



## SMOKELESS TOBACCO USE & ANAEMIA AMONG PREGNANT WOMEN IN KARAD TALUK WESTERN MAHARASHTRA: A CROSS SECTIONAL STUDY

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### INTRODUCTION

'Smokeless tobacco' is the term used for the tobacco that is consumed in un-burnt form and it can be used orally or nasally. <sup>1,2,3</sup> One-third of tobacco users consume traditional forms like betel quid, tobacco with lime and tobacco tooth powder etc.<sup>4</sup> Prevalence of use of tobacco as dentifrice varies from 6% to 68% in different parts of India <sup>5,6</sup>

Mishri is one of the smokeless forms of tobacco used as dentifrice that is prepared by roasting of

### ABSTRACT

**Introduction:** 'Smokeless tobacco' is the term used for the tobacco that is consumed in un-burnt form and it can be used orally or nasally. Mishri (masheri or misheri) is one of the smokeless tobacco used as dentifrice. It has been observed that smoking during pregnancy is associated with anaemia in mothers & their babies. Objective of the study was to assess the magnitude of anaemia among users & nonusers of mishri & correlation with cotinine levels in the blood.

**Methods:** A comparative study was conducted at Krishna hospital, Karad in 2011 among delivered women using and not using mishri. Blood levels of Haemoglobin & cotinine were estimated.

**Results:** The mean Hb% was found significantly lower among users compared to nonusers of Mishri during pregnancy ( $t = -8.16, p = 0.001$ ) whereas no significant difference was found in calorie consumption & iron intake among both groups. There is a significant Negative Correlation ( $r = -0.418, p = 0.01$ ) between Cotinine levels in the blood and Haemoglobin level among users of Mishri.

**Conclusion:** There is a need to find out effects of smokeless tobacco use during pregnancy and pathophysiology of anaemia among users of smokeless form of tobacco.

**Key words:** Mishri, Anaemia, Cotinine, Correlation

tobacco that was baked on a hot metal plate until it is uniformly black & is then made in to powder, with the index finger and applied to the teeth and gums. Initially used for the purpose of cleaning the teeth but later addicted to it due to nicotine. The prevalence in Maharashtra is 39% among women and 0.8% among men. <sup>1,7</sup> Tobacco contains N - nitrosamines, the major alkaloid responsible for addiction to tobacco.<sup>8</sup> Anaemia should be considered to exist when haemoglobin is below 11 gm/dl for pregnant women. <sup>9</sup>

It has been observed that smoking during pregnancy is associated with anaemia in mothers & their babies. Smokeless tobacco in Southeast Asia and is gaining popularity across the world among women as a safe alternative to smoking.<sup>10</sup> So hence the study was carried to explore the association between the use of smokeless tobacco & anaemia in pregnant women.

**METHODS**

A cross sectional study was conducted during the period of three months from Jan to March 2011 among pregnant women delivered at Krishna hospital, Karad taluk, Satara district of Maharashtra. Those who were using smokeless tobacco ‘Mishri’ during pregnancy taken as study subjects & not using any form of tobacco as control subjects after matching for age and parity.

Personal & obstetric histories, diet history by 24hr recall method & anthropometry of newborn babies were noted among both the groups and the details of pattern of use of mishri among users was taken. Blood samples of women of both the groups were collected for Haemoglobin & cotinine level estimation. Three levels of severity of anaemia are distinguished: Mild anaemia (Hb=10- 10.9g/dl), Moderate anaemia (Hb%=7.0-9.9g/dl) and Sever anaemia (Hb%<7.0g/dl).<sup>11</sup>

Cotinine estimation was done by ELISA kit method & standardization was done in Biochemistry Laboratory and also level of iron in the diet was estimated by using guidelines given by NIN, Hyderabad<sup>12,13</sup>

Institutional Ethics Committee clearance & informed consent was taken from the subjects prior to the start of the study. Data were collected and analyzed by using SPSS-20 software for proportions, chi-square test and student’s t-test.

