

# Evaluation of Smoking Among Pregnant Women in a Central Anatolian City of Turkey: Comparison with Other Countries

## Türkiye’de, Orta Anadolu’daki Bir İlde Gebe Kadınlarda Sigara Kullanımının Değerlendirilmesi: Ülkelerarası Karşılaştırma

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**ABSTRACT Objective:** The aim of this study is to evaluate the rate of smoking and perinatal outcomes of maternal smoking during pregnancy in a hospital-based study. **Material and Methods:** All cases recruited to the study were asked to respond to a series of questions in a face-to-face interview on the first day after delivery. Of the 830 subjects, 600 completed the questionnaire to determine the sociodemographic features and smoking status. Babies were weighed by the researchers. Abortions, stillbirth, premature delivery, low birth weight, placental abruption, placenta previa, eclampsia, premature ruptures of the membrane were determined. **Results:** The mean age was 28.4 ± 5.81 years. The rate of women who smoked at any time of their pregnancy was 7.3% (n= 44). Compared to the babies born to mothers who did not smoke during pregnancy, babies born to mothers who smoked during pregnancy were 128.68 g lighter. When the findings of smoking mothers were compared to never smoking mothers, the rates of abortion (38.6% versus 29.3%), stillbirth (4.5%-2.7%), premature delivery (31.8%-19.1%), low birth weight (22.7%-18.2%), placental abruption (2.3%-1.6%), and preeclampsia (9.1%-8.6%) were higher (p> 0.05). The rate of premature rupture of the membranes among smoker pregnant women was found significantly higher compared to never smokers (p< 0.05). **Conclusion:** According to our findings, it is clear that smoking during pregnancy had adverse perinatal outcomes. Pregnant smokers should be encouraged to quit smoking. Counselling should be given by healthcare professionals at all times. In addition, the partners who smoke should be informed of the risks as well.

**Key Words:** Pregnancy; smoking

**ÖZET Amaç:** Bu çalışmanın amacı hastane verilerine dayalı olarak gebelik sırasında sigara içme yüzdesi ve gebelikte sigara içilmesinin perinatal sonuçlarını değerlendirmektir. **Gereç ve Yöntemler:** Bütün olgular doğum sonrası birinci günde yüz yüze bir seri soruya cevap vereceği bildirilerek çalışmaya alındılar. 830 olgunun 600’ü sigara içme ve sosyodemografik özellikleri belirten bir anketi tamamladı. Bebekler araştırmacılar tarafından tartıldılar. Düşükler, intrauterin ölümler, prematür doğumlar, düşük doğum ağırlığı, abruptio placenta, placenta previa, eklampsi ve erken membran rüptürleri belirlenerek kaydedildi. **Bulgular:** Olguların yaş ortalaması 28.4 ± 5.81 yaş idi. Gebeliğin herhangi bir zamanında sigara içmiş olan kadınların yüzdesi %7.3 (n= 44) idi. Gebelik sırasında annesi sigara içmemiş olan bebeklere göre annesi gebelik sırasında sigara içmiş olan bebekler 128.68 gr daha hafif bulundu. Sigara içen annelerdeki bulgular sigara içmeyen annelerdeki bulgularla karşılaştırıldığında: düşükler (%38.6-29.3), intrauterin ölüm (%4.5-2.7), prematür doğum (%31.8-19.1), düşük doğum ağırlığı (%22.7-%18.2), abruptio placenta (%2.3-%1.6) ve preeklampsi (%9.1-%8.6) daha yüksekti (p> 0.05). Sigara içen gebe kadınlarda erken membran rüptür sıklığı hiç sigara içmemiş olanlara göre anlamlı derecede daha yüksekti (p< 0.05). **Sonuç:** Bulgularımıza dayanarak gebelik sırasında sigara kullanımının olumsuz perinatal sonuçları olduğu açıktır. Sigara içen gebelerin sigarayı bırakmaları desteklenmelidir. Bu konudaki yönlendirme sağlık görevlilerince her zaman yapılmalıdır. Aynı zamanda sigara içen eşler de bu riskler konusunda bilgilendirilmelidir.

