

Effect of Tobacco Use during Pregnancy on Fetal Birth Weight Born to Women between 18-35 years in Thatta District

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ABSTRACT

Background: Consumption of tobacco in its various forms is widespread and a serious public health issue globally. Although smoking is the predominant common method of tobacco use, the consumption of smokeless tobacco has increased in recent decades. Smokeless tobacco products are becoming more popular among women. In Pakistan, the overall prevalence of smokeless tobacco among males and females is 7%, out of which 10% are women which may be linked to poor reproductive outcomes and other health issues.

Objective: The purpose of the study was to determine the effect of smokeless tobacco use during pregnancy on fetal birth weight.

Methods: A case-control study was conducted at the five basic health units (BHU) of Thatta District, which were Garho, Ghora Bari, Dhabeji, Chattochand, and Jhimpeer from October 2022 – January 2023. A total of 300 mothers were included by consecutive sampling technique in the study and among them, 150 mothers who gave birth to a low-birth-weight baby *i.e.*, birth weight < 2.5 kg were enrolled as a case, and another 150 mothers who gave birth to a normal birth weight baby *i.e.*, birth weight ≥ 2.5 kg were enrolled as a control. Data collection involved face-to-face interviews utilizing a validated questionnaire, with strict adherence to ethical considerations throughout the study.

Results: In a study of 300 participants from Thatta District's five basic healthcare units, multivariate logistic regression revealed significant factors influencing tobacco use during pregnancy. Housewives had 1.862 times higher odds of tobacco use than employed individuals, and individuals aged 20–35 had 1.802 times higher odds than those aged 36–50. Smokeless tobacco, particularly most of the mothers in this study used gutka (47.3%) and chaliya (26%). Smokeless tobacco Gutka and Chaliya, increased the likelihood of tobacco use during pregnancy. Considering the frequency of smokeless tobacco use and healthcare provider recommendations emerged as important determinants.

Conclusion: Our study underscores the prevalence of smokeless tobacco use during pregnancy in Thatta, Karachi, Pakistan, with significant implications for low-birth-weight babies. This highlights the need for targeted public health interventions, like antenatal care, alongside further research to inform evidence-based strategies for maternal and child health promotion in the region.

Keywords: *Smokeless tobacco, birth weight, low birth weight, Thatta Pakistan.*

INTRODUCTION

World Health Organization (WHO) estimates that tobacco use kills more than 7 million people each year, and if it continues, it will kill 8 million people annually by 2030 [1]. Although smoking is the primary method of tobacco use, the use of smokeless tobacco has been observed on the rise in the past few decades [1]. The use of smokeless tobacco products is a global public health concern. It is estimated that there are around 300 million individuals worldwide who use smokeless tobacco. Smokeless tobacco products are comparatively cheaper than factory-made cigarettes and they are typically banned in public places, making them attractive to young people [2, 3].

In Pakistan, the overall prevalence of smokeless tobacco among males and females is 7%, out of which 10% of the women are SLT consumers in different forms such as gutka, paan, and naswar [2]. Smokeless tobacco consumption has been on the rise among women [4].

This may be associated with negative reproductive outcomes and other health-related problems [1, 5, 6]. The consumption of SLT among women has shown a significant association between adverse birth outcomes such as low birth weight and preterm delivery [3, 5, 7]. Low birth weight has been defined by WHO as a weight at birth of < 2500 grams (5.5 pounds) [8, 9].

A study found Southeast Asia at the top of the chart with the highest rates of consumption [8, 9]. According to the National Health Survey (NHS) of Pakistan, approximately 10% of females aged 25–64 years reported consistent use of chewing tobacco or snuff, and over 7% of women smoked 'huqqa' which is associated with maternal cigarette smoking [10, 11]. Women in rural areas are more prone to use smokeless tobacco [12]. Women in rural areas dominantly use tobacco every day in at least one form either in smoking or smokeless form [9]. Prior studies have investigated the effect of maternal smoking on LBW and other neonatal outcomes and have also found a clear descent [13, 14].

