48 cm	10	2.8%	12**	8.3%	7*	8.6%
more than 48	341		132		74	
4. head circumfer. less than 32cm	29	8.3%	24**	16.6%	10	12.3%
more than 32cm	322		120		11	
5. congenital malform. present	5	1.42%	6	4.16%	3	3.7%
6. mean birth weight /test 1/	3409.0g		3248.1g**		3169.5g**	
	523.5%		624.7%		508.5%	

The level of significance: *** p<0.0002, ** p<0.007, * p<0.005; test chi² or T.

uate the influence of smoking on newborn’s parameters, except of weight. An influence of smoking on the newborn’s weight was confirmed by an analysis of variance. The average weight of newborns delivered by mothers smoking during pregnancy was lower by 258.8 g in boys and 148.1 g in girls than in newborns of nonsmoking mothers.

The possible factors influencing a tendency to smoking and drinking were tested.

No relationship between age of women and intensity of smoking and alcohol drinking was discovered. Smoking and alcohol drinking during pregnancy was found more frequent among respondents with secondary school education than among elementary school and university graduates.

More smokers and drinkers were found among those women who were under psychological stress during pregnancy and/or did not plan pregnancy than among those who were not under stress and/or did plan their pregnancies.

Discussion

Among our respondents 68.5% abstained from alcohol and 70.0% did not smoke during pregnancy. These findings resemble the data obtained by Brooke

Table 6. Some factors connected with drinkind and smoking during pregnancy.

	all women 495	alcohol		cigarettes		
		nondrinkers 339	drinkers 156	nonsmok. 351	smokers 144	
maternal age						
- 25	219	154	65	29.3%	149	70 31.5%
25 - 35	230	151	79	33.8%	166	64 27.3%
35 +	46	35	11	23.9%	37	9 19.6%
unknown	1					
educational level						
element. school	265	216	49	18.5%	181	84 31.7
second. school	128	59	69*	53.9%	81	47* 43.3%
university	102	64	38	37.3%	89	13 12.7%
stressful sit. during pregn.						
present	120	54	66**	55.0%	68	52** 43.3%
absent	375	285	90	24.4%	283	92 24.5%
planning of the pregnancy						
planned	314	236	78**	24.8%	235	79* 25.1%
unplanned	181	103	78	43.1%	116	65 35.9%

The level of significancy in χ^2 and T-test: *** $p < 0.00001$, ** $p < 0.0001$, * $p < 0.01$.

(50.2 % and 67.5 %), by Schiono (53.1 % and 72.1 %), Rubin (64.6 % and 67.5 %, respectively). Marbury¹² found in his group 77.3 % abstainers from alcohol. Quantities of alcohol used by our respondents (0.8 % used more than 30.0 g of pure spirit weekly) were lower when compared with the data quoted by others. More than 100.0 g of pure spirit weekly was used by 2.8 % respondents of Marbury¹², 2.9 % of Schiono¹⁶ and 2.6 % of Brooke⁶.

Those of our respondents who did smoke during pregnancy declared smaller quantities of cigarettes (16.4 % smoked more than 5 cigarettes daily and 1.8 % more than 15) when compared with the data by Schiono¹⁶ (13.3 % smoked more than 20) and Brooke⁶ (10.2 % more than 15).

Much less frequently our respondents consumed analgetics (4.6 %) and tranquilizers (2.6 %) during pregnancy. This appears partly to be comparable with the date coming from England where 2.25 % respondents of Rubin¹⁴ used tranquilizers but as many as 19.2 % used analgetics. In the U.S. the consumption of these drugs among pregnant women appears to be much higher. Chasoff²⁵ reports on 25 % of his respondents using tranquilizers and 50–60 % – analgetics. Laegreid et al.²³ found congenital malformations, low weight and withdrawal symptoms among newborns of mothers who used these drugs.

In our study none of the eleven mothers of newborns with congenital malformations confirmed the use of above-mentioned drugs.

