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A CROSS-SECTIONAL STUDY: MATERNAL SMOKING DURING PREGNANCY AND ITS HARMFUL ASSOCIATION WITH NEONATAL BIRTH WEIGHT DECREASE

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Background: Increased morbidity and mortality in neonates are correlated with low birth weight (LBW). Many variables lead to LBW with prenatal exposure to smoking, such as maternal smoking and passive tobacco exposures, being one of the significant variables. During pregnancy, active maternal smoking leads to a reduction in birth weight and increases the risk of low birth weight (LBW) considerably. The adverse effects of reduced birth weight during pregnancy were associated with maternal smoking. Few studies were examining the connection between tobacco and its impacts on neonatal complications, but the findings were not significant.

Aim: This research aims to determine the impacts on some neonatal complications and results of the cigarette smoking of pregnant women.

Materials and Method: This study was a cross-sectional study, and it was conducted on 250 Syrian pregnant women in out patients clinics, from February 2019 to June 2019. They were interviewed before delivery using a questionnaire which included inquiries about the nature and extent of smoking during their pregnancy. The samples were divided into two groups: smoker pregnant women and control groups. Then, the outcomes of neonatal complications, in two groups were compared.

Results: After adjusting the physical and socioeconomic pregnant women status and maternal smoking during the same period, we found that maternal smoking decreased birth weight. Compared with the non-smoking (Control) group, the maternal smoking group had higher incidences of LBW, especially when the mothers smoked >20 cigarettes/day. The association of maternal smoking with LBW in birth infants was insignificant.

Conclusion: The increase in the incidences of LBW of newborns is caused by maternal smoking, and so it must be advisable for the pregnant women to stop/reduce smoking during pregnancy to decrease morbidity in neonates. Additional studies, including exposition to smokers in the family, are necessary to explain the association of fetal health with smoking.

Keywords: Birth outcome; pregnant women; Smoking; Low birth weight (LBW)

INTRODUCTION

The significant public health issue is tobacco smoking. It is one of the significant causes of mortality and morbidity ***(West R., 2017)***. Besides, tobacco smoke is a significant risk factor for chronic diseases, including lung disease, cardiovascular diseases, and lung cancer ***(Report, 2014)***. The World Health Organization recognizes it as the world's second major mortality risk factor ***(WHO, 2009)***. More than 1.3 billion people globally smoke tobacco despite its related health risks ***(GATS Atlas, 2015)***. According to the latest national representative study, the incidence of smoking in Syria in 2013 was 12.2 percent. The rate of smoking among men was 27.9%, and among women, 2.9% ***(Moradi-Lakeh M. et al., 2013)***.

Maternal Smoking during pregnancy can cause preterm delivery, low-birth weight, and infant death. It is estimated to account for 20 to 30 percent of low-birth-weight babies, up to 14 percent of preterm deliveries, and about 10 percent of all infant deaths according to the ***American Lung Association***. Maternal smoking during pregnancy is a well-known cause for adverse reproductive outcomes, such as increased placenta Previa incidence, abrupt placenta, pregnancy bleeding, premature membrane rupture, and decreased fertility. The most likely exposed infants to be born with a low birth weight (< 2500 g) and have twice the death risk from all causes, particularly sudden infant death syndrome***(Bashiri A. et al., 2016)***. Cigarette smoking is a potent vasoconstrictor which decreases the uterine and placental flow of blood, and it has many toxic substances, including nicotine, which is a primary addicting compound. Carbon monoxide and cyanide are also poisonous.***(Bashiri A. et al., 2016)***

In pregnant women's blood, the levels of nicotine and thiocyanate are 20%-30%. Continued smoking causes reduced fertility as well as enhanced spontaneous abortion, preterm birth, and perinatal mortality, as well as a low birth weight of babies, for every ten cigarettes smoked per day, 200 grams' lower birth weight ***(Norwitz E. et al., 2013)***. Tabaco, low nutrition, and reduced weight gain throughout the entire pregnancy have essential roles as regards incidence and outcome of babies that have low birth weights ***(Leveno K. et al., 2013).*** This research aims to determine the impacts on some neonatal complications and results of the cigarette smoking of pregnant women. This study aims to demonstrate the smoking effect on newborn body weight.

RESEARCH PROBLEM

Pregnancy maternal smoking is correlated with adverse effects of pregnancy, including enhanced risk of low birth weight. Life-lasting effects may be noted for decreased neonatal weight with maternal smoking because there is proof of significant pediatric and adult morbidity associated with decreased birth weight***(Amasha H. et al., 2012)***.

Intervention studies to reduce maternal smoking during pregnancy and retrospective analyses of mother smoking relation to birth weight indicate reduction or full cessation of maternal smoking during pregnancy is related to enhanced birth weights, even if these improvements were usually of little importance.