**RESULTS**

Total 105 pregnant women were involved as study subjects & equal number of control subjects from consecutive deliveries after doing matching for age & parity. Hb% among users was found to be 10.3±0.89gm% whereas among nonusers it was 11.5±1.1gm% (t=-8.16, p=0.001) the difference was found statistically significant. Users of Mishri gave birth to babies having the mean birth weight 480gm lesser compared to nonusers of mishri which was found statistically significant (t= -13.03, p=0.0001) (95% CI = -0.55 to -0.40).

Mean cotinine level among users of mishri was found to be 216±101ng/ml whereas among nonusers of tobacco it was 0.43±1.6ng/ml. The minimum level of cotinine among users was 50ng/ml whereas maximum level found was 559.5ng/ml.

**Table 1: Grades of anaemia among both groups**

Grades of Anaemia	Mishri users (n=105) (%)	Non Mishri users (n=105) (%)	Chi sqaure	p value
Normal (≥11 gm%)	40 (38.1)	85 (81)	40.60	0.001
Mild (9-11 gm%)	62 (59)	18 (17.1)		
Moderate (7-9 gm%)	03 (2.9)	02 (1.9)		
Severe (<7 gm%)	00 (00)	00 (00)		

The proportion of pregnant women not having anaemia was significantly higher (81%) among nonusers as compared to mishri users (38.1%). A significantly higher proportion of mild and moderate anaemic subjects were found among users of mishri as compared to the nonusers whereas no single case was found with severe anaemia in either groups (Table 1). Odds Ratio calculation (OR= -0.144, p<0.01 95%CI -0.07 to -0.27) for above table showed the risk of developing anaemia was reduced by 14% with non use of tobacco.

Table 2 shows the significant Negative Correlation between Cotinine levels in blood and Haemoglobin level among users of Mishri.

Table 3 shows significantly decreasing trend of heamoglobin level among users of mishri with increasing cotinine levels.

In the present study 58% women were consuming adequate diet among users as compared to 52% nonusers. Adequate diet accounts calorie intake of ≥2200Kcal/day & adequate Protein intake to ≥65gm/day. A statistical significance was not observed among both the groups (table IV) (p=0.18).

**Table 2: Correlation of Cotinine level in blood among users of Mishri & haemoglobin level**

	Mishri users (n=105)		
	Cotinine Mean ± SD	r-value	p-value
<b>Haemoglobin level (gm/dl)</b>	10.37 ± 0.89	-0.418	0.01

**Table 3: Mean haemoglobin values among users of mishri according to levels of cotinine**

Cotinine levels	No. (%)	Hb (gm%) (Mean±SD)	F value	p value
< 100 ng/ml	02 (1.9)	10.8±0.83	4.876	<0.01
100 - 199.999	52 (49.5)	10.6±0.96		
200 - 299.999	36 (34.3)	10.2±0.80		
300 +	15 (134)	9.7±0.56		

**Table 4: comparison of dietary factors among users & nonusers of mishri**

	Mishri users (n=105) Mean ± SD	Non Mishri users (n=105) Mean ± SD	t value	p value
Calories (kcal)	2365±110	2390±112	1.632	0.10
Proteins (gms)	66.2±6.0	67.5±6.2	1.544	0.12
Iron (mg)	27.17±4.53	27.35±4.66	0.459	0.44

**Table 5: categorization of Iron intake by subjects through diet among both groups**

Amount of iron in diet	Mishri users (n=105)		Non Mishri users (n=105)		χ <sup>2</sup> value (p value)
	No. (%)	Hb Mean±S.D	No. (%)	Hb Mean±S.D	
<20mg/day	19 (7.4)	10.1±0.8	19 (7.4)	10.6±0.9	1.052
20 - 29.99 mg/day	148 (57.4)	10.4±0.9	137 (53.1)	11.2±1.1	(0.59)
≥30mg/day	93 (35.3)	10.9±0.9	102 (39.5)	11.4±1.2	
ANOVA	F value	11.62	F value	4.09	
	p value	0.001	p value	0.01	

Table 5 shows no significant difference between the daily iron consumption among mishri users & non-users but a significant difference was observed in haemoglobin levels according to dietary iron levels (F=11.62, p=0.01).

