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Association Between Prolonged Maternal Smokeless Tobacco Use and Low Birth Weight Baby in a Tertiary Level Hospital

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Abstract: Introduction: Low birth weight and preterm birth are significant predictors of morbidity and mortality in newborns and infants. For more than 40 years, it has been known that babies born to smoking mothers weigh less than babies born to nonsmoking mothers. Preterm birth is also increased by smoking during pregnancy. There is evidence that using smokeless tobacco may be as harmful to fetal health as cigarette smoking. Low birth weight (LBW) is often associated with increased morbidities and mortalities in newborns. Maternal smoking has a great contribution to having LBW babies. 28% of women in Bangladesh use smokeless tobacco frequently. The goal of the study was to find out the association between prolonged (>5 years) smokeless tobacco (ST) use and LBW babies. Methods: A retrospective cohort study was conducted with 300 mother-neonate pairs enrolled in the Department of Paediatrics and Department of Gynecology & Obstetrics, Dhaka Medical College, Dhaka from January 2009 to December 2010. Result: The majority of the mothers in this study used shada, followed by jorda, shada+jorda and gul. Smokeless tobacco (ST) which was used by mothers for more than 5 years significantly associated with the delivery of LBW baby (P <0.001) and carries a risk of having delivery of LBW baby 3.5 times higher in contrast with non users of smokeless tobacco. Conclusion: This study observed that prolonged use of smokeless tobacco for more than 5 years is considerably associated with LBW baby.

Keywords: Smokeless Tobacco, Maternal, LBW, Nicotine, Carcinogenics

1. Introduction

The carcinogenic effects of smokeless tobacco (ST) are comparatively well initiated in Bangladesh as well as worldwide. In general, more than 22% of women in developed countries and 9% of women in developing countries smoke or use smokeless tobacco and it is getting significantly higher in developing countries from two decades. Though the prevalence of smoking is lessened among women compared to men, the number of women smokers is increasing gradually in recent years. About 200 million women smoke or use ST around the world [1]. Pregnant women experience a high prevalence of tobacco-related morbidity and mortality. Chewing paan has become popular in the Indian region, and use as an extensive way of ST which has been emerged as a chewing habit for women [2]. Bangladesh is one of the largest tobacco-consuming countries in the world, especially in South Asia. Based on recent estimation, more than 58% male and 29% female use tobacco of separate forms which is available in the market [3].

Tobacco use in any form can kill people. Smoking tobacco is an entrenched clause of the detrimental newborn outcome. Scientific research, comprising several ethnic sections, cultures, and nations has found that smoking tobacco during pregnancy considerably affects mothers, unborn fetuses, and newborn babies. Maternal tobacco smoking is frequently associated with the potential risk of IUGR and LBW babies [4]. Tobacco use during pregnancy brings into play the mother and the conceptus at all stages of prenatal development, at birth, in infancy and childhood, at adolescence, and throughout adult life. Every child with significant tobacco smoke exposure has probably been detrimentally affected to some degree. The weight of a neonate at birth is the most crucial predictor of its chances for survival and freedom from morbidity. LBW is closely related to neonatal morbidity or mortality. It is often suggested that the lower the birth weight, the higher the neonatal mortality. Maternal smoking cigarettes or using ST is a strong dose-dependent risk factor for LBW [5]. The prevention of LBW is a major clinical and public health concern in many developing countries including Bangladesh. Babies with a birth weight less than 2500 gram, irrespective of gestation are termed as LBW baby [6]. In Bangladesh, among LBW babies, the neonatal born mortality is 133 per 1000 live births [7]. An estimated data revealed that 11 million neonates are born with LBW in South Asia each year [8]. Across the world, neonatal mortality is 20 times higher for LBW babies in contrast with normal weight babies [9]. It is now a well-established event that birth weight is not only a critical determinant of child survival, growth, and development, but also a valuable indicator of maternal health, nutrition, and quality of life [10]. The restraints of LBW are a critical public health concern and clinical distress mostly in developing countries. The neonatal mortality among LBW infants is 133 deaths per thousand. Babies born underweight have higher mortality rates and are at greater risk of growth retardation, poor cognitive development, increased morbidity, and impaired immunity. In the long run ST users have exhibited a greater spontaneous level of nicotine and carcinogenic elements than the smoker. The total number of nicotine absorbed from a unit dose of ST is 4.5 mg higher compared to cigarettes [11]. This current study aimed to clarify the relationship between maternal ST with LBW.

