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Original Research

A cohort study on adverse pregnancy and birth outcomes in women associated with occupational tobacco exposure

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ABSTRACT:
Background- India is the world's second largest consumer and third-largest tobacco producer in world. It also ranks second in the cause of death universally which cannot be ignored. It is one of the social problem and a major public health Issue worldwide. It has been encountered as one of the major reason for around 6 million deaths each year due to its usage globally. **Materials and methods-**The study was a hospital-based cohort study, which consisted of women between the ages of 20 and 40 years with singleton pregnancies with no chronic illnesses and were enrolled between 19 and 23 weeks of gestation and followed at 27–29 weeks, 35–37 weeks, and at delivery. Total 300 cases were included in the study which is further classified into two groups as exposed group and unexposed group. Exposed group consists of 100 and unexposed group contains 200 cases. **Results-**Majority of the cases belonged to lower socioeconomic strata in which Women in the exposed group were older than the unexposed group. Approximately 40% of the women in the exposed and 30% of the women in the unexposed were underweight. Although mean hemoglobin was ≥10.0 g/dL in both groups, which was significantly lower in the exposed group. **Conclusion-** Adverse effects on pregnancy and birth outcomes in the women involved in occupational tobacco exposure and the magnitudes of the findings were comparable to moderate maternal smoking.
Key words: pregnancy, tobacco exposure, maternal health.

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INTRODUCTION-
India is the world's second largest consumer and third-largest tobacco producer in world. A hand-rolled cigarette commonly known as Bidi consists of shredded and sun-dried tobacco called Nicotiana tabacum dust wrapped in a tendu (Diospyros melanoxylon) leaf, which is a traditional labor-intensive occupation in several states of India. Tobacco is a silent but serious threat to health and humanity. It also ranks second in the cause of death universally which cannot be ignored.[1,2] It is one of the social problem and a major public health Issue worldwide. It has been encountered as one of the major reason for around 6 million deaths each year due to its usage globally.[3]

Because of the low molecular weight and high solubility, Nicotine is an efficient skin penetrator. The workers involved in occupation of rolling bidi around 600 bidis/day is exposed to 3 g of nicotine and 120 g of tobacco which is a natural alkaloid.[4] WHO estimated the deaths due to tobacco use to rise above 8 million annually in the next two decades [3]. Rinsing with soap and water is partially effective in the removal of nicotine because skin serves as nicotine depot.

The rollers are exposed to nicotine by handling and inhalation as Bidi does not contain any chemical

preservative or stabilizing agents. Therefore, it is concentrated by the placenta, and its level in the fetal circulation is 15% higher as compared to the maternal circulation.[5] This can be absorbed by GIT from amniotic fluid as well as through the fetal skin which can affect the fetal outcome in many way For example it can decreases the mitotic potential of trophoblasts which results in abnormal placentation.[6] As well as due to the vasoconstrictive effects of nicotine it can affect uterine and umbilical arteries too.[7]

Chronic exposure to nicotine can increase the vascular resistance in the uteroplacental circulation which can lead to the fetal hypoxia.[8] Recently, it has been implicated in alterations of gene expression and DNA methylation related to fetal growth.[9] Adverse pregnancy outcome is established in maternal cigarette smoking and exhibits dose-exposure causality.[6,7] The present study was designed to assess pregnancy and birth outcomes in tobacco handlers.

MATERIALS AND METHODS

The study was a hospital-based cohort study, which consisted of women between the ages of 20 and 40 years with singleton pregnancies with no chronic illnesses and were enrolled between 19 and 23 weeks of gestation and followed at 27–29 weeks, 35–37 weeks, and at delivery. Total 300 cases were included in the study which is further classified into two groups as exposed group and unexposed group. Exposed group consists of 100 and unexposed group contains 200 cases. The study period was 24 months with the approval of the Institutional Ethical Committee and the written consents were obtained from the participating women and were classified into two groups as the exposed and the unexposed cohorts with and without occupational tobacco exposure. Inclusion criteria- Exposure to bidi rolling for at least 1 year before and continued into pregnancy. Exclusion criteria in both groups - (i) active exposure to tobacco through smoking or nonsmoking snuff inhalation and chewing tobacco and (ii) passive exposure to tobacco. Data collection was done by interviewing women in the exposed group at each antenatal visit regarding occupational practices. Pregnancy was monitored for anemia, gestational diabetes mellitus, FGR, hypertention, maternal weight gain.

