

Passive Smoking and Pregnancy Outcome

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Abstract

Objective: To evaluate the association between passive smoking and adverse reproductive effects or pregnancy outcomes among Jordanian pregnant women.

Material and Methods: This was a retrospective study which was conducted at Prince Rashid Ben Alhasan hospital between 2011 and 2013. Total samples of 4125 newborns were included in the study. The demographic characteristics of these newborns included: gestational age, gender, birth weight, congenital anomaly, mode of delivery and admission to NICU. Maternal characteristics of Jordanian women according to passive smoking included: age, parity, weight, and income.

Results: Pregnancy outcome for Jordanian women according to passive smoking status indicated that passive smoking is related with stillbirth with an incidence of 1.0%, low birth weight in 11.9%, pre-term delivery in 12.5%, congenital anomaly in 1.6%, caesarean delivery in 23.7% and need for admission in NICU in 35.4%. The result indicated that exposure to passive smoking during pregnancy had adverse effects on low birth weight, admission to NICU, and need for antibiotic significantly, p-value <.0005.

Conclusion: Exposure to passive smoking during pregnancy had adverse effects on pregnancy outcome. Adverse reproductive effects are serious and costly health problems that have a huge impact on morbidity and mortality rate in all societies.

Key words: passive smoking, pregnancy, pregnancy outcome.

Introduction

Cigarette smoking either as active or passive smoking is a major public health concern and considered as the greatest preventable cause of illness and premature death in our society (1). Worldwide, it is estimated that the number of women who are smokers will be trebled over the next generation (2). In developed countries such as the United States, the prevalence of cigarette smoking among pregnant women declined from 25 % in 1980 to reach 12 % in 2000, while the reverse is occurring in developing countries(3). Unfortunately, lack of studies were found in Jordan to investigate cigarette smoking behaviors during pregnancy.

Indeed, there is growing and greater evidence surrounding potential adverse reproductive health effects and pregnancy outcomes resulting from exposure to either passive or active smoking(4). However a lot of studies demonstrated the adverse effect of active cigarette smoking on pregnancy outcome including low birth weight, pre-term birth, still birth, spontaneous abortion and fetal growth restriction(5,6,7,8) at the same time few studies have found an association between active smoking and congenital malformation(9). In fact, a few studies investigated the associations between passive smoking and adverse reproductive effects or pregnancy outcomes. Passive smoking is identified either as main stream or side stream. Main stream smoking is defined as tobacco smoke generated during puff-drawing in the burning cone of a tobacco product, which then travels through the unburnt tobacco and is inhaled directly by the smoker(10); while side stream smoking is defined as a combination of smoke emitted into the air during the burning of a tobacco product between puffs, smoke escaping into the surrounding air during puffs and smoke components that diffuse through cigarette paper (10).

The majority of passive smoking is in the form of side stream smoking generated from the burning end of a lighted cigarette, whereas the remainder is composed of main stream smoking exhaled by individuals actively smoking.

In all, women who have exposure to cigarette smoking were posed a greater danger not only to their own reproductive health, but also to their unborn child if they are exposed during pregnancy. However, cigarette smoke constituents, including mutagenic, neurotoxic, and fetotoxic agents can pass through the placenta and are detected in the urine of newborns (11).

Indeed, adverse reproductive effects are serious and costly health problems that have huge impact on morbidity and mortality rate in all societies. However, few recent studies have investigated the association between passive smoking and adverse reproductive effects or pregnancy outcomes. Globally, little is known about the associations between passive smoking and reproductive effects or pregnancy outcomes. In Jordan lack of studies have investigated this health problem too, so the purpose of this study is to evaluate the association between passive

smoking and adverse reproductive effects or pregnancy outcomes among Jordanian pregnant women.

Materials and Methods

This was a retrospective study which was conducted at Prince Rashid Ben Alhasan hospital between 2011 and 2013. Total samples of 4125 newborns were included in the study with the majority aged between 21- 29 weeks; newborn were categorized to five age groups which ranged from less than 20 weeks to more than 40 weeks.

