Impact of smokeless tobacco use on pregnant Indian women

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ARTICLE INFO	ABSTRACT
	Smokeless tobacco is a product consisting of tobacco or a tobacco blend that is used other than smoking. In Maharashtra the pattern of tobacco use is slightly different where smokeless tobacco is preferred over smoking. In the present study is focused to understand the impact of smokeless tobacco use on pregnant Indian women and assess adverse effects on feto-maternal outcome. The study is a hospital based case control study with sample size 591. Women who reside in *Chawl* type of resident, lower education level, homemaker/housewife, lesser family income and Marathi mother tongue are significantly associated with tobacco use and have prevalence of anaemia 77.32% among the pregnant women. The women who are tobacco users have 2 times higher risk of having anaemia as compared to tobacco non user women, (OR: 2.193, CI: 1.240 – 3.877), (p = 0.007). Women who delivered in the government hospital have 3 times higher chance of having anaemia as compared to the private hospital (OR: 3.268, CI: 1.889 – 5.652), (p = 0.000**). The illiterate have 9 times higher risk of having anaemia (OR: 9.545, CI: 2.191 – 41.592), (p = 0.003*) compared to post graduate.

Introduction

Smokeless Tobacco is a product consisting of "tobacco or a tobacco blend and this is used without smoked". It is available in different forms such as chewing tobacco and snuff, it is also available as a dentifrice and used to apply on teeth (IARC Working Group on the Evaluation of Carcinogenic Risks to Humans 2004). Chewing Tobacco is seen in the form of loose leaf (in pouches of tobacco leaves), 'plug' or 'twist' form. Chewing tobacco product is used orally by mixing tobacco with any other ingredient like areca nut. (IARC Working Group on the Evaluation of Carcinogenic Risks to Humans 2004).

Oral chewing tobacco consist of, betel quid with tobacco which is known as paan or pan. Pan is chew by adding areca nut, slaked lime and tobacco. Similarly, gutka, paan masala with tobacco and tobacco water are also a kind of smokeless tobacco products which prepared by using other tobacco products like dried tobacco leaves, lime, betel leaf, areca nut and any sweeteners (SEARO 2004; IARC Working Group on the Evaluation of Carcinogenic Risks to Humans 2004; Gupta and Ray 2003).

Sucking Tobacco is also one form of smokeless tobacco which consist of *kaini* and *zarda* as its by-products. These products are also made up of by using dried tobacco leaves with other tobacco related ingredients like lime. There are other types of tobacco products which are used for application, those are Mishri, creamy snuff, gul and gudhaku. Mishri is the tobacco product which is commonly use in Maharashtra (IARC Working

Group on the Evaluation of Carcinogenic Risks to Humans 2004; Gupta and Ray 2003).

Tobacco use is one of the biggest public health threats the world has ever faced. There are more than one billion smokers in the World. Globally, the trend of using tobacco is observed from developing to developed countries, from high to low prevalence. Air gets polluted due to tobacco smoke and therefore, almost half of the World's population breathe polluted air. Smokeless tobacco product is mostly prevent in low and middle income countries, almost 80% of the world's tobacco users resides in low and middle income countries. It is calculated that almost 5.4 million killed every year by tobacco use (Mathers and Loncar 2006). Smokeless tobacco prevalence is observed throughout the World. Illiterate women use purely smokeless tobacco than the literate ones, it may be because of the cost of the product (Begum et al. 2015).

According to the World Health Organization Framework Convention of Tobacco Control (WHO FCTC, 2013), smokeless tobacco use is more prevalent all over the world and its male consumption average from 1% in the region of the America to 33% in the South East Asia Region. However, female shows 2% of the consumption among the European Region to a high of 10% among the South-East Asia and the Western Pacific Region (WHO 2013). World Health Organization reported that 47 million adults currently smoke cigarettes and over 5 million use smokeless tobacco; over 3 million adolescents are current smokers and over 750,000 use smokeless tobacco (WHO 2013). Thus, these scary figures indicate that tobacco use continues to be a major public health concern.

