

The relationship of gestational smoking with pregnancy complications and sociodemographic characteristics of mothers

Gebelikte sigara içen anne adaylarının sosyodemografik özellikleri ve bu durumun gebelik komplikasyonları ile ilişkisi

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Abstract

Objective: In this study, we aimed to assess the relationship of gestational smoking and passive smoking with pregnancy complications like preterm delivery, low birthweight, early membrane rupture, abruptio placentae, fetal distress and preeclampsia. We also analyzed the sociodemographic features of mothers who smoked during their pregnancy.

Material and Methods: Pregnant women have been questioned for their habits of smoking and household members' usage of tobacco products during their antenatal visits. Perinatal outcome of gestational smoking was assessed by the type of the delivery, birthweight, occurrence of preeclampsia, early membrane rupture and fetal distress during pregnancy. Differences in group means were analyzed with the Fisher's exact test, Chi-square test and ANOVA.

Results: There wasn't any significant statistical difference between the smokers' (n=86), passive smokers' (n=118) and nonsmokers' (n=77) groups in terms of maternal age, socioeconomic status of the family, gestational age, Apgar scoring and the rate of delivery by cesarean section. However, gestational smoking was found to be more common in mothers with poor or none education (p=0.001). There wasn't any significant statistical change in the rates of fetal distress, early membrane rupture, abruptio placentae and preeclampsia by gestational smoking (p>0.05). But, infants of mothers who smoked more than 10 cigarettes per day showed statistically significant birthweight deficits (p<0.05).

Conclusions: Data from this study indicate that gestational smoking is more common among women with low education and results in low birthweight. Therefore, it is essential to educate the women before pregnancy and implement new smoking cessation programs for pregnancy. (J Turkish-German Gynecol Assoc 2009; 10: 148-51)

Key words: Gestational cigarette smoking, passive smoking, perinatal complications, sociodemographic features

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Özet

Amaç: Bu çalışmada gebelikte aktif ve pasif sigara içiminin preterm doğum, düşük doğum ağırlığı, erken membran rüptürü, dekolman ve preeklampsi gibi kötü gebelik sonuçları ile ilişkisi araştırıldı. Ayrıca gebelikte sigara içen kadınların sosyodemografik analizi yapıldı.

Gereç ve Yöntemler: Antenatal vizitlerde gebelere sigara içimleri ve erkek arkadaşlarının sigara kullanımları soruldu. Preterm doğum, düşük doğum ağırlığı, erken membran rüptürü, dekolman ve preeklampsi gibi kötü gebelik sonuçları kaydedildi. Verilerin analizi için Fisher kare, kare ve ANOVA testleri kullanıldı.

Bulgular: Sigara içen (86) ve pasif içiciler (118) ve içmeyen (77) gebeler arasında anne yaşı, sosyoekonomik durumu, gebelik yaşı, apgar skoru ve sezaryen oranı açısından anlamlı bir fark saptanmadı. Sigara içen anne adayları genellikle düşük eğitim grubundan idi (p=0.001). Fetal distres, erken membran rüptürü, dekolman ve preeklampsi ile sigara içimi arasında bir ilişki saptanmadı. Ancak günde 10 dan fazla sigara içen kadınların bebeklerinin doğum kilosu istatistiksel olarak daha düşük olarak saptandı (p<0.05).

Sonuç: Bu verilerle gebelikte sigara içiminin düşük eğitimli kişilerde ve düşük doğum ağırlıklı doğum yapan kadınlarda daha sık olduğu söylenebilir. Bu nedenle gebelik öncesi kadınların bu konuda eğitimlerinin önemi büyüktür.

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Anahtar kelimeler: Gebelikte sigara içimi, pasif içicilik, perinatal komplikasyonlar, sosyodemografik veriler

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Introduction

Maternal smoking during pregnancy has long been considered an important risk factor for intrauterine growth retar-

ation (1, 2). A remarkably constant 100-300 g difference in birthweight between cigarette smokers' and nonsmokers' newborns has been determined in many studies since 1957 (3-6). Previous studies also have shown that cigarette smok-

ing during pregnancy increases the risk of fetal mortality and morbidity (3, 5). The perinatal mortality rate among smokers is 150% greater than is seen in nonsmokers (1, 2). It has been suggested that smoking is responsible for 15% of all preterm births and 20–30% of all low birthweight (LBW) infants (1). There is good epidemiological evidence to support an association between smoking during pregnancy and increased risk of premature rupture of membranes, abruptio placentae, placenta praevia and a modest increase in the risk for preterm delivery (1-3, 7-9). On the other hand, maternal cigarette smoking during pregnancy was associated with decreased risk for preeclampsia by many studies (10, 11).

Tobacco smoke contains thousands of compounds that may have adverse effects on the human body. The major compounds of significance are nicotine and carbon monoxide. Nicotine crosses the placenta and can be detected in the fetal circulation at levels that exceed maternal concentrations by 15%, while amniotic fluid concentrations of nicotine are 88% higher than in maternal plasma (1). The antenatal effects of nicotine are mainly a predictable decrease in uterine artery blood flow, variable changes in umbilical artery flow, and variable changes in fetal oxygenation and acid-base balance. Nicotine can also cause a decrease in fetal heart rate and an increase in mean arterial pressure (1, 2).