The mechanisms of decreased fetal growth induced by maternal smoking have not been clarified; however, it may be a mixture of variables such as decreased intervillous blood flow, the effects of carbon monoxide and thiocyanate upon the fetus, and decreased production of prostacyclin ***(Arias F. et al., 2008)***. The developing chronic diseases risk such as high blood pressure (HBV), type 2 diabetes, and coronary heart condition is increased by maternal smoking. ***(Chiolero A., et al., 2005)***

LITERATURE REVIEW

Although the global smoking prevalence during pregnancy has become relatively low (1·7%, 95% CI 0·0–4·5), smoking during pregnancy is currently prevalent in many countries. Knowledge of smoking during pregnancy prevalence can inform strategies for developing targeted anti-smoking campaigns and intervention programs.

Globally, 52·9% of women who smoked daily continued to smoke daily during pregnancy. The European Region had the highest estimated smoking during pregnancy prevalence; however, the lowest estimated women proportion who smoked daily and continued to smoke daily during pregnancy (30·6%). The African Region had the lowest estimated smoking prevalence during pregnancy (0·8%), but the second-highest estimated women proportion who smoked daily and continued to smoke daily during pregnancy (61·9%). The Western Pacific Region had the highest women proportion who smoked daily and continued to smoke daily during pregnancy (79·6%).***(Lancet, 2017; Lancet Glob Health, 2014)***

Overall, the prevalence of smoking tobacco among Syrians is 12.1%. This prevalence was 1.5% among females and 23.7% among males. Daily tobacco smoking is 1.1% among females and 11.4% – 21.5% among males.

The prevalence of smokers who consume cigarettes daily with an average of 15.0 cigarettes per day was11.4% (1.1% among females and 21.5% among males). Approximately, Syrians start smoking at age 18.7 (females at 21.6 and males at 19.0). Overall, the percentage of Syrians who started smoking before the age of 15 was 29.7%, and those who started smoking before the age of 18 was 60.9%. ***(Algabbaniet al., 2018)***

STUDY DESIGN

A cross-sectional study was conducted on 250 Syrian pregnant women in Out patients clinics, from February 2019 to June 2019. They were interviewed before delivery using a questionnaire which included inquiries about the nature and extent of smoking during their pregnancy. The samples were divided into two groups: smoker pregnant women and control groups. Then, the outcomes of neonatal complications, in two groups were compared.

STUDY POPULATION

Participants recruited were Syrian pregnant women in out patients clinics. Enrollment occurred between February 2019 and June 2019. Women enrolled in the study program had to be before 26 menstrual pregnancy weeks. All participants had gestational age assignment through ultrasound confirmation and performed ultrasound examinations at less than 20 weeks of gestational age. All women had data collected near their first pregnancy visits' time.

DATA COLLECTION

Data were obtained from 280 women enrolled in Out patients clinics-based outpatient research clinic for smoking prevention during pregnancy. All women receiving prenatal care completed a brief questionnaire regarding primary sociodemographic and cigarette smoking at these clinics. Mothers who declared smoking any time during the current pregnancy were contacted subsequently by study staff by phone or in-person regarding study participation.

Only women with complete data across all measures and assessments were included in the study.

PATTERNS OF SMOKING EXPOSURE

Information on the patterns of smoking was obtained from the interview questionnaire. The relevant questions were "Did the mother smoke before pregnancy, in the first three months of pregnancy, and four months after pregnancy?" and "If yes, how many cigarettes were smoked in one day?" According to the prevalence of smoking, we categorized the mothers into 2 groups, namely, nonsmoking group, and smoking group (1–10 cigarettes/day, 11–20 cigarettes/day, and >20 cigarettes/day during three different stages of pregnancy (preconception, first trimester, and second and third trimesters)).

POTENTIAL CONFOUNDING VARIABLES

The following were considered as potential confounding variables for gestational age, birth weight, and SGA: maternal age (<20, 20–34, and >35 years), education (high school or below and university student or above), total body-weight gain during pregnancy (<10, 10–17, and >35 kg), and gender of the infant.

STATISTICAL ANALYSES

The relationships of maternal smoking with gestational age and birth weight during the different periods of pregnancy were assessed using multivariate linear regression to control for maternal age, nationality, education, total weight gain during pregnancy, the gender of the infant, multi-fetus, during the same period. Multiple logistic regression analyses were performed to estimate the odds ratios (ORs) and 95% confidence intervals of preterm delivery, LBW, and SGA during the different maternal smoking status and different stages of pregnancy, after adjusting for maternal age, nationality, education, parity, total weight gain during pregnancy, gender of the infant, multi-fetus, and maternal smoking during the same period. The dose-response relationship was tested by trend test.