**Anahtar Kelimeler:** Gebelik, sigara içme

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In many countries, smoking during pregnancy is recognized as the most important preventable risk factor for an unwanted pregnancy outcome. Since 1980, hundreds of additional studies have expanded what is known about the health effects of smoking among women. Smoking is harmful in every phase of reproduction. Despite increased knowledge of the adverse health effects of smoking during pregnancy, many pregnant women continue to smoke (estimates range from 12% to 22%). It is estimated that only 18-25% of women quit smoking once they become pregnant.<sup>1,2</sup>

Smoking during pregnancy and postpartum period is a serious health risk for the fetus, infant and child. Women who smoke have an increased risk for infertility. Studies have shown that smoking makes difficult to get pregnant.<sup>1,2</sup> Active maternal smoking increases the risks of perinatal mortality, preterm delivery (PTD), miscarriage, ectopic pregnancy, antepartum hemorrhage, and placenta previa. Neonates born to active smokers weigh approximately 200 g less at birth, are at an increased risk of being small-for-gestational age (SGA) and having smaller head circumferences.<sup>2</sup> In addition, smoking in pregnancy has been associated with cleft palate and cleft lip, sudden infant death syndrome (SIDS), hyperviscosity in the newborn, elevated blood pressure during infancy and childhood, childhood cancers, deaths due to respiratory illnesses, otitis media, all kinds of genital tract bleeding, burns and fire deaths.<sup>1</sup> Even in infants who appear normal, there may be long-lasting effects of prenatal tobacco smoke exposure on cognitive development in their childhood. Studies have shown increased risk of neurobehavioral deficits, mental retardation and learning problems during childhood in the children of mothers who smoked during pregnancy.<sup>3</sup>

Unfortunately, the majority of women who smoke prior to pregnancy continue to smoke during pregnancy. Because of the serious health risks for both mother and infant, effective interventions are needed to help pregnant women to quit smoking. We aimed to investigate the rate of smoking and perinatal outcomes of maternal smoking during pregnancy in a hospital based study.

## MATERIAL AND METHODS

This cross-sectional study was carried out on women who delivered in the Gynecology and Obstetric Department of Konya Meram Medical Faculty of Selçuk University, between July 22<sup>nd</sup> 2004 and January 3<sup>st</sup> 2005. Ethical approval for the study was obtained before applying out questionnaires. During this period, 830 women had delivered. Initial decision was to include all of them in the study, however due to several reasons (i.e. refuse to recruit, early discharge, discontinuing of the study on holidays), we were able to include only 600 (72.3%) of them.

Questions on smoking during pregnancy, educational and socioeconomic status of the couples and the harmful effects of smoking that could affect the health of mother and child were asked to the mothers in a face-to-face interview on the first day after the parturition. Standard questions which were used in the classification of smoking status in the United States, and Fagerstrom Test for Nicotine Dependence were administered.<sup>4</sup> Babies were weighed by the researchers. Abortion, stillbirth, premature delivery, low birth weight, placental abruption, placenta previa, eclampsia, premature rupture of the membranes were determined.

Statistical analysis was performed using SPSS software package, version 11.0 (SPSS Inc., Chicago, IL, USA). The rates of delivery outcomes were compared between pregnant smokers and non-smokers. Statistical analyses were carried out using Chi-square test and Student-t test. A probability value of  $p < 0.05$  was regarded as significant.

## RESULTS

### SOCIO-DEMOGRAPHIC CHARACTERISTICS

The mean age was  $28.46 \pm 5.81$  years (median: 28, and min: 17, max: 43). Of the participants, 29.7% ( $n=178$ ) were primiparous and employment rate of these women was 8% ( $n=48$ ). The characteristics of the participants according to their smoking status during pregnancy are presented in Table 1. Maternal characteristics of women who smoked or never smoked were similar.