Evidence suggests that infants born to mothers who use smokeless tobacco during pregnancy have a higher risk

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of several adverse outcomes such as preterm birth, and low birth weight [1, 5, 9, 15]. Many types of research have proven the association between the consumption of tobacco during pregnancy and the impact on one's health. This study will determine the association consumption of tobacco during pregnancy and the impact it will have on the weight of the baby. Maternal health and tobacco use are already very important public health issues and through this study, we aim to target the population that does not have the resources and exposure to know better about the outcome.

MATERIALS AND METHODS

A case-control study was carried out from October 2022 to January 2023 in the selected primary healthcare settings of Thatta district, Sindh, Pakistan. Consecutive sampling was used to select 300 participants in total, 150 participants in each group. Mothers who gave birth to a low-birth-weight baby *i.e.*, birth weight < 2.5 kg were selected as a case, and mothers who gave birth to a normal birth weight baby *i.e.*, birth weight \geq 2.5 kg were selected as a control. The sample size was calculated by the WHO sample size calculator by taking a percentage of smokeless tobacco (SLT) among low-birthweight (LBW) at 68.6% and among normal weight at 31.33% [16], with the power of test 90% and 99% confidence level. The estimated sample size came out as 90 in each group. To increase the efficacy of the result we have increased the sample size to 300 total which means 150 participants in each group. All participants signed the informed consent and ethical approval was taken to conduct this study from the Institute of Ethical Review Board (IERB -220156).

At the time of delivery, if the fetus is born with a birth weight of less than 2.5 kg, the mother was selected as a case, according to the eligibility criteria. Mothers who gave birth to a normal birth weight baby *i.e.*, birth weight \geq 2.5 kg were selected as a control. For every case, a consecutive control was recruited. The case-to-control ratio was 1:1. Mother and baby were enrolled in the study within one day of delivery.

All the pregnant women who were coming for the delivery were enrolled in the study according to the eligibility criteria. Pregnant women who came for delivery at the basic healthcare unit were selected. After the delivery, the weight of the baby was checked and if it is a low-birth-weight baby the mother was asked to answer the questions related to the study. The eligibility criteria included mothers aged between 18 and 35 years.

The mother delivering at 37 weeks or more, mothers using smokeless tobacco and practicing smoking during this pregnancy and are prone to passive smoking, delivered within one day of selection in the study, and the newborn's age is less than 24 hours. Exclusion criteria, mothers who have a history of stillbirths or miscarriages will not be selected, mothers delivering twin babies, mothers who used to smoke before pregnancy but

stopped during pregnancy, and newborns with congenital anomalies was excluded.

Data was collected by formulating a structured questionnaire. The questionnaire included sections on socio-demographic information, previous pregnancy history, factors associated with the use of smokeless tobacco consumption during pregnancy, and recent birth information. Furthermore, the birthweight of the newborn was measured immediately at the time of birth or within one day, gestational age in weeks was noted at the time of delivery and maternal complications will be assessed. The data was administered through face-to-face interviews after delivery with enrolled mothers of both groups.

An informed consent form was signed, or a thumb impression was taken by the mother before they were enrolled in the study. Confidentiality of the mother and newborn was maintained and ensured that they did not face any problems during the interview. All data of the newborn as well as the mother was kept confidential.

Data were tested for comprehensiveness and entered into SPSS analysis to calculate the mean and SD for continuous variables and the percentage for categorical variables was computed. Associations of the outcome with each independent variable were estimated by independent t-test or chi-square test. The level of statistical significance was put as p-value \leq 0.05. Binary logistic regression was applied to compute the adjusted odds ratio and 95% confidence interval was computed to measure the association between the dependent variable and the independent variable by using SPSS version 21.

RESULTS

The sample of 300 participants was equally divided among the five basic healthcare units of Thatta District, and a minimum of 60 respondents were interviewed from each basic healthcare unit (BHU). Results of 300 respondents of the five BHU Garho, Ghora Bari, Dhabeji, Chattochand, and Jhimpeer with a response rate of 100% are being presented.