According to the results of the Global Adult Tobacco Survey (2009) in India, 20.3% of women were users of tobacco in some form: 1.9% women are smokers and 17.3% of women were smokeless tobacco users (Asma et al. 2015). As per GATS report shows that 10.7% of all adults currently smoke; 19% of men and 2% of women are current smokers. However, 29.6% of men, 12.8% of women and 21.4% of all adults are smokeless tobacco users. It is indicated that women are mostly smokeless tobacco users (GATS, 2016). In Maharashtra the pattern is slightly different where smokeless tobacco is preferred over smoking. Among women, 18.8% are users of smokeless tobacco, while smoking is hardly found (0.0%) (Asma et al. 2015).

Several studies have reported use tobacco products experience and its adverse health effects on women; like infertility, premature births, low birth weight, still births and infant deaths, anaemia, etc. (Gupta 2004; Asma et al. 2015). Therefore, the current study is formulated to understand whether the smokeless tobacco use during reproductive age cause adverse effects on feto-maternal outcome like anaemia in tobacco user mothers.

Materials and Methods

The present study design is a hospital based case – control study. This study is conducted in Pune city. Total sample size of the study is 591 out of which 191 are cases and 400 are controls. The sample number was decided as per 1:2 case control ratio. However, the data was collected from 2 Government and 2 Private Hospitals from Pune.

Case was considered as women who delivered a live baby and were smokeless tobacco user during pregnancy and consented to take part in the study. The use of smokeless tobacco could be during current pregnancy and/or before pregnancy; or the woman who quit smokeless tobacco after delivery (ever tobacco users) but were smokeless tobacco users during current pregnancy are also included in the case category. Controls were considered as all women who delivered a live baby and were non-users of smokeless tobacco and consented to take part in the study, were included in the control group.

Outcome definition

According to the WHO criteria, anaemia is defined as a haemoglobin concentration which has a minimum normal limit which is differing as the age differs. The normal limit of haemoglobin for

non-pregnant women is 12g/100ml and for pregnant women it is 11g/100ml.

Ethical Consideration

The present study was carried out after obtaining approval from the Ethical Committee at the Savitribai Phule Pune University. The purpose of the study was explained to all the participants before getting their verbal consent. The questionnaire was administered after the consent of the participant. They were informed about their rights that they can refuse any question and they can withdraw at any point of time whenever and if they feel uncomfortable.

Statistical Analysis

Data processing and statistical analyses were performed by using SPSS V 20.0 and Minitab V 17.0 software. Statistical analysis comparison, descriptive and inference statistic were carried out for the full date. At the commencement, descriptive analysis is accomplished to express mean, standard deviation of continuous variables which consists of; age, gestational weight gain, maternal haemoglobin level during pregnancy, baby's birth weight, delivery days of the mother, head and chest circumference ratio of the baby, all these were depicted to describe the data easily.

Results

The socio-demographic characteristics of the women are shown as per case and control status (Table 1). Four hundred control and one hundred and ninety one cases were enrolled in the current study. The age of the women is divided into 4 categories, age group between 18 to 22 years, 23 to 27 years, 28 to 32 years; and 33 and above years. Age group is considered in completed years. Around, 161 (40.25%) control and 87 (45.55%) cases are from the age group of 23 to 27 years. Only few women belongs to age group 33 and above i.e. 21 (3.55%). Almost 1/3rd of women are from *chawl* type of residence i.e. 253 (63.25%) control and 147 (76.96%) case.

Educational categories are divided into illiterate, literate with no formal education, up to primary school, middle school class V to VII, secondary school, graduate/ post graduate/ professional degree. For educational level, more than 65% of women from case category belonged to illiterate till primary level of education; whereas 60% women from control category belonged to middle school and above level of education. The above level of education includes graduation, post-graduation. Employment is divided into 2 categories, employed and homemaker/housewife. Most of the women from case and control groups are homemaker or housewife, 189 (98.95%) and 358 (87.50%) respectively.