2. Objectives

1) To examine the association between prolonged (>5 years) ST use by mothers and pregnancy outcome.
2) To assess the association between the prolonged (>5 years) ST users mothers and LBW infants.

3. Methods

A retrospective cohort study was accomplished in the Department of Paediatrics and Department of Gynecology and obstetrics, Dhaka Medical College Hospital, Dhaka from January 2009 to December 2010. A total of 300 mother-newborn pairs were included in the study and among them, 150 mothers using ST for more than 5 years and their recently delivered neonates (mother-neonate pairs) were enrolled as 'cases' by purposive sampling, and another 150 mother-neonate pairs matched with age socio-economic status, BMI, paternal smoking, educational status with histories of not using smokeless tobacco were enrolled as controls. Ethical consent was taken from the Ethical Committee of Dhaka Medical college and hospital, Dhaka. The information was kept confidential only to be used for the study purpose.

Inclusion Criteria

1) Mother using smokeless tobacco for more than 5 years and had delivered recently a newborn baby.
2) The age of the mother was between 20-40 years.
3) BMI and hemoglobin level of the mother was more than 18.5 and 10gm/dl accordingly.
4) The infant's age was less than 24 hours.

Exclusion Criteria

1) Mothers having hypertension, pre-eclampsia, diabetes mellitus & chronic renal disease.
2) Multiple gestations.
3) Both smoker and alcoholic mother.

3.1. Control

The neonates whose age was not more than 24 hours and mothers who neither smoked nor took ST were selected as controls.

3.2. Matching

Matching was assessed regarding

1) Age and sex of the baby
2) BMI of mothers
3) Maternal age
4) Socioeconomic status
5) Parental smoking
6) Hb level of mother
7) Educational status

3.3. Evaluation

Specified records of mothers were taken which included age, parity, educational level, socioeconomic status, passive smoking status, frequency and duration of taking ST. Mothers were asked about the signs of eclampsia or preeclampsia. Mothers' physical examinations were done entirely which included height, weight, BMI, blood pressure, signs of any systematic disease, or any infection, hypertension. Estimation of Hb, blood urea, serum creatinine, the blood sugar of each mother was done. The neonatal was assessed for birth weight, OFC, supine length, any stigmata of chromosomal disorders, and signs for congenital infection. Karyotyping and screening were done when required. The baby's supine length was taken in centimeters by infantometer. The babies were weighed in grams using the baby scale. OFC was calculated in centimeters by using a measuring tape. The gestational age of the newborn was examined by LRMP and New Ballard Scoring System.