Among those of our respondents who used alcohol during pregnancy, symptoms of imminent abortion were two times (2.2) more common than among those who abstained from alcohol, which is consistent with observations of Harlap⁹ and Kline¹⁰. Harlap found that the risk of spontaneous abortion is to be estimated as almost two times higher (1.98) among women having 1–2

drinks daily (10.0–20.0 g of pure alcohol) than among abstainers. In the study of Kline¹⁰ from New York the risk of spontaneous abortion was 2.6 times higher while consuming 1–2 drinks twice a week. Marbury¹², however, did not find any relationship between alcohol consumption and bleeding in the second and third trimester of pregnancy.

Our data is similar to that obtained by other authors saying that the relationship between consumption of small quantities of alcohol and the weight and length at birth does not exist if other factors influencing these parameters are eliminated. At the same time, our findings confirm the data by Schiono¹⁶ who found that small amounts of alcohol (1–2 drinks weekly) increase the risk of pathology during pregnancy. In our group consumption of low doses of alcohol was connected with more frequent imminent abortion and/or symptoms of toxemia, which suggests an indirect influence of alcohol consumption on worsening the parameters of newborn.

Among 23 children born by mothers who drank high quantities of alcohol during pregnancy we found 3 cases with congenital malformations, two of them with low weight were suspected to have FAE symptoms and needed further observation. Other factors which could be responsible for malformations and low weight were not found in the two cases. In other subgroups (abstainers, drinking low quantities, smokers) the number of newborns with congenital malformations was not so high as among newborns born by heavy drinkers.

Our findings are in agreement with the estimated prevalence of FAS in European countries (1 : 300 – 1 : 600) and with data of Little et al.³ who found that 4 % of pregnant women are at risk of giving birth to a child damaged by alcohol during pregnancy and in need of specialized therapy. Our group consisted of 4.5 % of women who drank moderately and/or heavily, and it is quite possible that their tendency was to declare smaller amounts of alcohol than actually used.

Among smokers during pregnancy in our group preterm births were more common (1.4 times) than among nonsmokers. Similar data was obtained by Marbury¹² and Schiono¹⁶ (1.3 times).

We have not found any data in literature confirming our finding that instrumental deliveries are more common among smokers. Our data proving that the low weight of newborns is connected with smoking during pregnancy (also when prematurity and other factors able to reduce birth weight are eliminated) finds confirmation in the data presented by other authors^{18,17}.

According to Kleinman¹⁷, an average weight of newborns born by mothers smoking during pregnancy is lower by about 200.0 g and depends on the number of cigarettes smoked. In our group an average weight of boys born by smokers was 285.5 g lower and of girls 148.1 g lower than of boys and girls of nonsmokers. We did not find any influence of passive smoking on birth weight, which is in consistence with the data given by Brooke⁶ and inconsistent with the data quoted by Rubin¹⁰ and Martin²⁰.

We do not know how to interpret our finding that drinking and smoking during pregnancy was more common among women with secondary school education than with primary school and university education. Brooke⁶ does not consider education to be of importance as far as smoking and drinking during pregnancy is

concerned, but Kleinmann et al.¹⁷ found that it is more common among women with primary school education.

As could be expected, we found that women who had planned pregnancy were less inclined to smoke and drink during its course than those who had not. Brooke⁶ did not quote such a relationship and we have not found any other data concerning this question. Women who declared being in stressful situation during pregnancy were, according to our data, more inclined to alcohol drinking, drug taking and smoking, which needs no comment. The age of our respondents did not influence the behaviours analyzed.

Our findings prove that it is necessary to organize preventive programs focused on hazards connected with smoking, alcohol drinking and drug use during pregnancy for women in their procreational age. In case of pregnant women who drink and/or smoke a close medical supervision within maternal clinics, counselling and psychological intervention if needed – should be provided. Special attention should be given to pregnant women who did not plan their pregnancy and/or are under serious psychological stress.

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