Family income is divided into 4 different categories, monthly income less than 10,000 rupees, 10,001-15,000 rupees, 15,001-20,000 rupees and 20, 001 rupees and above. Overall, 70% of women have family income less than 15,000 INR. Mother tongue is divided into 3 categories, Marathi, Hindi and other. Almost, 61.93% women have Marathi as their mother tongue, 32.1% have Hindi mother tongue. Overall, 67.17% women have family size less than 7 people in the household and 32.83% have family size more than 7 people in the household. Women who reside in *Chawl* type of resident (p=0.002), lower education level (p=0.000), homemaker/housewife (p=0.000), lesser family income (p=0.000), Marathi mother tongue (0.000) and Hindu religion (0.006) are significantly associated with tobacco use.

Overall grades of anaemia among cases and controls have been observed in this study (Table 2). It is observed that anaemia is observed among both cases and control groups. It is 106 (86.18%) and 236 (73.98%) among case and control respectively. Similarly, around 17 (13.82%) and 83 (26.02%) falls under the no anaemia category among case and control group respectively. The women who fall under the anaemia category are divided into different grades of anaemia as per WHO classification. The grades of anaemia includes mild (9-11 gm %), moderate (7-9 gm %), severe (<7 gm %) and normal (>11 gm %).

Table 1: Socio-demographic characteristics of the women as per case and control group

Socio- Demographic Characteristics		Control (n = 400)		Case (n = 191)		p-value
		N	%	n	%	
Age Group in Completed Years	18 to 22	159	39.75	69	36.13	0.675[NS]
	23 to 27	161	40.25	87	45.55	
	28 to 32	65	16.25	29	15.18	
	33 & above	15	3.75	6	3.14	
Type of Residence	Flat	109	27.25	37	19.37	0.002[**]
	Chawl	253	63.25	147	76.96	
	Any other type	38	9.5	7	3.66	
Education	Illiterate	21	5.25	26	13.61	0.000[**]
	Literate, no formal education	26	6.5	24	12.57	
	Up to primary School	105	26.25	84	43.98	
	Middle School class V to VII	160	40	56	29.32	
	Secondary School	63	15.75	1	0.52	
	Graduate/ Post Graduate/ Professional Degree	25	6.25	0	0	
Employment	Employed	42	10.5	2	1.05	0.000[**]
	Homemaker/Housewife	358	89.5	189	98.95	
Family Income	less than 10,000 rupees	114	28.8	55	28.5	0.000[**]
	10,001-15,000 rupees	148	37	103	53.93	
	15,001- 20,000 rupees	64	16	15	7.85	
	20,001 and above	74	18.5	18	9.42	
Marital Status	Divorced or separated	0	0	1	0.52	NA
	Married	400	100	190	99.48	
Mother Tongue	Marathi	225	56.25	141	73.82	0.000[**]
	Hindi	146	36.5	44	23.04	
	Other	29	7.25	6	3.14	
Religion	Hindu	212	53	128	67.02	0.006[**]
	Muslim	106	26.5	35	18.32	
	Other	82	20.5	28	14.66	
Family Size	≤ 7	271	67.75	126	65.97	0.666[NS]
	>7	129	32.25	65	34.03	

**Statistically significant, [NS] Statistically non-significant, Chi-square Test

Anaemia grades observed among the women who are smokeless tobacco users (case category), are mild 81 (65.85%), moderate 23 (18.70%), severe 2 (1.63%) and normal 17 (13.82%). However, anaemia grades observed among the women who are non-smokeless tobacco users (control category), are mild 182 (57.05%), moderate 48 (15.05%), severe 6 (1.88%) and normal 83 (26.02%). Overall prevalence of anaemia is found to be 77.32% among the pregnant women.

The distribution of pregnant mother's haemoglobin level at 4 different Antenatal Care (ANC) visits have been recorded (Fig 1). The mean haemoglobin level is slightly increases at all four time points among cases as well as control except at T2 (second visit) among case. The difference between the mean age at first three time points among case and control are statistically significant and only at fourth visit, it has no significant difference (T1 = p value 0.034*; T2 =

p value 0.000**; T3 = p value 0.049*; T4 = 0.250[NS]) respectively. The reason behind non-significant difference in the haemoglobin level of the women who are tobacco users and non-users could be that women have receive treatment for low haemoglobin level during initial visits to antenatal care and therefore the haemoglobin level became normal at last visit.