In addition to demographic data, the socioeconomic class was established using Kuppuswamy scale

Statistical analysis was performed using the software SPSS version 20.0. For determining intergroup differences Chi- square test was used. Relative risk with 95% confidence interval (CI) was expressed. Intergroup comparisons were performed using independent sample t-test or Kruskal–Wallis test $P < 0.05$ was considered statistically significant.

RESULTS

During the study, 300 pregnant women were screened, in which 100 were included in the exposed and 200 in the unexposed group. The basic characteristics of the study at enrollment are presented in **Table 1**. Majority of the cases belonged to lower socioeconomic strata in which Women in the exposed group were older than the unexposed group. Approximately 40% of the women in the exposed and 30% of the women in the unexposed were underweight. Although mean hemoglobin was ≥10.0 g/dL in both groups, which was significantly lower in the exposed group. **Table 2** shows the pregnancy outcome in both the groups. The adjusted risks for hypertension during pregnancy and FGR were significantly higher in the exposed group while the adjusted risk for prematurity were not different between the groups. **Table 3** shows the birth outcome of live-births in both the groups. Mean birth weight, length, and head circumference were lower in the exposed group.

Table-1 DEMOGRAPHIC DATA OF TOBACCO EXPOSED AND UNEXPOSED GROUP

VARIABLES	MEAN±SD		MEAN DIFFERENCE	P VALUE
	EXPOSED (n=100)	UNEXPOSED (n=200)		
Age (years)	27.34±3.37	25.78±3.62	1.32 (0.61-2.01)	<0.001
Haemoglobin (g/dL)	10.00±1.00	11.26±1.24	−0.24 (−0.03-−0.42)	0.014
BMI (kg/m^2)	22.87±1.65	11.45±2.66	−0.40 (−1.06-0.27)	0.146
Pregnancy weight gain (kg)	6.53±3.33	6.50±3.88	0.12 (−0.63-0.85)	0.640

TABLE-2 PREGNANCY OUTCOME IN EXPOSED AND UNEXPOSED CASES

OUTCOME	EXPOSED (N=100)	UNEXPOSED (N=200)	RELATIVE RISK (95% CI)	TREND (P)	ADJUSTED RISK (95% CI)	TREND (P)
Anaemia	50 (40.1)	170 (47.8)	1.08(0.86-1.32)	0.598	-	-
Hypertention	10 (6.1)	8(2.7)	3.75 (1.42-9.94)	X2=8.04; P=0.003	3.55 (1.22-10.32)	0.022
Gestational Diabetes Mellitus	4 (2.7)	9 (2.4)	2.04 (0.58-6.81)	0.320	-	-
Pregnancy Losses	3 (2.1)	0	-	-	-	-
Placental Abruption	2(0.4)	0	-	-	-	-
Placenta Previa	2 (1.1)	0	-	-	-	-
Prematurity	10 (6.7)	13 (4.1)	2.24 (1.00-4.96)	X2=4.07; P=0.042	1.82 (0.75-4.46)	0.196
Fetal Growth Restriction	19 (13.8)	19 (5.4)	2.56 (1.36-4.58)	X2=11.21 P<0.001	2.61 (1.19-5.19)	0.005

TABLE- 3 BIRTH OUTCOME IN EXPOSED AND UNEXPOSED GROUP

Outcome	Mean±SD		Mean Difference	Trend (P)	Adjusted Mean Difference (95% CI)	Trend (P)
	Exposed (n=97)	Unexposed (n=200)				
Gestation (weeks)	37.17±2.01	37.47±1.11	−0.32 (−0.62-0.02)	0.071	−0.15 (−0.42-0.11)	0.242
Birth weight (g)	2612.70±411.76	2393.22±462.67	−168.53 (−246.38-−81.10	t (297)=−3.71<0.001	−102.83 (−176.63-−31.04	0.004
Length (cm)	45.34±2.51	47.05±1.80	−0.60 (−1.10-−0.21)	t (297)=−3.40<0.001	−0.44 (−0.77-−0.13)	0.005
Head circumference (cm)	32.26±1.83	34.87±1.12	−0.40 (−0.70-−0.18)	t (297)=−3.25<0.001	−0.35 (−0.58-−0.14)	0.001

DISCUSSION-

In the present study pregnancy outcomes were detected in the occupational tobacco exposure. Statistically significant findings included hypertension during pregnancy and FGR were observed. The risks for FGR and prematurity with maternal tobacco exposure are well established**.** [4,8,9,10] The adjusted risk for FGR seen in our study is comparable to that noted by Dejmek et al**.**[10] The adjusted risk for prematurity was not significant in our study. Due to the differences in the magnitude of tobacco exposure discrepant results were observed. Unlike active tobacco exposure in the mentioned study, tobacco exposure is passive in our study, premature births were present only in the exposed group. However, statistical inference is not possible due to the small numbers.