The demographic characteristics of these newborns included: gestational age, gender, birth weight, congenital anomaly, mode of delivery and admission to NICU. Maternal characteristics of Jordanian women according to passive smoking included: age, parity, Body Mass Index, resident area, income, occupation, and education as shown in Table 1 (page 36).

Results

Analysis of the distribution of participants according to gender revealed that male newborns represented 49.6% of the participants, while female newborns represented 50.4%. Pregnancy outcome for Jordanian women according to passive smoking status indicated that passive smoking is related with stillbirth with an incidence of 1.0%, low birth weight in 11.9%, pre-term delivery in 12.5%, congenital anomaly in 1.6%, caesarean delivery in 23.7% and need for admission in NICU in 35.4%.

Pregnancy and outcome for Jordanian women according to passive smoking status indicated that passive smoking is related with Still birth, Low birth weight, Pre-term delivery, Need of an infant for treatment by antibiotic, Need for admission in NICU, and Caesarean significantly as shown in Table 2 (page 37).

Adjusted for age, weight, height, job, residency, education, mother blood group, gravidity, parity, history of abortion, history of chronic pain, family history of low birth weight, history of prematurity, onset of antenatal visit, plan for pregnancy, happiness, drug pregnancy, use of medication during pregnancy, gum bleeding during pregnancy, coffee drinking, urinary tract infection, inter pregnancy interval, and gender, the result indicated that exposure to passive smoking during pregnancy had adverse effects on low birth weight, admission to NICU, and need antibiotic significantly p- value <.0005 as shown in Table 3 (page 37).

Discussion

Cigarette smoking contains more than 2.500 chemicals; these chemicals are harmful to the developing baby(12). Both nicotine and carbon monoxide are believed to play a role in causing adverse pregnancy outcomes. Most recent studies reported that carbon monoxide and dioxide decrease availability of oxygen which are the primary substance responsible for fetal adverse effect(13).

Table 1: Socio-demographic and maternal characteristics of Jordanian women according to passive smoking status

Variable	Passive Yes/n%	Smoking No/n%	P-value
Age (year):			
<=20	487(11.8)	336 (7.7)	
21-29	2444 (59.2)	2523 (57.8)	
30-34	623 (15.1)	904 (20.7)	
35-39	354 (8.6)	430 (9.9)	< 0.0005
>=40	217(5.3)	172(3.9)	
Body Mass Index:			
Normal	1142(27.8)	1015(23.3)	
Underweight	54(1.3)	33 (0.3)	
Overweight	1782(43.4)	2296 (52.6)	
Obese	1132(27.5)	1021 (23.4)	< 0.0005
Income (JD):			
<200	2348 (56.9)	1690 (38.7)	< 0.0005
>=200	1777 (43.1)	2675(61.3)	
Occupation:			
Employed	599 (14.5)	688 (15.8)	0.111
Unemployed	3526 (85.5)	3677 (84.2)	
Resident area:			
Urban	2283(55.3)	2499(57.3)	0.077
Rural	11842(44.7)	1866 (42.7)	
Education:			
< high school	11292(31.3)	1399(32.1)	< 0.0005
High school	1445(35.0)	946(21.7)	
>high school	1388(33.6)	2020 (46.3)	
Gravidity :			
1	1520(36.8)	1337(30.6)	< 0.0005
2or3	1242(30.1)	1357(31.1)	
4	1363(33.1)	1671 (38.3)	
Parity:			
0	1223(29.6)	1159(26.6)	<0.0005
1 or 2	1595(38.7)	1474(33.8)	
>2	1307(31.7)	1732(39.7)	

However, exposure to cigarette smoking during pregnancy via active or passive routes is believed to be a strong risk factor for pre-term birth and low birth weight. There is growing concern surrounding potential adverse reproductive health effects and pregnancy outcomes resulting from passive smoking (14). Passive smoking for pregnant women can possess significant health risks to the mother, infant, and it is associated with numerous avoidable health risks to infant such as risk for low birth weight is doubled, small for gestational age, and prenatal death.

Indeed, a recent study conducted in Canada examined the adverse effects of cigarette smoking among 225 women

undergoing IVF in Canadian reproductive clinic between 2003 and 2004. The finding showed significant lower implantation rates and pregnancy rates were found among both active and passive smokers compared with non-smokers. However, passive smoking among the women in the study was measured only by the self-reported(14).