4. Results

The maternal mean age of patients was 28 ±SD who were recruited as cases. The mean BMI and the Hb status of the patients enrolled as cases were 19.9±SD and 10.9±SD respectively. More than half of the study population (cases) studied secondary level (60.0%), around 13.3% of patients were illiterate and 16.7% studied at the primary level. About three-forth (110,73.3%) of the study population were poor who enrolled as cases. Around three fourth of the husband was found smoking (110,73.3%) of the study population (case). The mean age in hours of the neonate was less than 24 hours (12.0±SD) and most of the neonates (53.3%) recruited as cases were female. In the case of controls, the maternal mean age of patients was 27.6±4. SD. The mean BMI and the Hb status of the patients enrolled as control were 20.1±SD and 11±SD respectively. More than half of the study population (66.7%) were educated up to secondary level and about one-tenth (15,10%) of them were illiterate. 66.7% of the study population were poor and passive smoking was found in about three-fourths (75.3%) of patients who were enrolled as controls. The mean age in hours of neonatal was 11.6±SD. Half of the neonates (52%) enrolled as controls were female [Table 1]. Most of the mothers used shada 105 (70%) followed by jorda 30 (20%), shada+jorda 10 (7%) &gul 5 (3%) [Figure 1]. Table 2 shows that maximum mothers (67.6%) used ST 5-10 times per day with a minimum once and maximum of 15 times per day. Table 3 explains the frequency of LBW delivery among ST users was 60.0% (90) and among non-ST users was 30.0% (45) and the odds ratio was 3.5. The prolonged use of ST is significantly associated with the delivery of LBW infants (P<0.001) & carries a risk of having delivery of LBW baby 3.5 times higher than that of non-ST users.

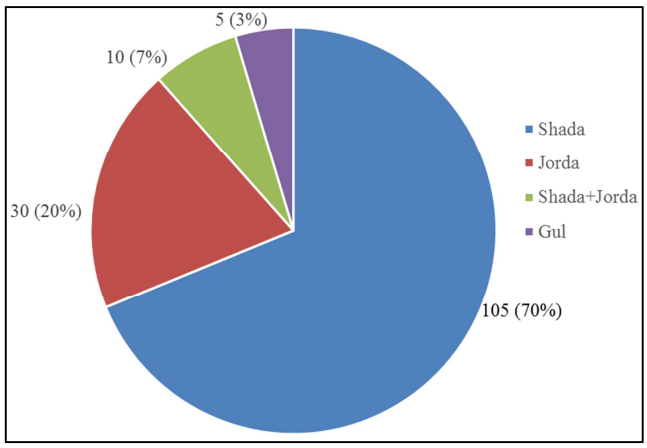

Figure 1. *Types of smokeless tobacco (ST) used by mothers.*

Table 1. *Baseline characteristics of the cases (N=150) and controls (N=150).*

	Characteristics	Cases (N,%)	Controls (N,%)	P-value
Maternal	Age in years (Mean±SD)	28±SD	27.6±SD	>.10 *
	BMI (Mean±SD)	19.9± SD	20.1± SD	>.10 *
	Hb status in gm/dl (Mean±SD)	10.9± SD	11± SD	>.10 *
	Educational status			
	Illiterate	20 (13.3%)	15 (10.0%)	>.50 #
	Class1-V	25 (16.7%)	20 (13.3%)	>.10 #
	Class VI-X	90 (60.0%)	100 (66.7%)	>.50 #
	SSC and above	15 (10.0%)	15 (10.0%)	>.10 #
	6. Socio-economic status			
	Poor	110 (73.3%%)	100 (66.7%)	>.50 #
	Middle class	40 (26.7%)	50 (33.3%)	>.50 #
	7. Husbands smoking			
	Yes	110 (73.3%)	113 (75.3%)	>.50 #
	No	40 (26.7%)	37 (24.7%)	
Neonatal	Age in hours	12.0±SD	11.6±SD	>.50 #
	Sex			>.50 #
	Male	70 (45.7%)	72 (48.0%)	
	Female	80 (53.3%)	78 (52%)	

* = by Z test
#= by λ^2 test

Table 2. *Frequency of Smokeless Tobacco use by MothersDuring Pregnancy (Cases, N=150 Controls, N=150).*

Times per Day	N, %	Mean (±SD)
<5	36, 23.8%	
5-10	102,67.6%	6.7±2.7
>10	13,8.6%	

Table 3. *Frequency of LBW Delivery in women and Who Did Not Use Smokeless Tobacco During Pregnancy (Cases, N=150, Controls, N=150).*