This study examined the effect of smokeless tobacco usage during pregnancy and the effect it has on the birth weight of the fetus in Thatta, District. The estimated prevalence of the use of smokeless tobacco among the 300 respondents both cases and controls were around 60% either in the form of gutka, chaliya, paan, or naswar in the district of Thatta, Pakistan and most of them live in rural areas, and were illiterate. The majority of the women used gutka which was the predominant type of SLT (47.3%), (34%), and chaliya (26%), (14.6%) among cases and controls respectively. Paan and naswar were used as a subsidiary in comparison with gutka and chaliya.

In Table 1 significant associations were found between low birth weight and maternal occupation (p=0.020), with

Table 1: Analysis shows an association between low birth weight and socio-demographic information among mothers aged 18-35 years in Thatta District.

Variable	Cases (n=150)	Control (n=150)	OR	95% CI	p-value
	n (%)	n (%)		lower upper	
Maternal Age in Yrs.					
18 – 26 years	38 (25.3)	35 (23.3)	1.115	0.658	0.686
27 – 35 years*	112 (74.6)	115 (76.6)		1.890	
Maternal Level of Education					
Illiterate	133 (88.6)	124 (82.6)	1.640	0.849	0.138
Primary and above*	17 (11.3)	26 (17.3)		3.169	
Maternal Occupation					
Housewife	119 (79.3)	101 (67.3)	1.862	1.105	0.020
Employed*	31 (20.6)	49 (32.6)		3.139	
Husband's Age in Yrs.					
20 – 35 years	107 (71.3)	87 (57.9)	1.802	1.115	0.016
36 – 50 years*	43 (28.6)	63 (42.1)		2.912	
Husband's Level of Education					
Illiterate	124 (82.6)	119 (79.3)	1.242	0.697	0.462
Primary and above*	26 (17.3)	31 (20.6)		2.216	
Husband's Occupation					
Employed*	130 (86.6)	138 (92)	0.565	0.266	0.135
Unemployed	20 (13.3)	12 (8)		1.202	
Ethnicity of Mother					
Sindhi speaking	119 (79.3)	127 (84.6)	0.695	0.384	0.229
Balochi speaking & other *	31 (20.6)	23 (15.3)		1.260	
Family Type					
Nuclear*	85 (56.6)	84 (56)	0.973	0.617	0.907
Joint	65 (43.3)	66 (44)		1.536	
Monthly Household Income					
5000 – 20000 PKR	102 (68)	98 (65.3)	1.128	0.697	0.624
21000 – 40000 PKR or more*	48 (32)	52 (34.6)		1.823	

CI: Odds ratio, OR: Odds ratio, *Reference category

Table 2: Analysis shows an association between low birth weight and previous pregnancy history among mothers aged 18 – 35 years in Thatta District.

Variable	Cases (n=150)	Control (n=150)	OR	95% CI	P-value
	n (%)	n (%)		lower upper	
No. of Live Births					
1 – 3*	101 (67.3)	102 (68)	0.970	0.598	0.902
4 – 5 or more	49 (32.6)	48 (32)		1.574	
Age of the Mother at First Delivery in Yrs.					
18 – 25 years	135 (90)	128 (85.3)	1.547	0.769	0.219
26 – 32* years	15 (10)	22 (14.6)		3.113	
Previous History of LBW					
Yes	26 (17.3)	16 (10.6)	1.756	0.900	0.096
No*	124 (82.6)	134 (89.3)		3.428	
Previous History of Preterm Delivery					
Yes	30 (20)	25 (16.6)	1.250	0.695	0.456
No*	120 (80)	125 (83.3)		2.248	
ANC Visits in Previous Pregnancies					
Yes*	83 (55.3)	81 (54)	1.055	0.670	0.817
No	67 (44.6)	69 (46)		1.663	

CI: Odds ratio, OR: Odds ratio, *Reference category

housewives having higher odds, and husband's age (p=0.016), indicating increased odds for mothers with husbands aged 20-35 years compared to those aged 36-50 years.

