

## Original Article

# CORRELATES OF ANAEMIA AND WORM INFESTATION AMONG RURAL PREGNANT WOMEN: A CROSS SECTIONAL STUDY FROM BENGAL

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## ABSTRACT

### INTRODUCTION

Anemia is the commonest nutritional problem worldwide with its highest prevalence among young children and pregnant women. <sup>1</sup> Anemia is especially more common in developing countries because of various socio-cultural problems like illiteracy, poverty, lack of awareness, cultural and religious taboos, poor dietary habits and high prevalence of parasitic infestation which are widespread in these regions. On an average 56% of pregnant women of developing regions of the world are anemic with a range of 35% to 100% among various regions of the world. <sup>2</sup>South Asian regional anemia prevalence has been estimated to be 75% among pregnant women which is highest in the world.<sup>3</sup> The NFHS III data clearly shows that majority of pregnant women of India are anaemic. <sup>4</sup> Presence of parasitic infestation and its relationship with anaemia

**Background:** Anemia is the commonest nutritional problem among pregnant women. It is more common in developing countries because of varied socio-cultural problems.

**Objectives:** To find out the prevalence of worm infestation and anaemia among pregnant women along with their socio-demographic characteristics, dietary habits and state of personal hygiene and elicit the association, if any, with anemia and worm infestation

**Materials and methods:** A cross-sectional study was carried out among pregnant mothers attending the antenatal clinic at Nasibpur Union Health Center. All antenatal mothers who came for antenatal checkup for the first time to the health centre on two prefixed days of the week during the study period were interviewed. The reports of their stool and haemoglobin examination were followed up.

**Results:** 82% of the pregnant women were suffering from anemia. 25% of the study population had worm infestation. Age at marriage, green leafy vegetable, fruit and flesh food intake of at least 4 days a week, use of lemon with food most of the time, avoiding the practice of eating last in the family, handwashing with soap and water before eating and use of footwear outside the house were statically significant with hemoglobin concentration. Only religion and handwashing practice with soap and water before eating had statistically significant association with worm infestation.

**Conclusion:** The study showed that certain protective factors like diet and personal hygiene if addressed at the time of antenatal checkup can reduce the number of cases of anemia significantly.

**Key words:** Anaemia, diet, personal hygiene, pregnant woman, worm infestation.

and foetal outcomes was also studied by Stratton et al. in United States. <sup>5</sup> They found that, there was a three-fold increase in the incidence of significant neonatal hyperbilirubinemia in the mothers that had the presence of helminthes in the stool<sup>5</sup>.

Anemia in pregnancy is considered one of the major risk factors contributing to maternal deaths in developing countries, <sup>6</sup> with hemorrhage, eclampsia, obstructed labour and infections being the three other major causes of maternal deaths in India (SRS2007-2009). In West Bengal, anemia in pregnancy contributes to 17% of maternal deaths. <sup>7</sup> Bleeding associated with normal delivery may even cause death in anemic women as anemia reduces resistance to blood loss. Anemia is also associated with adverse maternal outcome like puerperal sepsis, ante partum hemorrhage, postpartum hemorrhage and maternal mortality. <sup>8</sup> So

early diagnosis and treatment of anemia is of utmost importance especially in pregnant women.

With this in backdrop, a study was conducted among antenatal mothers who had come for checkup for the first time in Nashibpur Union Health Centre to find out the prevalence of worm infestation and anaemia as well as assess the various socio-demographic characteristics, dietary habits and state of personal hygiene of the study population and find out their association with anemia and worm infestation

## METHODS

The study was conducted at Nashibpur Union Health Centre which falls under Singur Rural Health Unit and Training Centre in Singur block, Hooghly district, West Bengal. The health centre caters to a population of 9885 distributed in 4 villages namely, Deara, Gobindapur, Ramchandrapur and Mollahshimla. Villagers from the aforementioned villages avail the services of this health centre. Out of 6 days of the week, the researchers chose two days (Mondays and Wednesdays) of every week to conduct the study by simple random sampling. All antenatal mothers who were coming for antenatal checkup for the first time to the health centre on these two days of the week during the study period of three months (October, November and December, 2012) were interviewed using a pre-designed, pretested semi structured questionnaire. Only mothers coming for the first time during present pregnancy were considered to avoid impact of iron and folic acid tablets that were provided free of cost to antenatal mothers from this health centre. Informed oral consent was taken before each interview. Subsequently, the reports of their stool and haemoglobin examination which were conducted at the health centre were followed up by the researchers. Haemoglobin (Hb) estimation was done by cyanmethaemoglobin method<sup>12</sup>, using the filter paper technique.