Furthermore, a study conducted by Meeker and colleagues (2006), used multivariate design for 921 women undergoing assisted reproductive technologies to assess relationship between maternal exposure to second hand tobacco smoke and adverse pregnancy outcomes. The result indicated that the infant in utero of female exposure

Table 2: Pregnancy and outcome for Jordanian women according to passive smoking status

Outcome	Passive smoking Yes/n(%)	Passive Smoking No/n(%)	P-value
Gender of the infant :			
Male	2045(49.6)	2180(52.8)	0.002
Female	2080(50.4)	1945 (47.2)	
Still birth	41(1.0)	71(1.7)	0.015
Any congenital anomaly	67(1.6)	75(1.8)	0.306
Caesarean delivery	979(23.7)	1102(26.7)	0.105
Normal delivery	3146(76.3)	3263 (79.1)	
Need for admission in NICU:	1460(35.4)	231(5.6)	0.000
Need of an infant for treatment by antibiotic:	198(4.8)	59(1.4)	0.000
Underwent surgical Intervention:	0(0)	18(0.4)	0.000
Pre-term delivery	514(12.5)	462(11.2)	0.000
Low birth weight delivery	478(11.9)	315(7.6)	0.000

Table 3: Multivariate analysis of the difference in adverse pregnancy outcome between passive smokers and non smoker

Outcome	Odd ratio (95% CI)	P-value
Pre-term delivery	1.35(0.98,1.87)	0.067
Low birth weight delivery	1.97(1.56,4.49)	< 0.0005
Admission to NICU	2.30(1.75,3.03)	< 0.0005
Need antibiotic	3(0.3,10.04)	< 0.0005

to second hand tobacco smoke may increase risk for spontaneous abortion(15).

In Asia, one recent study examined the association between maternal smoking and pregnancy loss among 526 non-smoking Chinese females. However, the result indicated increased odds of early pregnancy loss among women with husbands who smoked more than 20 cigarettes per day(16). This study emphasized on the result obtained by another study conducted in California among 3000

pregnant women with exposure to second hand tobacco smoke. However, the finding showed an increased risk of spontaneous abortion among mothers who were exposed to tobacco smoke for one hour or more per day(17).

Another adverse effect of passive cigarette smoking was reported by Hunke and their colleagues in (1999); they conducted a study to evaluate the effect of environmental tobacco smoke on the risk of pre-term delivery and small for gestational age in central Poland with a randomly

selected population of 1751 women who gave birth between June 1996 and May 1997 and based on a structured interview. The result showed that 95 of the passive smoking women delivered before 37 weeks of pregnancy and 111 passive smoking mothers delivered babies with birth weight below the 10 % of the standard curves for central Poland(18).

The questions that emerged in the previous studies is whether these associations differ by maternal age. However, Ahluwalia et al. (1999) examined the association between exposure to environmental tobacco smoke during pregnancy and birth weight, prematurely and small for gestational age and to determine whether these associations differed by maternal age. They found that the mean adjusted birth weight among infants of non-smoking mothers age 30 years or older was 90 gm less than infants not exposed; similarly, were the risk of low birth weight (odds ratio = 2.42, 95% confidence interval 1.51-3.87) and pre-term -delivery (odds ratio = 1.88, 95% confidence interval 1.22-2.88). These finding indicated that the association between environmental tobacco smoke exposure and adverse pregnancy outcomes appears to be modified by maternal age(19).

On the other hand, a study was conducted among mothers at delivery and neonates in Incheon, which included 81 mothers exposed to tobacco smoke, to examine the association between environmental pollutants with smoking and utero developmental damage. The result indicated that oxidative damage in newborns is affected by mothers exposure to environmental tobacco smoke, and the findings strongly show the need for smoking cessation among household members during pregnancy(20).

One random sample study found in our literature used a cross-sectional design in stratified random sample study, in the city of Espoo in 1991. The researcher examined pregnancy outcomes among nonsmoking pregnant women exposed to environmental tobacco. The result indicated there was a trend of risk of low birth weight and pre-term delivery related to maternal exposure to environmental tobacco smoke(21).

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