Analysis of 300 mothers aged 18-35 in Thatta District reveals a significant association between low birth weight and previous pregnancy history. Mothers with 4-5 or more live births had a lower odds ratio (OR=0.970, 95% CI: 0.598-1.574, p=0.902), while those aged 26-32

Table 3: Analysis shows an association between low birth weight and factors associated with smokeless tobacco consumption during pregnancy among mothers aged 18 – 35 years in Thatta District.

Variable	Cases (n=150)	Control (n=150)	OR	95% CI	p-value
	n (%)	n (%)		lower upper	
Smokeless Tobacco Consumption					
Yes	106 (70.6)	82 (54.6)	1.998	1.241	0.004
No*	44 (29.3)	68 (45.3)		3.217	
Age at which You Started Using SLT in Yrs.					
0 – 13 years	105 (70)	115 (76.6)	0.710	0.424	0.192
14 - 29* years	45 (30)	35 (23.3)		1.188	
Type of Smokeless Tobacco that You Use					
<i>Gutka</i>					
Yes	71 (47.3)	51 (34)	1.745	1.095	0.019
No*	79 (52.6)	99 (66)		2.779	
<i>Paan</i>					
Yes	10 (6.6)	10 (6.6)	1.000	0.404	1.000
No*	140 (93.3)	140 (93.3)		2.478	
<i>Naswar</i>					
Yes	18 (12)	13 (8.6)	1.437	0.677	0.343
No*	132 (88)	137 (91.3)		3.049	
<i>Chaliya</i>					
Yes	39 (26)	22 (14.6)	2.044	1.143	0.015
No*	111 (74)	128 (85.3)		3.655	
Smokeless Tobacco Use During the Current Pregnancy					
Yes	106 (70.6)	82 (54.6)	1.998	1.241	0.004
No*	44 (29.3)	68 (45.3)		3.217	
Household Smokeless Tobacco Production					
Yes	18 (12)	12 (8)	1.568	0.727	0.248
No*	132 (88)	138 (92)		3.382	
Family Members Use Smokeless Tobacco					
Yes	110 (73.3)	109 (72.6)	1.034	0.621	0.897
No*	40 (26.6)	41 (27.3)		1.722	
Usage of Smokeless Tobacco Per Day					
0 – 2 times per day	70 (46.6)	96 (64)	0.492	0.310	0.004
3 - ≥ 5 times per day*	80 (53.3)	54 (36)		0.782	
Ever Tried to Quit the use of Smokeless Tobacco					
Yes*	40 (26.6)	36 (24)	1.152	0.684	0.595
No	110 (73.3)	114 (76)		1.939	
Ever Tried to Quit Smokeless Tobacco and HCP Recommended You Quit					
No	49 (32.6)	69 (46)	1.756	1.099	0.018
Yes*	101 (67.3)	81 (54)		2.805	
Success in Quitting Tobacco					
Yes*	4 (2.6)	3 (2)	1.342	0.295	0.702
No	146 (97.3)	147 (96)		6.104	

CI: Odds ratio, OR: Odds ratio, *Reference category

Table 4: Analysis shows an association between low birth weight and delivery-related information among mothers aged 18 – 35 years in Thatta District.

Variable	Cases (n=150)	Control (n=150)	OR	95% CI	p-value
	n (%)	n (%)		lower upper	
Gestation Age in weeks					
37 weeks – 38 weeks	115 (76.6)	109 (72.6)	1.236	0.734 2.082	0.426
39 weeks – 40 weeks or more*	35 (23.3)	41 (27.3)			

CI: Odds ratio, OR: Odds ratio, *Reference category

at first delivery showed higher odds (OR=1.547, 95% CI: 0.769-3.113, p=0.219). Previous history of low birth weight (LBW) exhibited significance (OR=1.756, 95% CI: 0.900-3.428, p=0.096), unlike previous preterm delivery (OR=1.250, 95% CI: 0.695-2.248, p=0.456) and ANC visits (OR=1.055, 95% CI: 0.670-1.663, p=0.817) Table 2.

The analysis revealed a significant association between low birth weight and smokeless tobacco consumption

during pregnancy among mothers aged 18 – 35 years in Thatta District. Notably, smokeless tobacco consumption, Gutka usage, smokeless tobacco use during the current pregnancy, and HCP recommendation to quit tobacco were significantly associated with low birth weight (p < 0.05) Table 3.