All the 110 pregnant women who came to the health centre for registration for the first time willingly consented for the study but 4 women refused to undergo haemoglobin examination. They were excluded from the study population. In addition another 5 mothers were already on iron supplementation. They were also excluded from the study. Thus a total of 101 antenatal mothers were interviewed. Different sociodemographic variables like age, literacy, religion, per capita monthly income, occupation of the husband, dietary habits, personal hygiene worm infestation etc. were elicited.

The variables considered for scoring dietary habits were intake of green leafy vegetables  $\geq 4$  days a week, intake of fruits  $\geq 4$  days a week, intake of fleshy food  $\geq 4$  days a week, habit of squeezing lemon usually while eating and avoiding the common custom of eating last usually. The favorable habits were allotted a score of 1 and unfavorable ones score 0. For scoring for personal hygiene practices following variables were considered-Washing of hands with soap and

water before eating, washing of hands with soap and water after defecation, use of latrine for defecation and use of footwear outside the house. Favorable practices followed most of the times were given a score of 2, sometimes score= 1 and never score =0.

## RESULTS

**Table 1** shows the socio-demographic characteristics of the study population. Most of the participants were in the age group of 20-24 years (36.63%), while only 2.9% were above 35 years. The mean age of the women was  $22.7 \pm 4.57$ . The mean age of marriage was only  $19.38 \pm 2.85$  years with majority being married (65.35%) in their teens. Almost 38% delivered their first child when they were still adolescents. The mean age of first child birth was  $20.82 \pm 3.14$  years.

**Table 1: Sociodemographic characteristics of the study population (n=101)**

Variable	Frequency (%)	Mean $\pm$ SD
<b>Age (years)</b>		
15-19	32(31.68)	18.43 $\pm$ 0.5
20-24	37(36.63)	21.7 $\pm$ 1.54
25-29	20(19.8)	25.85 $\pm$ 0.93
30-34	9(8.91)	31 $\pm$ 1.5
35-39	3(2.97)	36 $\pm$ 0
Total	101(100)	22.74 $\pm$ 4.57
<b>Age at marriage(years)</b>		
15-19	66(65.35)	17.8 $\pm$ 1.02
20-24	29(28.71)	21.27 $\pm$ 1.53
25-29	6(5.94)	27.5 $\pm$ 1.64
Total	101(100)	19.38 $\pm$ 2.85
<b>Age at first child birth(years)</b>		
15-19	38(37.62)	18.26 $\pm$ 0.6
20-24	51(50.50)	21.08 $\pm$ 1.21
25-29	6(5.94)	25.67 $\pm$ 0.82
30-34	6(5.94)	30 $\pm$ 0
Total	101(100)	20.82 $\pm$ 3.14
<b>Previous pregnancies</b>		
0	45 (44.55)	
1	30 (29.70)	
2	15 (14.85)	
3	11 (10.89)	
<b>Literacy status</b>		
Illiterate	20 (19.8)	
Primary completed	9 (8.91)	
Middle completed	42 (41.58)	
Secondary completed	23 (27.77)	
H.S & above	7 (6.93)	
<b>Religion</b>		
Hindus	80 (79.21)	
Muslims	21 (20.79)	
<b>Per capita monthly income (Rs)</b>		
<850(median)	49 (48.51)	
$\geq$ 850(median)	52 (51.49)	

Most of the study population was primigravida (44.55%). It was found that 19% of the women were

illiterate. It was found that 48% of the study population had per capita monthly income below the median of Rs.850. Majority (79%) of the participants were Hindus.

**Table 2: Distribution of the study population according to prevalence of anemia and worm infestation (n=101)**

Variable	Frequency (%)	Mean ± SD
<b>Hemoglobin level</b>		
<11gm%	83(82.17)	9.47±1.0
≥11gm%	18(17.83)	11.27±0.25
<b>Worm infestation</b>		
Absent	76	75.24
Present	25	24.75

**Table2** shows that majority (82%) of the pregnant women were suffering from anemia (hemoglobin <11gm %).

Almost 25% of the study population had one or more worm infestation, the most common being hookworm (14%), followed by ascariasis (10.89%), giardiasis (9.9%), trichuriasis (2.97%) and entamoebiasis (1.98%).

**Table 3** shows that majority (72.28%) of the women consumed green leafy vegetables for at least four days a week. Only a small proportion of these women (21.78%) ate fruits for 4 or more days per week. 40.59% consumed fleshy food for at least 4 days a week. The social custom of eating last in the family was prevalent in 66.34% of the women, while about 42.54% of the women used lemon with food usually.