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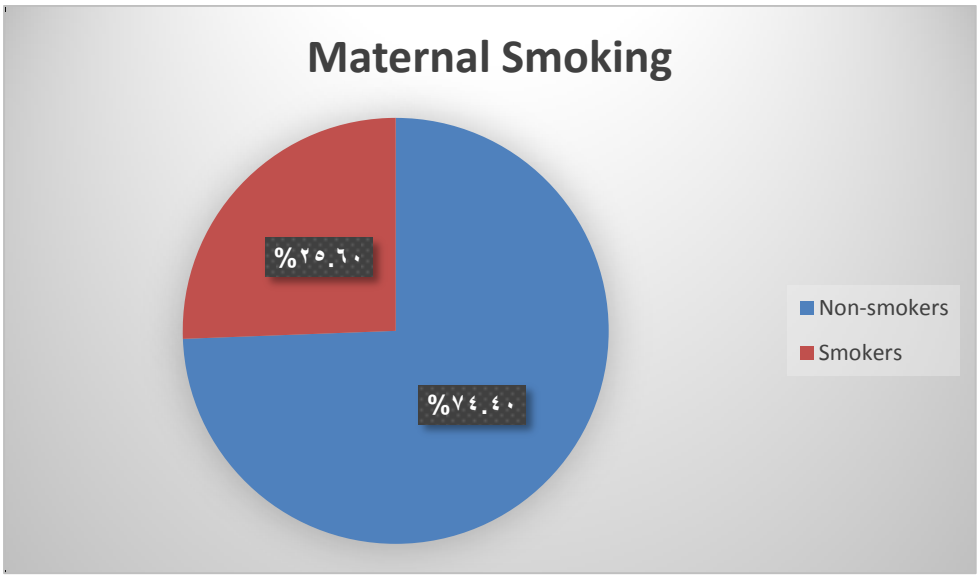
The threshold statistical for significance was set at 0.05. All statistical analyses were performed using SPSS for Windows, release 12.0.

RESULTS

The majority of mothers were nonsmokers (186mothers, [74.4%]), while 64 mothers were smokers (25.6%).



In the nonsmokers' group (control group), the results found that the mean newborn body weight was 3252 g, with a standard deviation of 337 g. In the second group of smokers, the mean newborn body weight was 2430 g with a standard deviation of 330 g and $P < 0.05$, which indicates a highly significant relationship.

Regarding smoking and newborn body weight, compared with the non-smoking (Control) group, the maternal smoking group had higher incidences of LBW, especially when the mothers smoked >20 cigarettes/day with $P < 0.001$, which indicates a highly significant relationship between smoking and decreasing the weight of the newborn baby.

Group	Control	Smoker
Newborn body weight (g)	3252	2430
SD	337.0196	330
***P*-value**		0.017742

These results were similar to other studies that analyzed the smoking effect on birth weight, fetal growth, and prematurity, in over 17,000 pregnancies, which confirmed that smoking lowers the birth weight both through reducing the fetal growth and the gestation age at delivery. ***(Bashiri A. et al., 2016; Norwitz E. et al., 2013; Leveno K., et al., 2013; Curtis M. et al., 2013; Byrom S. et al., 2009;Arias F. et al., 2008***] Another prospective studies showed a 400 g mean birth weight reduction in the smoking group; the patients have been matched for weight, height, socioeconomic status, and gestational age. Each patient in this study was free from all significant obstetric and medical disorders. Very few authors disagreed with the above results, arguing that particular woman type (both smokers and nonsmokers), gave the birth weight of small children since such an association could be demonstrated in women who did not smoke until the child was born. [***Norwitz E. et al., 2013; Pfeifer S. et al., 2012;Byrom S. et al., 2009;Arias F. et al., 2008***]

CONCLUSION

The increase in the incidences of LBW of newborns is caused by maternal smoking, and so it must be advisable for the pregnant women to stop/reduce smoking during pregnancy to decrease morbidity in neonates. Additional studies, including exposition to smokers in the family, are necessary to explain the association of fetal health with smoking.

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Appendix:

Demographic characteristics: This section asks about the demographic profile.

1. How old are you?
2. What is your nationality?
   - ( ) Syrian
   - ( ) Not Syrian
3. What is your marital status?
   - ( ) Married
   - ( ) Divorced
   - ( ) Widow
4. Number of previous pregnancies:
   - ( ) zero
   - ( ) 1-5 times
   - ( ) more than 5 times
5. What is your highest degree of education?
   - ( ) Primary school
   - ( ) Intermediate school
   - ( ) High school
   - ( ) Undergraduate
   - ( ) Bachelor
   - ( ) Postgraduate
   - ( ) Illiterate
6. Do you smoke? Which type?
   - ( ) Cigarettes
   - ( ) Hookah
   - ( ) Chewing tobacco

- ( ) I don't smoke

7. How many Cigarettes do you smoke daily?
   - ( ) None
   - ( ) ≤ 20
   - ( ) > 20