Table 4 reveals a significant link between low birth weight and delivery-related factors among mothers aged 18-35 in Thatta District, with those delivering at 39 weeks or more showing a higher odds ratio (OR=1.236, 95% CI: 0.734-2.082, p=0.426) compared to deliveries at 39-40 weeks.

The factors of tobacco use during pregnancy by analyzing 150 cases and 150 controls through multivariate logistic regression. The study found significant associations between several variables and the probability of tobacco use during pregnancy. Tables 1 and 5 show maternal occupation played a crucial role, with housewives having 1.721 times higher odds of tobacco use compared to employed individuals. Husband's age was also a factor, with those aged 20 – 35 having 1.802 times higher odds

Table 5: Regression Analysis of Variables with Significantly Low P-Values (< 0.025).

Variables	Cases (n=150)	Control (n=150)	Univariate Logistic Regression			Multivariate Logistic Regression		
			OR	95% CI	p-value	aOR	95% CI	p-value
Maternal Occupation								
Housewife	119 (79.3)	101 (67.3)	1.862	1.105-3.139	0.020	1.8721	1.241-3.130	0.012
Employed*	31 (20.6)	49 (32.6)						
Husband's Age								
20 – 35 years	107 (71.3)	87 (57.9)	1.802	1.115-2.912	0.016	1.841	1.165-2.872	0.011
36 - 50* years	43 (28.6)	63 (42.1)						
Smokeless Tobacco Consumption								
Yes	106 (70.6)	82 (54.6)	1.998	1.241-3.217	0.004	2.412	1.441-3.328	0.001
No*	44 (29.3)	68 (45.3)						
Type of Smokeless Tobacco Used								
<i>Gutka</i>								
Yes	71 (47.3)	51 (34)	1.745	1.095-2.779	0.019	1.967	1.179-3.281	0.010
No*	79 (52.6)	99 (66)						
<i>Paan</i>								
Yes	10 (6.6)	10 (6.6)	1.000	0.404-2.478	1.000	1.587	0.612-4.116	0.342
No*	140 (93.3)	140 (93.3)						
<i>Naswar</i>								
Yes	18 (12)	13 (8.6)	1.437	0.677-3.049	0.343	2.257	1.010-5.044	0.047
No*	132 (88)	137 (91.3)						
<i>Chaliya</i>								
Yes	39 (26)	22 (14.6)	2.044	1.143-3.655	0.015	2.009	1.106-3.647	0.022
No*	111 (74)	128 (85.3)						
Tobacco Use During Pregnancy								
Yes	106 (70.6)	82 (54.6)	1.998	1.241-3.217	0.004	1.999	1.221-3.242	0.005
No*	44 (29.3)	68 (45.3)						
Usage of Smokeless Tobacco Per Day								
0 – 2 times per day	70 (46.6)	96 (64)	0.492	0.310-0.782	0.004	0.492	0.310-0.782	0.003
3 - ≥ 5 times per day*	80 (53.3)	54 (36)						
During Your Visit to the Health Facility, the HCP Recommended You Quit Tobacco								
No	49 (32.6)	69 (46)	1.756	1.099-2.805	0.018	1.756	1.099-2.805	0.019
Yes*	101 (67.3)	81 (54)						

CI: confidence interval, aOR: adjusted odds ratio OR: Odds ratio (reference category)*

than those aged 36-50. Smokeless tobacco consumption, particularly the use of Gutka and Chaliya, was associated with increased odds of tobacco use during pregnancy Tables 3 and 5. Additionally, the frequency of smokeless tobacco use per day and healthcare provider recommendations to quit tobacco were significant determinants in Tables 3 and 5. There was no association between low birth weight and previous pregnancy history among mothers aged 18 – 35 years Tables 2 and 5. Table 4 shows no association between LBW and gestational age. The results underscore the importance of considering multiple factors in understanding and addressing tobacco use during pregnancy.