Different grades of anaemia have been analysed at different trimesters (Table 3). Grades of anaemia is divided into 4 categories as per World Health Organizations (WHO). At all 4 trimesters, very few women found to have normal range of haemoglobin. It was observed that most of the women fall under the categories, mild, moderate and severe anaemia among both the groups, case and control.

Table 2: Status and overall grades of anaemia among case and control group

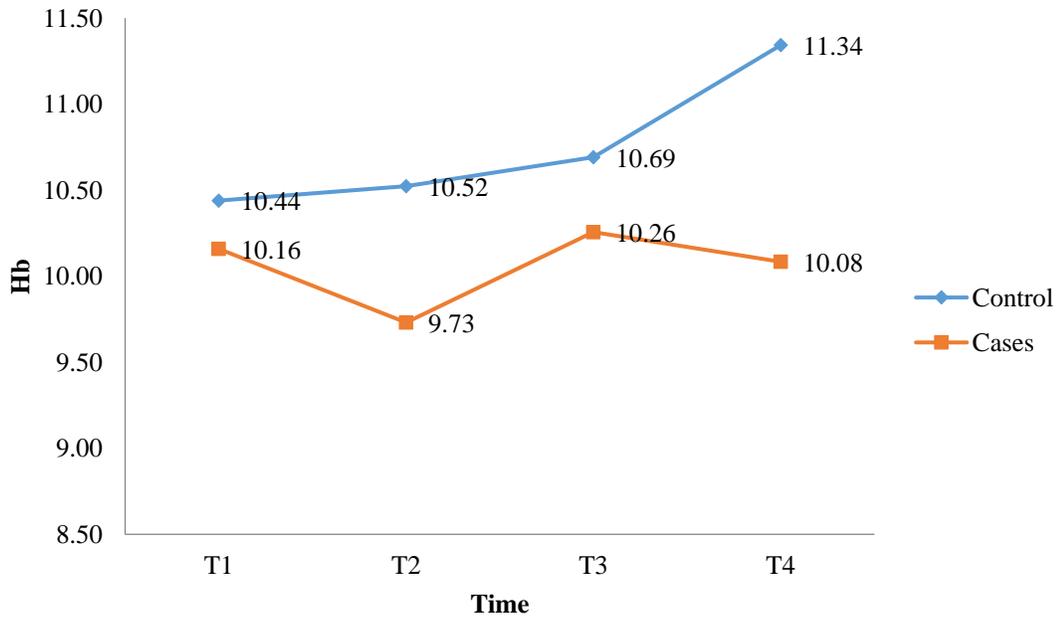| Status of Anaemia		Control (n = 400)		Case (n = 191)		Total (n = 591)	
		n	%	n	%	n	%
Anaemic Status (p=0.006**)	Anaemia	236	73.98	106	86.18	342	77.38
	No Anaemia	83	26.02	17	13.82	100	22.62
Grades of Anaemia	Normal (> 11 gm %)	83	26.02	17	13.82	100	22.62
	Mild (9-11 gm %)	182	57.05	81	65.85	263	59.50
	Moderate (7-9 gm %)	48	15.05	23	18.70	71	16.06
	Severe (<7 gm %)	6	1.88	2	1.63	8	1.81

Fig. 1. Hemoglobin (hb) of mother at different anc visits as per case and control

Table 3: Grades of anaemia at different trimester among case and control group

Trimester	Grades of Anaemia	Case		Control	
		N	%	n	%
1st	Normal (> 11 gm %)	0	0.00	0	0.00
	Mild (9-11 gm %)	1	4.17	0	0.00
	Moderate (7-9 gm %)	11	45.83	13	35.14
	Severe (<7 gm %)	12	50.00	24	64.86
2nd	Normal (> 11 gm %)	2	1.96	3	1.19
	Mild (9-11 gm %)	14	13.73	8	3.17
	Moderate (7-9 gm %)	56	54.90	123	48.81
	Severe (<7 gm %)	30	29.41	118	46.83
3rd	Normal (> 11 gm %)	2	1.87	4	1.02
	Mild (9-11 gm %)	18	16.82	29	7.42
	Moderate (7-9 gm %)	52	48.60	185	47.31
	Severe (<7 gm %)	35	32.71	173	44.25
Post-dated	Normal (> 11 gm %)	0	0.00	1	1.69
	Mild (9-11 gm %)	5	16.13	6	10.17
	Moderate (7-9 gm %)	20	64.52	25	42.37
	Severe (<7 gm %)	6	19.35	27	45.76