**TABLE 1:** Characteristics of mothers according to smoking status.

Maternal Characteristics	Never smokers (n=556)	Smokers (n=44)	p-value	n%	n%
<b>Maternal</b>					
Mean age, (years)	28.4 ± 0.24	29.09 ± 1.00	p> 0.05a		
<b>Educational status</b>					
Uneducated	20	3.5	2	4.6	
Primary education	381	68.6	25	56.8	
High school and university education	155	27.9	17	38.6	p= 0.292 <sup>b</sup>
<b>Employment status</b>					
Employed	44	7.9	4	9.1	
Unemployed	512	92.1	40	90.9	p= 0.771 <sup>b</sup>
<b>Marriage age</b>					
4-17 years old	114	20.5	12	27.3	
18-24 years old	386	69.4	23	52.3	
25 and over	56	10.1	9	20.4	p= 0.050 <sup>b</sup>
<b>Parity status</b>					
Primiparous	164	29.5	14	31.8	
Multiparous	392	70.5	30	68.2	p= 0.878 <sup>b</sup>
Gaining weight during pregnancy, (kg)	12,1±0.24	11,8±0.79	P>0.05a		
<b>Abortion before pregnancy</b>					
Yes	163	29.3	17	38.6	p= 0.259 <sup>b</sup>
<b>Smoking status of husbands</b>					
Current smokers	304	54.7	36	81.8	
Former smokers	58	10.4	3	6.8	
Never smokers	194	34.9	5	11.4	p= 0.001 <sup>b</sup>

a Student-t test was used

bChi-square test was used

## PREVALENCE OF SMOKING

The rate of women who had smoked at any time during pregnancy was 7.3% (n=44), and who had smoked continuously during pregnancy was 2.5% (n=15). Smoking rates were 7.3% (n=44), 4.0% (n=24) and 3.3% (n=20) in the first, second and third trimesters of the pregnancy, respectively. On the first day after delivery, the point prevalences among the participants were %3.3 (n=20), 9.3 % (n=56) and 87.3% (n=524) for current smokers, former smokers and never smokers, respectively. Of the former smokers, 48.2% (n=27) stopped smoking just before pregnancy, while 51.8% (n=29) during the current pregnancy. Of the women who were smoking in the first month of the pregnancy, 34.1% (n=15) quitted smoking in the second month.

## TOBACCO DEPENDENCE AND SMOKING BEHAVIOR

Ten percent of the smokers were smoking 10-20 cigarettes/day, while 90.0% were smoking 1-10 cigarettes/day. The mean value of nicotine dependence according to the Fagerstrom score was 3.65 (SD=2.10) for all smokers. The results of the test scoring were as follows: 40.0%, 20.0%, 20.0%, 15.0% and 5.0% were 0-2 points, 3-4 points, 5 points, 6-7 points and 8-10 points, respectively.

Smoking rate during pregnancy was higher in high school and university graduates compared to other groups. When the findings of smoking mothers were compared with never smoking mothers, the rate of abortion (38.6% versus 29.3%) was higher. However, these results were not statistically significant (p> 0.05).

## SMOKING STATUS OF HUSBANDS

The smoking rate of the husbands was 56.7% (n=340), 10.2% (n=61) 33.2% (n=199) for current smokers, former smokers and never smokers, respectively. Although, maternal characteristics of women who smoked or never smoked were similar, when smoking status of husbands of the women who smoked at any time during pregnancy were compared to never smoking mothers, the rate of current smokers (81.8% versus 54.7%), former smokers (6.8% versus 10.4%) and never smokers (11.4% versus 34.9%) were significantly higher ( $p=0.001$ ) (Table 1). Sixty eight point two percent of the pregnant women whose husbands were smokers reported that their husbands went on smoking in the house during the pregnancy. Premature delivery (24.4% versus 14.2%) rates was significantly higher ( $p<0.05$ ) among the women whose husbands were smokers.

## CHARACTERISTICS OF THE NEWBORN

Table 2 shows the characteristics of the newborns of smoking and never smoking mothers. The mean birth weight of babies whose mothers smoked at any time during pregnancy was 2899.55 g (SD=858.22). The mean birth weight of babies whose mothers never smoked was 3029.23 g (SD=764.32).

When the findings of smoking mothers were compared to never smoker mothers; the rates of stillbirth (4.5% versus 2.7%), premature delivery (31.8% versus 19.1%), low birth weight (22.7% versus 18.2%), placental abruption (2.3% versus 1.6%) and preeclampsia (9.1% versus 8.6%) were higher in the smokers. However, these results were not statistically significant ( $p>0.05$ ). The rates of delivering male children (46.4% versus 63.6%) and premature rupture of the membranes (6.5% versus 15.9%) were found significantly higher among smoking mothers compared to never smokers ( $p<0.05$ ).