Carbon monoxide (CO) crosses the placenta rapidly and is detectable in the fetal circulation, equilibrating at levels that are 15% higher than in maternal blood (1). Carboxyhemoglobin is formed by the binding of CO and hemoglobin, shifting the oxygen dissociation curve to the left and resulting in a decrease in the availability of oxygen to fetal tissues (1, 2).

While medical researchers and health care providers studied the health risks of cigarette smoking in pregnant women and their offspring, social science researchers have produced studies concerning factors determining smoking choices during pregnancy (12). These social science researches indicated that factors influencing the choice to smoke during pregnancy include age, employment status, economic status, race, education, birth parity and the provision of prenatal care (8, 12).

In this study, we aimed to analyse the sociodemographic features of mothers who smoked during their pregnancy. We also wanted to show the relationship of maternal smoking and passive smoking during pregnancy with perinatal complications such as preterm delivery, premature rupture of membranes, abruptio placentae, fetal distress and preeclampsia.

Material and Methods

Two hundred and eighty-one pregnant women who applied for antenatal examinations within a month at Sisli Etfal Education and Research Hospital, Istanbul, Turkey were recruited for this study. The participants filled out a detailed written questionnaire while attending antenatal services and their consent was obtained along with the questionnaire. Data on their smoking habits, age, pre-pregnancy weight, household members' smoking habits, education periods by years (no education, 1-5 years of primary school education, secondary school or higher education) and their economic status determined by the monthly income (low class: min. wage or lower, upper class: 2000.-TL or more, middle class: from min. wage up to 2000.-TL) were obtained from this questionnaire. The mother's weight gain was noted at each antenatal visit. The delivery room interview ascertained the information about her smoking habits. Mothers were asked how many cigarettes they smoked per day. If they had stopped smoking, they were asked when and how many cigarettes they smoked per day before they stopped. The household members' smoking habits were also ascertained in the delivery room interview. Passive smokers were defined only from those who had a household member who smoked more than 10 cigarettes per day inside the house. The perinatal outcome of gestational smoking was assessed by the type of delivery, birth weight, gestational age, occurrence of preeclampsia, early membrane rupture and fetal distress during pregnancy. The initial examination of the newborns conducted within the first 24 hours after birth included birth weight, complete physical examination and 1 and 5 minutes Apgar scorings. Infants were weighed naked on a beam balance to the nearest 10 g using standard techniques. Gestational age

Table 1. General characteristics of the mothers and the neonates

	Nonsmokers (n=77)	Passive smokers (n=118)	Smokers <5 cigarettes/day (n=34)	Smokers 5-10 cigarettes/day (n=30)	Smokers >10 cigarettes/day (n=22)	p
Maternal Age (year)	25.7±5.7	26.3±6.1	24.3±4.5	23.7±3.7	28.0±5.9	0.30
Prepregnancy weight (kg)	59.4±9.6	59.8±11.0	59.4±9.8	54.7±7.2	54.6±8.7	0.08
Weight gain during pregnancy (kg)	13.7±4.0	12.8±2.8	12.4±4.4	13.6±4.0	12.9±3.4	0.59
Gestational Age by Naegela Formula (wk)	38.1±2.9	38.2±3.3	39.3±1.4	38.9±1.4	38.7±3.0	0.43
Gestational Age by USG (wk)	38.1±2.4	37.7±2.0	38.5±1.7	37.4±2.9	36.7±1.9	0.23
Birthweight of the neonate (gr)	3293±649	3161±672	3260±493	3048±482	2884±524	0.04*
Apgar 1'	8±1	8±1	8±1	8±1	8±1	0.30
Apgar 5'	9±1	9±1	9±1	9±1	9±1	0.37
Significance of difference (in bold): *p < 0.05						

was calculated by the Naegele formula and by gestational ultrasonography prior to delivery. A fetal tococardiography was performed prior to delivery to assess fetal distress. Ethical approval for this study was obtained from the ethics committee of Sisli Etfal Education and Research Hospital. For statistical analysis, the ANOVA test was used for the parametric variables in Table 1. Nonparametric categorical data such as mother's education level and the economic status of the family were compared using the Fisher's exact test and Chi-square test (Table 2 and 3). To compare the type of delivery and perinatal complications, the Chi-square test was used (Table 4 and 5). P-values less than 0.05 were considered statistically significant. The statistical analyses were performed using the SPSS software, version 16.0 for Windows.

Results

Out of 281 pregnant women who participated in our study, 77 were nonsmokers, 118 were passive smokers and 86 were smokers; 34 smoked less than 5 cigarettes per day, 30 smoked 5-10 cigarettes per day and 22 smoked more than 10 cigarettes per day. There were no significant statistical difference between the smokers' passive smokers and nonsmokers groups in terms of maternal age, maternal prepregnancy weight and weight gain during pregnancy (Table 1). The gestational age calculated by the Naegele formula and fetal ultrasonography did not reveal any difference between the groups (Table 1). The 1 and 5 minutes Apgar scorings were within normal ranges in all 3

groups (8 and 9 respectively). However, birthweight of neonates showed significant differences between the groups. Infants of mothers who smoked more than 10 cigarettes showed statistically significant birthweight deficits ($p < 0.05$) (Table 1).

