

Research Article

A critical analysis of second-hand tobacco smoke and nicotine levels on pregnancy outcomes and infant health

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ABSTRACT

Introduction: Smoking during pregnancy is associated with various adverse effects on pregnancy and fetal development, carries a lot of serious complications such as spontaneous abortion, placental abruption, and reduced birth weight of the newborn. **Aims and objective:** The main objective of the study is to find the effect of second-hand tobacco smoke and nicotine levels on pregnancy outcomes and infant health among local population of Pakistan. **Material and methods:** This cross sectional study was conducted in Lahore General Hospital during September 2018 to January 2019. This study was done with the permission of ethical committee of hospital. The data was collected from 100 pregnant females who visited the OPD of hospital. The data was collected through a questionnaire. This questionnaire include the demographic data of all the participants. The self-administrated questionnaire included medical and lifestyle variables, such as demographics, ages of both male and female partner, medical and reproductive history, smoking history and duration of infertility. **Results:** The data was collected from 100 pregnant females who were second hand smokers. These women were non-smoker pregnant women and exposed to cigarette smoking and suffer from complications during childbirth. The mean age of mothers, was 27.38 ± 5.5 years (range from 13 to 45 years). The mean number of pregnancies was 1.91 ± 0.99 (range from 1 to 5). The mean parity was 1.77 ± 0.84 (range from 0 to 5). 14.2% (213) of women were SHS exposure during pregnancy and 85.8% (1287) were not. **Conclusion:** It is concluded that non-smoking pregnant women in Pakistan who lived with a smoking husband were highly exposed to SHS, especially from their husbands. In addition, non-smoking pregnant women have inadequate knowledge on the harms of SHS.

Keywords: SHS, Pregnant, Females, Smoking, Passive

INTRODUCTION

Smoking during pregnancy is associated with various adverse effects on pregnancy and fetal development, carries a lot of serious complications such as spontaneous abortion, placental abruption, and reduced birth weight of the newborn. Children of smoking mothers have

an increased risk of premature birth, low birth weight, sudden infant death syndrome and respiratory diseases during infancy¹. Smoking also causes long-term risk of maternal health problems such as: heart disease, cancer, emphysema, chronic obstructive pulmonary

disease and higher mortality rate². Because women are more likely to quit smoking during pregnancy than at any other time, there are attempts to increase motivation and help them to stop smoking at the procreative phase of their life³. There is growing concern surrounding potential adverse reproductive health effects and pregnancy outcomes resulting from exposure to second-hand tobacco smoke⁴. Although exposure to second-hand tobacco smoke is preventable, it remains prevalent. The majority of second-hand tobacco smoke is in the form of side stream smoke generated from the burning end of a lighted cigarette, whereas the remainder is composed of mainstream smoke exhaled by individuals actively smoking⁵. Both mainstream and side stream smoke contain thousands of compounds many of them are harmful to humans⁶⁻⁷. Mainstream and side stream smoke are produced at differing temperatures and oxygen conditions, and harmful constituents exist in varying proportions between the two types of smoke⁸. For example, side stream smoke contains more CO and less CO₂, and higher levels of combustion products formed by nitroization and amination than mainstream smoke⁹.

Theoretical background

Second-hand smoke is characterized as the product released into the environment whenever someone who is smoking exhales. It can also come from the end of tobacco-containing smoking products¹⁰. There are approximately 4,000 chemicals present in second-hand smoke, many of which have been determined to be related to cancer. If you are exposed to second-hand smoke during pregnancy, both you and your baby are put at risk. Some of the health conditions associated with being exposed to second-hand smoke are a miscarriage, low birth weight, early birth, learning or behavioral deficiencies in your child, and Sudden Infant Death Syndrome

(SIDS)¹¹. SIDS is a disorder where an infant dies unexpectedly while they are sleeping. This condition is somewhat of a mystery as autopsies and medical examinations do not pinpoint a cause of death, and infants seem healthy before they die¹².

Aims and objective

The main objective of the study is to find the effect of second-hand tobacco smoke and nicotine levels on pregnancy outcomes and infant health among local population of Pakistan.

MATERIAL AND METHODS

This cross sectional study was conducted in Lahore General Hospital during September 2018 to January 2019. This study was done with the permission of ethical committee of hospital. The data was collected from 100 pregnant females who visited the OPD of hospital. The data was collected through a questionnaire. This questionnaire include the demographic data of all the participants. The self-administrated questionnaire included medical and lifestyle variables, such as demographics, ages of both male and female partner, medical and reproductive history, smoking history and duration of infertility. Clinical pregnancy was determined by ultrasound visualization of a gestational sac and a fetal heartbeat. The samples, based on exposure to cigarette smoking, were divided into two groups: passive smoking-exposed and control groups and outcomes of maternal and neonatal complications, (Preterm Delivery, gestational age, rupture of membranes before the onset of labor, or up to 37 weeks of gestation (PROM), Stillbirth, Baby's head circumference, birth weight and length) in two groups were compared.

Nicotine measurement

Nicotine in body degrades to cotinine, which it is a good marker of exposure to SHS, before birth. We can measured it, in umbilical cord blood, urine, amniotic fluid and meconium. Biomarkers

in umbilical cord blood, can be detected in a few days after birth, whereas meconium biomarker of exposure to tobacco smoke, can be shown in several months.