An association of anaemia has been observed at different trimesters (Table 4). Haemoglobin level is divided into anaemia and normal haemoglobin. As per WHO, normal haemoglobin range for a pregnant women is 11 gm%., haemoglobin level other than that is considered as anaemia. At 1st trimester, there is no significant difference observed among the haemoglobin level at case and control group, however, at 2nd, 3rd trimester and postdated pregnancy, there is a statistically significant association found among the haemoglobin level at case and control group. P value for 2nd, 3rd trimester and post trimester pregnancy are 0.003**, 0.036*, 0.021* respectively.

Table 4: Association of anaemia among case and control groups at different trimesters

Trimesters	Haemoglobin Status	Case		Control		p-value
		n	%	n	%	
1st	Anaemia	12	50.00	13	35.14	
	Normal	12	50.00	24	64.86	0.294NS
2nd	Anaemia	72	70.59	134	53.17	
	Normal	30	29.41	118	46.83	0.003**
3rd	Anaemia	72	67.29	218	55.75	
	Normal	35	32.71	173	44.25	0.036*
Post-dated	Anaemia	25	80.65	32	54.24	
	Normal	6	19.35	27	45.76	0.021*

**Highly Significant, *Statistically Significant, NS Not Statistically Significant, Fisher's Exact Test

Present study is emphasized on various factors associated with anaemia (Table 5). Odds ratio and 95% confidence interval is calculated to find the risk factors. The women who are tobacco users (cases) have 2 times higher risk of having anaemia as compared to tobacco non user women (controls), (OR: 2.193, CI: 1.240 – 3.877). It is statistically significant (p = 0.007). In terms of hospital type, women who delivered in the government hospital have 3 times higher chance of having anaemia as compared to women who delivered in the private hospital (OR: 3.268, CI: 1.889 – 5.652). This is statistically significant (p = 0.000**). In terms of education, as compared to post graduate women, the illiterate have 9 times higher risk of having anaemia (OR: 9.545, CI: 2.191 – 41.592). This is statistically significant (p = 0.003*). Women who have completed upto primary schooling have 7 times higher chance of having anaemia as compared to post graduate women (OR: 7.159, CI: 1.840 – 27.858). This is also statistically significant (p = 0.005*). Women who have completed upto middle school have 4 times higher chance of having anaemia as compared to post graduate women (OR: 4.295, CI: 1.607 – 11.481). This is also statistically significant (p = 0.004*).

In terms of income group, compared to the higher income group women (rupees 20,001 and above), there is one time higher chance of having anaemia in lower income group (rupees 20,000 and below). This is not statistically significant. The women who are exposed to second hand smoke have 2 times higher risk of having anaemia as compared to non-exposed women (OR: 2.427, CI: 1.536 – 3.833). This is statistically significant (p = 0.000*). The women whose husband is tobacco user has 2 times higher risk of having anaemia as compared to non-tobacco user husband (OR: 2.336, CI: 1.377 – 3.961). This is statistically significant (p = 0.002*). The women who has done physical activity during pregnancy shows statistically significant impact for having anaemia (p = 0.002*).

Discussion

The findings of the present study shows lower level of education which is associated with increased use of tobacco and findings of the study shows positive agreement with the study conducted by Majumdar et al in 2013 at rural Maharashtra. The study conducted by Majumdar reported that more than half of the illiterate population use tobacco as compared to the literate population (Majumdar et al. 2013). Similarly, the study by Kakrani reports that women who were married, illiterate and housewife and whose monthly income with mean less than 9000 INR show higher mishri use (Kulkarni et al. 2015). Also, the smokeless tobacco use monograph has reported more prevalence among low educated people as compared to the educated one. Due to education the knowledge of harms of tobacco use increases and therefore that is helpful to reduce its use and outcomes of the study are somewhat consistent with study conducted by Mutti (2016).