**TABLE 2:** Characteristics of newborns and labor complications according to smoking status of mother.

	Never smokers (n=556)		Smokers (n=44)		pvalue
<b>Gender</b>					
Male	258	46.4	28	63.6	
Female	298	53.6	16	36.4	0.041 <sup>b</sup>
Weight, (kg)	3.02 ± 0.7	2.8 ± 0.8	p> 0.05 <sup>a</sup>		
<b>Type of delivery</b>					
Cesarean	314	56.5	25	56.8	
NSVD	242	43.5	19	43.2	p=1.000 <sup>b</sup>
<b>Complication rate in all cases</b>					
<b>Stillbirth</b>					
Yes	15	2.7	2	4.5	p=0.358 <sup>b</sup>
<b>Premature delivery</b>					
Yes	106	19.1	14	31.8	p=0.066 <sup>b</sup>
<b>Low birth weight</b>					
Yes	101	18.2	10	22.7	p=0.583 <sup>b</sup>
<b>Abruptio placentae</b>					
Yes	9	1.6	1	2.3	p=0.536 <sup>b</sup>
<b>Pre-eclampsia</b>					
Yes	48	8.6	4	9.1	p=0.78
<b>Premature ruptures of the membranes</b>					
Yes	36	6.5	7	15.9	p=0.03 <sup>b</sup>

NSVD=Normally Spontaneous Vaginal Delivery

a Student-t test was used

bChi-square test was used

## DISCUSSION

Our study focused on prevalence of smoking during pregnancy and its perinatal outcomes. The percentage of women who smoked at any time of pregnancy was 7.3%. The prevalence of smoking among pregnant women in different countries were as follows; Israel 12.8% (in 2002),<sup>5</sup> Sweden 13.0% (in 2000),<sup>6</sup> Italy 17.0% (in 1995),<sup>7</sup> USA 12.0% (in 1999),<sup>8</sup> United Kingdom 25.0% (between 1992-1995)<sup>9</sup> and Germany 26.0% (between 1992-1994).<sup>10</sup>

There are very few studies concerning cigarette smoking during pregnancy in our country. The percentage of cigarette smoking during pregnancy was 37% in Samsun between 1988-1989.<sup>11</sup> Women who delivered between 1991-1992 in Erzurum had a smoking rate of 2.7% during their pregnancy.<sup>12</sup> The percentage of women who had smoked at any time during pregnancy was found 17% in Sivas Maternity Hospital in 2002.<sup>13</sup> In a recent study carried out in Bursa Medical Faculty Department of Obstetric and Gynecology in 2005, the smoking rate among pregnant women was 9.8%.<sup>14</sup> The smoking rate among pregnant women was lower in our study. This result may be related to the more conservative life styles of cases who live in Konya compared to others cities of Turkey, except Erzurum and Bursa.

In our study, the rates of quitting smoking in the first and second trimesters were 45.5% and 4.5%, respectively. Approximately one-third of the women who became pregnant were smokers at the time of conception, however, %20 of them quit smoking before their first prenatal visit. Approximately 1/3 of the women who declared that they were smokers quit smoking in the second month of the gestation. These result could suggest that the women who realized that they were pregnant gave up smoking considering the health of their babies.<sup>13,14</sup>

As we mentioned in the results section, the smoking rates of the smoker pregnant women's husbands were significantly higher than the husbands of the never smoker pregnant women. There may be a higher risk for the smoker pregnant wo-

men if their husbands are also current smokers. In this study, the smoking rate of husbands was 56.7%. In 1993, BIGTAS study revealed 59.0% smoking rate in the adult male population in Turkey.<sup>15</sup> A national survey conducted in 2003 reported the smoking prevalence among Turkish males older than 18 years as 51.0%.<sup>16</sup> These results are compatible with our findings.