DISCUSSION

The impact of tobacco use during pregnancy on fetal birth weight is a topic of significant concern and interest, particularly among women aged 18-35 years in Thatta District. Understanding the potential effects of tobacco use on birth outcomes in this demographic is crucial for informing public health interventions and policies aimed at promoting maternal and child well-being. In this discussion, we delve into the findings of our study, exploring the implications of tobacco use on fetal birth weight and the broader implications for maternal and child health in the region.

When we compared the present study with another study conducted in Dhaka the results show the frequency of LBW delivery among SLT users was 58.2 and among non-SLT users was 27.7% in Dhaka [5], similar results when compared to this study.

A hospital-based cohort study found similar implications for the birth weight that reported the use of mishri had an association with the weight of the baby [5, 17]. A study conducted in Sir Ganga Ram Hospital, Lahore, found that the odds of having low birth weight babies were 5.84 times higher in the mothers exposed to passive smoking than in unexposed [17, 18] whereas this study along with other studies did not find any association of passive smoking on the birth weight of the baby [7]. The variation in prevalence might be due to the difference in geographical location, population, socioeconomic status, previous history of low-birth-weight babies, passive smoking exposure, frequency of SLT used by mothers, gender biases, household tobacco production, and gestation age.

The mean age of the women was 29.03 (\pm 4.17) and 28.73 (\pm 3.70) for cases and controls respectively. Stating that the majority of the women delivered when they were aged 28-29, women who turn 30 have complications during their pregnancy resulting in pre-term delivery, low birth weight, stillbirth, *etc.* This likely reflects the increased risk of having a low-birth-weight baby with consumption of tobacco use during pregnancy. These results were similar to previous findings reported by [10, 19]. Some studies also suggest that nearly half of the female population is anemic and malnourished which

can also be one of the factors that contribute to LBW babies [1, 9].

A similar study conducted in Bangladesh established that the potentiality of delivery of LBW babies among non-SLT mothers was 3.7 times lower than those who consumed smokeless tobacco [5]. One of the studies also shows that mothers who stopped using SLT during their first-second trimester were more likely to have a higher level of education, employment, and a slightly lower level of vulnerability than those who continued to smoke beyond the second trimester [4]. Women who quit smoking in the third trimester or who smoked throughout their pregnancy had lower levels of education than non-smokers this study also had similar findings [4].

One of the studies also suggests that exposure to second-hand smoke makes pregnant women exposed as well and it is more likely that pregnant women are most likely to start the use of SLT due to cultural discipline [20, 21]. A study in Bangladesh found that maternal SLT use in pregnancy was significantly associated with LBW babies and carries a risk of having LBW babies 4.6 times more than non-ST users. These findings conform with the results of the current study.

It is worth noting that smoking SLT is significantly associated with low-birth-weight babies, as well as other complications including high blood pressure, gestational diabetes, infections, preeclampsia, preterm labor, depression, anxiety, pregnancy loss, stillbirth, and others during pregnancy. However, there are several limitations to this some mothers were confused about the age at which they started the use of smokeless tobacco, which led to recall biases however the strength of this study was that data was collected from areas of a high prevalence of SLT consumption.

CONCLUSION

The study highlights that exposure to tobacco use during pregnancy has been a contributing element in adverse maternal outcomes. Smokeless tobacco is inexpensive and easily available to women around the world, especially in rural areas. This study documented the effect of smokeless tobacco use during pregnancy on fetal birth weight in Thatta, District highlighting the need for targeted public health interventions, like antenatal care, alongside further research to inform evidence-based strategies for maternal and child health promotion in the region.

ETHICAL APPROVAL

Ethical approval was obtained from the Institutional Ethical Review Board of SZABIST, Karachi (REF letter No. IERB-220156). All procedures performed in studies involving human participants were following the ethical standards of the institutional and/ or national research committee and with the Helsinki Declaration.

CONSENT FOR PUBLICATION

Written informed consent was taken from the participants.

AVAILABILITY OF DATA

The data set may be acquired from the corresponding author upon a reasonable request.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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AUTHORS' CONTRIBUTION

All the authors contributed equally to the publication of this article.

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