Characteristics	Yes (N, %)	No (N, %)	*p*-value	Odds Ratio
ST Users	90, 60.0%	60, 40%	<0.001	3.5
Non-ST Users	45, 30.0%	105, 70.0%		

Figure 2. *LBW causes thinner legs (1).*

Figure 3. *Low birth weight babies.*

5. Discussion

Babies with a very low birth weight have a greater risk of developing problems. Premature birth and fetal growth restrictions are the major causes of LBW babies. This study aims to determinethe association between prolonged smokeless tobacco use and LBW babies. It is estimated that about 40% of LBW occurs due to hereditary issues. However, 60% of LBW takes place due to environmental issues. This current retrospective cohort study reflected that among the neonatal of ST user mothers 60% were LBW infants. In contrast, about 30% were LBW among non-ST user mothers. In Pakistan, the author found almost similar results [12]. In this current study, the percentage of mothers, who use shada, jorda, shada+jorda, and gul was 105 (70%), 30 (20%), 10 (7%), and 5 (3%) respectively. Another study which was also conducted in Bangladesh showed that jorda, shada, gul were used by mothers at about 52.17%, 21.73%, and 26% respectively [13]. A study conducted in Bangladesh found that 87% of current consumers reported using either Shadapata or Hakimpuree Jarda [14]. An analysis conducted in Harvard University assumed that most women especially during pregnancy chew tobacco or snuff to divert their mood [15]. Analyses conducted in India also revealed the same sorts of ways of ST consumption among mothers of LBW babies. In this study, the author found that mothers used ST for more than 5 long years. ST use is also associated with the delivery of LBW babies in some reports. This current study established that the potentiality of delivery of LBW baby among the non-ST mothers was 3.5 times lower than ST users group. The association between the use of ST for more than 5 years and the delivery of LBW infants is extremely significant ($p<0.001$). In India, the author found almost alike outcomes such as 1.6 times more risk of LBW for women who used ST compared to the non-ST user [16]. More analyses done in India and middle-income countries support the findings of recent outcomes [17] [18]. Studies done in Bangladesh showed there was 4.1 times, 2 times and 2.2 times more risk of LBW for women who was used ST than non users [19, 20, 21]. However, developed countries had a very low incidence of LBW babies, for example, Thailand 9%, East Asia and Pacific 8% Sub-Saharan Africa 14%, Latin America 10%, US 8%, Russia 6%, globally 16% [22]. The increased incidence of LBW babies in developing countries is probably due to the poor socioeconomic status, large population, illiteracy, poor educational states, and other environmental factors are main reasons which are responsible for causing LBW babies [23]. Low birth weight remains a major public health challenge, especially in Bangladesh. In rural areas, about 37% of neonates are born with low birth weight. The government of Bangladesh has held a long-standing commitment to improving maternal and child health to prevent underweight babies, such as; raising awareness to mothers who use ST, supporting the equitable delivery of health interventions and services, especially for marginalized sections, improving coverage of effective neonates health interventions, providing priority to improve adolescent health, etc [24].

6. Limitations

Some limitations include:

1) There might be subjective bias in identifying the size of the baby by seeing photographs.
2) Some mothers were confused about the frequency and duration of chewing tobacco use.
3) Small sample size.

7. Conclusion

In short, smokeless tobacco is cheap and easily accessible to women around the world. Shada, or white tobacco was the most commonly used among participants, and 5-10 tobacco were consumed on an average day. Women who become daily users, tend to increase their level of tobacco consumption either by increasing the amount or adding products and this happens continuously whether they are pregnant or not. Prolonged use of smokeless tobacco for more than 5 years is significantly associated with LBW infants. Socioeconomic factors also play a role in the birth of LBW babies.

8. Recommendations

Some recommendations may need in this study. That include:

1) Women of child bearing age should not use smokeless tobacco (ST).
2) Steps should be taken for increasing public awareness through mass media against the adverse effects of smokeless tobacco (ST) use during reproductive period.

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