In the present study significantly lower newborn anthropometric measurements and a higher proportion of SGA were noted in the exposed group. The adjusted mean difference in birthweight seen in the study is comparable to the decrement seen with moderate maternal active smoking reported in the United Kingdom Millennium study.[8] The decrement is higher than that reported with maternal light smoking[11] environmental exposure to tobacco smoke**,**[10] and smokeless tobacco exposures.[12,13] There are no reports on the effect of maternal tobacco exposure on birth length, but a meta-analysis shows a 0.5 cm decrease in birth head circumference with maternal smoking.[14] The adjusted risk for SGA in the

exposed group is comparable to the risk reported in maternal snuff use.[13]

CONCLUSION-

The present study shows that there are adverse effects on pregnancy and birth outcomes in the women involved in occupational tobacco exposure and the magnitudes of the findings were comparable to moderate maternal smoking.

REFERENCES-

1- Ball K. Smoking spells death for millions. World Health Forum. 1986;7:211-6.
2- Older J. Anti smoking language that the young understand. World Health Forum. 1986;7:74-8.
3- Mathers CD, Loncar D. Projections of global mortality and burden of disease from 2002 to 2030. Plos Med. 2006;3(11):442
4- International Labour Organisation. Making Ends Meet: Bidi Workers in India Today. Study of Four States. Geneva: International Labour Organisation; 2003. Available from: http://www.ilo.org/public/english/ dialogue/sector/papers/food/wp202.pdf. [Last accessed on 2018 Jan 20].
5- Lambers DS, Clark KE. The maternal and fetal physiologic effects of nicotine. Semin Perinatol 1996;20:115-26.
6- U.S. Department of (HHS) Health and Human Services 2004. Reproductive effects. The Health Consequences of Smoking: A Report of the Surgeon General. Ch. 5. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2004. p. 525-610. Available from: https://www.cdc.gov/tobacco/data_statistics/sgr/2004/pdfs/chapter 5. pdf. [Last accessed on 2018 Feb. 10].
7- U.S. Department of (HHS) Health and Human Services 2014. Reproductive outcomes. The Health Consequences of Smoking: 50 Years of Progress. Report of the Surgeon General. Ch. 9. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2014. p. 459-521. Available from: https://www.surgeongeneral.gov/library/ reports/50-years-of-progress/sgr50-chap-9.pdf. [Last accessed on 2018 Feb 12].
8- Xiao D, Huang X, Yang S, Zhang L. Direct effects of nicotine on contractility of the uterine artery in pregnancy. J Pharmacol Exp Ther 2007;322:180-5.
9- Janssen BG, Gyselaers W, Byun HM, Roels HA, Cuypers A, Baccarelli AA, et al. Placental mitochondrial DNA and CYP1A1 gene methylation as molecular signatures for tobacco smoke exposure in pregnant women and the relevance for birth weight. J Transl Med 2017;15:5.
10- Dejmek J, Solanský I, Podrazilová K, Srám RJ. The exposure of nonsmoking and smoking mothers to environmental tobacco smoke during different gestational phases and fetal growth. Environ Health Perspect 2002;110:601-6.
11- Ward C, Lewis S, Coleman T. Prevalence of maternal smoking and environmental tobacco smoke exposure during pregnancy and impact on birth weight: Retrospective study using millennium cohort. BMC Public Health 2007;7:81.
12- Gupta PC, Subramoney S. Smokeless tobacco use, birth weight, and gestational age: Population based, prospective cohort study of 1217 women in Mumbai, India. BMJ 2004;328:1538.
13- Baba S, Wikström AK, Stephansson O, Cnattingius S. Changes in snuff and smoking habits in Swedish pregnant women and risk for small for gestational age births. BJOG 2013;120:456-62
14- Ekblad M, Korkeila J, Lehtonen L. Smoking during pregnancy affects foetal brain development. Acta Paediatr 2015;104:12-8.