Although the effects of paternal smoking on pregnancy have not been extensively studied, a small number of studies yielded different results. Haug et al. noted that there was no substantial difference between birth weights of infants of never smoking mothers and infants of mothers who were exposed to cigarette smoke (passive smokers), and that passive smoking among pregnant women was not a major health concern in Norway.<sup>17</sup> In their meta-analysis, Kramer et al. reported that there was 150-200g difference in birth weights of the infants of passive smokers and nonsmokers.<sup>18</sup>

In other studies, the exposure to cigarette smoke during pregnancy had an effect on infant birth weight and preterm delivery, especially when the fathers smoked.<sup>19,20</sup> Zhang and Ratcliffe noted that passive smoking might be even more harmful due to faster metabolism of nicotine in active smokers.<sup>19</sup> We found that paternal smoking might be a risk factor for premature delivery. This result was in agreement with the literature.<sup>18-20</sup>

Compared to babies born to mothers who did not smoke during pregnancy, babies born to mothers who smoked during pregnancy were 128.68 g lighter. A causal relationship has been shown between birth weight and smoking during their pregnancy. Mothers who smoke during pregnancy generally deliver infants weighing 100-300 g lighter than infants born to never smoking mothers.<sup>21</sup> This result was in accordance with the literature.<sup>1,2,10,17-21</sup>

In our study, when the findings of smoker mothers were compared to the never smoker mothers, the rate of low birth weight was higher in the smokers. However, this result was not statistically significant. Smoking during pregnancy was correlated with low birth weight. Smoking during preg-

nancy causes low birth weight among infants by 20-30%. Smoking increases vitamin E consumption which accordingly increases peroxide production excessively, and consequently, prostacyclin causes placenta to be thin down preventing the fetus to be nourished adequately.<sup>21-23</sup>

In our study, when the findings of smoking mothers were compared to never smoking mothers, the percentage of placental abruption was higher in the smokers. However, this result was not statistically significant. It was widely enunciated that uteroplacental insufficiency could be the reason of placental abruption and growth retardation of the fetus as a result of cigarette smoking. According to this hypothesis, nicotine causes vasoconstriction in the uteroplacental vessels, and consequently, oxygen and food transfer to fetus decreases. In a study, it was found that cigarette smoking decreased the intervillous blood transfer acutely which turned to normal 15 minutes after stopping smoking.<sup>24</sup>

In our study, when the findings of smoker mothers were compared to never smoker mothers, the percentage of preeclampsia was higher in the smokers. However, this result was not statistically significant. Several theories have been proposed as biological relationships between smoking and preeclampsia. One of them suggests that the plasma volume expands less in pregnant smokers compared to pregnant nonsmokers. Another theory suggests that the agent thiocyanate found in tobacco smoke has a hypotensive effect. Finally, it has been suggested that nicotine has an inhibitory effect on the production of fetal thromboxane A<sub>2</sub>, which is a potent vasoconstrictor involved in the pathogenesis of pre-eclampsia.<sup>25</sup>

In our study, when the findings of smoking mothers were compared with never smoking mothers, the rate of premature delivery was found high

her in the smokers. However, this result was not statistically significant. The relationship between cigarette smoking and premature delivery was shown by Simpson for the first time in 1957.<sup>26</sup> Smoking during pregnancy can cause premature delivery. Premature delivery is twice more frequent in smokers compared to nonsmokers. In addition, the connection between the quantity of cigarette smoking and premature delivery has been shown. Premature delivery risk increased two-fold in the women who smoke more than ten cigarettes per day. This relative risk increased three-fold in the women who smoked 20 cigarettes per day.<sup>2,26,27</sup> In a study conducted in Italy, it was found that the risk of premature delivery was 1.5-2.5 fold higher in the smoker pregnant women with a dose-response relationship related to the number of smokers at home.<sup>27</sup> As our study presents, this finding supports the relationship between premature membrane rupture and cigarette smoking.

## CONCLUSION

In conclusion, premature rupture of the membranes is one of the statistically significant negative effects of smoking during pregnancy. In addition, it was observed that smoking of husbands of the pregnant women also increased some of the risks. These data suggest that, for the women who smoke during pregnancy, smoking cessation is the optimal treatment for the ultimate health of mother and child. As physicians, our primary duty should be providing counselling for smoking cessation before and after conception as well as during pregnancy.

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