A study conducted by Hailu (2013) at Ethiopia reported that the prevalence of anaemia among pregnant women were 21.3%, however, this study reported to have higher prevalence of anaemia among pregnant women who are smokeless tobacco user and who are non-smokeless tobacco users. They reported to have 80.95% mild anaemia, 17.86% moderate anaemia and 1.19% were severe anaemia. The factors like age (39-45 years), education status (illiterate), family size (greater than 7), gestational age (third trimester), gravidity (multigravida) were significantly associated with anaemia (Hailu 2013).

Table 5: Factors associated with anaemia

Risk Factors		Anaemia	Percentage (%)	OR	95% C.I. Lower	95% C.I. Upper	p value
Tobacco use status	Control	236	39.93	Ref.			
	Cases	106	17.94	2.193	1.240	3.877	0.007*
Hospital Type	Private	38	6.43	Ref.			
	Government	304	51.44	3.268	1.889	5.652	0.000*
Age (in Years)	18-22yrs.	145	24.53	Ref.			0.308
	23-27yrs.	139	23.52	.646	0.392	1.063	0.086
	28-32yrs.	47	7.95	.669	0.338	1.322	0.247
	33yrs. and above	11	1.86	1.252	0.265	5.917	0.777
Education	Post graduate	11	1.86	Ref.			0.000*
	Illiterate	35	5.92	9.545	2.191	41.592	0.003*
	Upto primary school	35	5.92	7.159	1.840	27.858	0.005*
	Middle school	126	21.32	4.295	1.607	11.481	0.004*
	secondary school	112	18.95	2.131	0.825	5.502	0.118
	Graduate	23	3.89	1.107	0.375	3.264	0.854
Income	20001 and above	42	7.11	Ref.			0.670
	5001-10000	99	16.75	1.300	0.640	2.643	0.468
	10001-15000	156	26.40	1.486	0.758	2.911	0.249
	15001-20000	45	7.61	1.143	0.503	2.596	0.750
Second Hand Smoke (SHS) Exposure	No	97	16.41	Ref.			
	Yes	245	41.46	2.427	1.536	3.833	0.000*
Husband's Tobacco Use Status	No	211	35.70	Ref.			
	Yes	131	22.17	2.336	1.377	3.961	0.002*
Parity	1	136	23.01	Ref.			0.099
	2	132	22.34	1.120	0.685	1.830	0.651
	3	60	10.15	1.324	0.685	2.557	0.404
	4	11	1.86	3.640	0.457	28.979	0.222
Gravida	1	124	20.98	Ref.			0.468
	2	117	19.80	1.078	0.642	1.812	0.776
	3	71	12.01	0.954	0.532	1.711	0.875
	4	21	3.55	6.774	0.883	51.968	0.066
Sufficient Food Intake During Pregnancy	No	24	4.06	Ref.			
	Yes	318	53.81	0.697	0.259	1.878	0.476
Physical Activity During Pregnancy	No	183	30.96	Ref.			
	Yes	159	26.90	0.489	0.308	0.774	0.002*
Health Problem During Pregnancy	No	292	49.41	Ref.			
	Yes	50	8.46	0.676	0.381	1.202	0.183

OR: Odds Ratio; CI: Confidence Interval; *Statistically Significant

Conclusion

Present study reported that most of the women are Maharashtrian and they found to be Mishri user. Demographic factors which are related to smokeless tobacco use are, chawl type of residence, lower education, lower family income and homemaker occupation or housewife.

Use of smokeless tobacco in the family member is most reported reason to initiate tobacco use. Generally, anaemia is prevalent in women however, it is observed among most of the women who are smokeless tobacco users. Cases with lower education level i.e. illiterates show higher grades of anaemia. Cases who got exposed to second hand smoke and also the women whose husbands are tobacco users, found to be anaemic. The other factors like age of the women, number of parity, gravida, sufficient food intake during pregnancy and health problem has no significant impact on anaemia among women.

Conflict of Interest

There are no conflict of Interest

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