Among users of Mishri no significant difference in mean levels of iron in diet was found when compared between those having Anaemia & not having Anaemia. Also little or no linear relationship was seen between haemoglobin levels and dietary iron of subjects using Mishri (r=0.047, p=4.53) and among nonusers of Mishri (r=0.129, p=0.05).

**DISCUSSION**

In the present study, mean Hb% had been found significantly lower among users compared to non-users of Mishri whereas no significant difference has been found in calorie, protein & iron intake among both groups. There has been a significant Negative Correlation between Cotinine levels in the blood and Haemoglobin levels among users of Mishri, i.e. with increase in levels of cotinine there is decrease in Hb levels.

Sreevidya S et al<sup>11</sup> have found in their study that smokeless tobacco use during pregnancy influenced hemoglobin levels in a population-based cohort of 918 pregnant women in Mumbai, India. Mean hemoglobin levels (Hb) has been significantly lower in users (10.00 g/dl) as compared with non-users (10.46 g/dl), p<.000. Anemia (Hb<10 g/dl) has been seen significantly associated with smokeless tobacco in the univariate analysis (OR=1.7, 95%

CI 1.2-2.5). Subramoney S et al (2008)<sup>14</sup> have found similar results. Our results corroborate with their clinical findings and negative correlation between serum cotinine levels and haemoglobin in our study further strengthen the association between mishri use & anaemia. The results suggest that smokeless tobacco use during pregnancy is associated with lower hemoglobin levels, as has often been observed with cigarette smoking.

Anaemia among Tobacco users could be due to lower Hepcidine levels in serum of pregnant women as studied by Chelchowska M et al.<sup>15,16</sup> they have shown that tobacco smoking during pregnancy affected pro-hepcidine levels in serum of mothers and their newborns. Hepcidin is now acknowledged to be the main iron regulatory hormone. It is a 25-amino acid peptide exclusively synthesized by the liver, initially identified as part of a search for novel antimicrobial peptides.<sup>17</sup>

It is known that anaemia and hypoxia suppress hepcidine in RNA expression. Hepcidin is a peptide hormone produced by liver is a central mediator of iron metabolism. It regulates intestinal iron absorption, macrophage iron release and the placental passage of iron. Low concentrations of some iron markers (ferritin, transferrin, total iron) in umbilical cord blood in their study have suggested that mother's smoking could lead to subclinical iron deficiency in fetus. Also they have found low concentration of ferritin both in placenta and umbilical cord blood indicating that smoking during pregnancy could lead to subclinical deficiency in matched maternal-cord pairs. Maternal smoking is associated with increased fetal iron requirements

and stimulates fetal erythropoiesis. It is probably through a hypoxic effect on the fetus and is dose related to the maternal smoking level.<sup>15,16,18,</sup>

We don't know the mechanism of anaemia in pregnant mothers using smokeless tobacco. It cannot be related to hypoxia but could be related to decreased iron absorption. We have observed that the iron intake has been similar in pregnant women using smokeless tobacco and non users. There could be a direct effect of nicotine on gastro intestinal mucosa or it could be through reduced levels of hepcidine.

## CONCLUSION

There is a need to find out effects of smokeless tobacco use during pregnancy on iron absorption and iron parameters like serum levels of pro-hepcidin, concentration of ferritin, transferrin and iron binding capacity to find out pathophysiology of anaemia among users of smokeless form of tobacco. Considering the widely prevalent use of smokeless tobacco among women in south east Asia & its association with anaemia is of considerable public health importance.

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