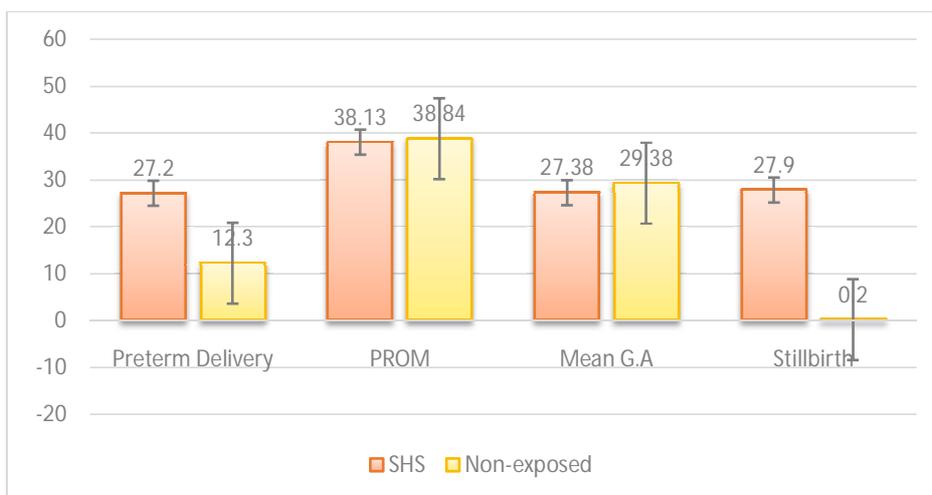
Statistical analysis

Statistical analysis was performed with SPSS 17.0 software (Chicago, IL). Results are reported as median, geometric mean or numbers with percentages. Categorical data were analyzed using chi-squared analyses, and continuous variables using independent Student’s t-tests. Spearman’s rank correlation was used to assess the relation between self-reported exposure and nicotine levels.

RESULTS

The data was collected from 100 pregnant females who were second hand smokers. These women were non-smoker pregnant women and exposed to cigarette smoking and suffer from complications during childbirth. The mean age of mothers, was 27.38±5.5 years (range from 13 to 45 years). The mean number of pregnancies was 1.91 ± 0.99 (range from 1 to 5). The mean parity was 1.77 ± 0.84 (range from 0 to 5). 14.2% (213) of women were SHS exposure during pregnancy and 85.8% (1287) were not.

Factor	SHS	Non-exposed	P-values
Preterm Delivery	27.2	12.3	<0.001
PROM	38.13 ± 1.54	38.84 ± 1.31	<0.001
Mean G.A	27.38±5.5	29.38±2.8	<0.001
Stillbirth	27.9	0.2	1.00



The mean number of cigarettes smoked by the partners of pregnant women was 12.5 ± 7.7 (range from 5 to 40 cigarettes per day). The gestational age, in SHS exposure group, on average was 38.14 weeks (SD = ± 1.55) and in non-SHS exposure group, was 38.85 weeks (SD = ± 1.32). This difference was statistically significant (p- value < 0.001). This means, exposure to cigarette smoke effects on gestational age (Table 1). The mean length of infants, in SHS exposure group was 48.69 ± 1.88 and in non-SHS

exposure group, was 49.42 ± 213. This difference was statistically significant (p- value < 0.001). This means, exposure to cigarette smoke effects on baby’s length (Table 2).

	Passive smoker	Non passive smoker	P value
Baby’s head circumference(cm)	33.42 ± 1.23	33.88 ± 1.45	<0.001
birth weight (g)	2996.19 ± 354.35	3236.46 ± 413.32	<0.001
Birth length(cm)	45.69 ± 1.88	46.42 ± 2.13	<0.001

DISCUSSION

The high prevalence of SHS exposure for the non-smoking pregnant women in our provincial study (75%) is consistent with previous literature described 10 years ago in the city of Guangzhou. Although one study in the U.S.A. reported that 16.4% of non-smoking singleton pregnancies had SHS exposure during pregnancy, certain subpopulations even in developed countries like the U.S.A. may have high SHS exposure rates¹³. Among pregnant women in New Haven, Connecticut, U.S.A., 52% of nonsmokers had been classified as having had recent SHS exposure according to their urinary cotinine levels¹⁴. Another study examined correlates of SHS avoidance in a population of African-American pregnant non-smokers who lived with smokers and reported 73% of the women's salivary cotinine levels exceeded the passive smoking cut-off of 10 ng/ml¹⁵.

The results of our study indicated an adverse effect of SHS exposure on length, weight, baby's head circumference, PROM and pre-mature birth¹⁶. However, SHS exposure in mothers during pregnancy causes to decrease of birth weight, length, baby's head circumference but, increase the risk of PROM and pre-mature birth¹⁷. In this study, 14.2% of mothers were in SHS exposure during pregnancy. But in numerous studies this percentage, has been reported, 35.9% in Brazil, 13% in U.K, 24.4% in Indian and 69.1% in China. It is important your baby has limited exposure to second-hand smoke even once he/she is born¹⁸. Babies in contact with second-hand smoke are more likely to develop SIDS. In addition, children exposed to second-hand smoke experience negative effects on their immune system.

They are more likely to have ear infections, colds, respiratory ailments, and teeth problems¹⁹. Third-hand smoke is likely to be as harmful as second-hand smoke to your infant, so it is important to keep your child away from areas that contain third-hand

smoke residue. Blackburn et al. found that banning smoking at home was associated with significant reductions in urinary cotinine to creatinine ratio in infants²⁰.

CONCLUSION

It is concluded that non-smoking pregnant women in Pakistan who lived with a smoking husband were highly exposed to SHS, especially from their husbands. In addition, non-smoking pregnant women have inadequate knowledge on the harms of SHS. These findings are particularly significant for rural women.

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