In Table 2, the mothers' education showed differences between groups ($p = 0.001$). Gestational smoking was found to be more common in mothers who had either no education or who had an education of less than 5 years ($p = 0.001$). The mother group with higher education was found to be less prone to gestational smoking.

In Table 3, there were no significant differences in terms of the mother's economic status between the groups. Table 4 revealed that there were no statistically significant difference in the rate of delivery by caesarian section between smokers, nonsmokers, and passive smokers groups.

Table 5 shows the rates of some perinatal complications that could be caused by gestational smoking. Compared to nonsmokers, passive smokers and smokers showed no statistically significant increase in the rates of fetal distress, early membrane rupture, abruptio placentae or preeclampsia during their pregnancies ($p > 0.05$).

Discussion

The results obtained in the present study revealed that gestational smoking rate does not change with the mother's age or socioeconomic status. Only, the mother's education shows changes between the smokers, passive smokers and

Table 2. Mother's Education

	Nonsmokers (n=77)	Passive smokers (n=118)	Smokers <5 cigarettes/day (n=34)	Smokers 5-10 cigarettes/day (n=30)	Smokers >10 cigarettes/day (n=22)	p
No Education	7	18	3	4	8	0.001*
1-5 years	57	90	20	17	8	
5-10 years	11	10	10	9	5	
Higher education	2	0	1	0	1	

Table 3. Economic Status of the Family

	Nonsmokers (n=77)	Passive smokers (n=118)	Smokers <5 cigarettes/day (n=34)	Smokers 5-10 cigarettes/day (n=30)	Smokers >10 cigarettes/day (n=22)	p
Low Class	31	69	17	20	13	0.34
Middle Class	42	45	16	9	8	
Upper Class	3	4	1	1	1	

Table 4. Type of Delivery

	Nonsmokers (n=77)	Passive smokers (n=118)	Smokers <5 cigarettes/day (n=34)	Smokers 5-10 cigarettes/day (n=30)	Smokers >10 cigarettes/day (n=22)	p
Spontaneous	53	80	24	24	17	0,68
C- section	24	38	10	6	5	

Table 5. Perinatal Complications

	Nonsmokers (n=77)	Passive smokers (n=118)	Smokers <5 cigarettes/day (n=34)	Smokers 5-10 cigarettes/day (n=30)	Smokers >10 cigarettes/day (n=22)	p
No Complications	67	93	28	25	17	0.86
Fetal distress	6	15	3	2	3	
EMR	3	5	2	3	2	
Abruptio Placentae	1	1	0	0	0	
Preeclampsia	0	4	1	0	0	

nonsmokers groups. We also demonstrated that the neonates born to mothers who smoked more than 10 cigarettes per day showed significant birthweight deficits compared to neonates of the nonsmokers.

Studies carried out either by medical scientists (8) or by social scientists (12) show that many sociodemographic features play a part in smoking behavior of mothers during pregnancy. These studies found that high parity numbers, passive smoking at home, age, socioeconomic status of the family and maternal education were associated with a significantly increased risk for continued smoking during pregnancy. High levels of education and high age at onset of smoking decreased the risk of gestational smoking (12). In our study, gestational smoking was found to be more common in mothers with poor or none education ($p=0.001$).

Smoking during pregnancy is considered an antepartum cause of fetal hypoxia, which occurs as a result of fetoplacental respiratory and nutritional insufficiency (2). Carboxyhemoglobinemia and chronic hypoxemia, impairment of chorionic histoarchitecture and placentation, vasoconstriction of uteroplacental circulation and intermediary metabolic disturbance are the ethiopathogenetic basis of growth retardation in neonates of smoker mothers (2). For years, smoking during pregnancy has been strongly associated with an increase in pregnancies complicated by intrauterine growth restriction and LBW, as well as an overall 150-250 g decrement in mean birthweight (1, 3-7). In the present study, a birthweight deficit of 400-450 g in neonates of mothers who had smoked more than 10 cigarettes per day was found to be significant compared to neonates of nonsmokers ($p=0.04$) (Table 1). This is an important finding because in many studies the growth deficit of neonates of smokers was found to persist in their postpartum life, affecting their intellectual and physical development until 1 year of age (4-7).

Preterm delivery (1, 7), abruptio placentae (9, 1), early membrane rupture (1) and fetal distress (1, 2) are all found to be increased in rate related to the effect of nicotine and CO in pregnancies complicated by maternal smoking. Paradoxically, the risk of preeclampsia is found to be decreased by an estimated 30% among smokers (10, 11).

In our study, we could not reveal any relationship of gestational smoking with these pregnancy complications. We suggest

multicenter studies with higher numbers of subjects for this purpose.

In conclusion, data from this study indicate that gestational smoking is more common among women with low education and results in low birthweight. Therefore, it is essential to educate women before pregnancy and implement new smoking cessation programs for pregnancy.

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