**Table 3: Distribution of the study population according to their dietary pattern (n=101)**

Dietary pattern	Yes (Score 1) No. (%)	No (Score 0) No. (%)
Intake of green leafy vegetables ≥4 days a week	73(72.28)	28(27.72)
Intake of fruits ≥ 4 days a week	22(21.78)	79(78.22)
Intake of fleshy food ≥ 4 days a week	41(40.59)	60(59.41)
Habit of squeezing lemon usually while eating	43(42.57)	58(57.43)
Avoiding the custom of eating last in the family usually	34(33.66)	67(66.34)

**Table 4: Distribution of the study population according to their personal hygiene practice (n=101)**

Personal hygiene practice	Most of the times (score=2) No. (%)	Sometimes (score=1) No. (%)	Never (score=0) No. (%)
Washing of hands with soap and water before eating	4(3.96)	59(58.42)	38(37.62)
Washing of hands with soap and water after defecation	32(31.68)	62(61.39)	7(6.93)
Use of sanitary latrine for defecation	73(72.28)	11(10.89)	17(16.83)
Use of footwear outside the house	32(31.68)	56(55.45)	13(12.87)

**Table 5: Multiple linear regressions between Hemoglobin level (≥11 gm %) and other variables under study**

Variables under study	Coefficient	Std Error	F-test	P-Value
Age at marriage	0.172	0.081	4.4998	0.036918
Green leafy vegetable intake	1.238	0.184	45.1331	0.000000
Fruit intake	1.003	0.170	34.7234	0.000000
Flesh food intake	0.585	0.157	13.8897	0.000355
Habit of squeezing lemon while eating	1.391	0.143	94.0098	0.000000
Avoiding eating last	0.516	0.162	10.1775	0.002015
Hand washing with soap & water before eating	0.457	0.127	12.9655	0.000542
Use of footwear outside house	-0.284	0.109	6.7806	0.010937
Constant	5.862	0.572	104.9383	0.000000

**Table 6: Multiple regression between worm infestation and variables under study (n=101)**

Variable	Coefficient	Std Error	F-test	P-Value
Religion	0.262	0.111	5.5182	0.021226
Hand washing with soap & water before eating	-0.193	0.091	4.4371	0.038224

**Table 4** depicts the personal hygiene practice of the pregnant women. Only 3.96% of the women washed their hands with soap and water most of the times before eating and 31.68% did the same after defecation. Almost 17% of the women practiced open air

defecation and a meager 31.68% used some form of footwear outside their house most of the times.

**Table 5** shows the results of multiple linear regressions between hemoglobin level and varied correlates of anemia in pregnancy. It was found that age at marriage, green leafy vegetable, fruit and flesh food intake

of at least 4 days a week, use of lemon with food most of the time, avoiding the practice of eating last in the family, handwashing with soap and water before eating and use of footwear outside the house were statistically significant with hemoglobin concentration.

Multiple linear regressions between worm infestation and other variables (**table 6**) revealed that only religion and handwashing practice with soap and water before eating had statistically significant association with worm infestation.

## DISCUSSION

The results on the prevalence and determinants of anemia among pregnant Indian women should be interpreted in their economic and socio-cultural context. The high rates of anemia among Indian women reflect their social and biological vulnerability both within the society and the household. Common customs and cultural taboos often aggravate the anemic status of these women. Some of these like eating last in the family, open air defecation, walking barefoot outside, early age at marriage, teenage pregnancy are still rampant in rural areas of our country. Coupled with this, poverty, illiteracy and unemployment take a heavy toll on the anemic pregnant women. The NFHS 3 Survey shows that an alarming proportion of pregnant women of our country (57.9%) are anemic. <sup>4</sup>What is distressing is the fact that the figure has increased a few notches above the NFHS 2 figures of 49.7%. This is echoed by various studies conducted all over the country in the last decade or so. In an interstate study by Agarwal et al the prevalence of anaemia among pregnant women was as high as 93% in Assam, 91% in Haryana, 68% in Himachal Pradesh, 97% in Madhya Pradesh and Orissa and 92% in Tamil Nadu. <sup>9</sup> The present study shows that a huge proportion (82%) of the pregnant women was anemic (Hemoglobin<11gm %). The contributing factors of the interstate study found on multiple regression analysis for anaemia in pregnancy were: literacy, occupation and standard living index of the study women, its prevention by regular consumption of iron-folate tablets and increase in food intake. Similarly in the present study, dietary practice of taking green leafy vegetable, fruits, fleshy food in plenty, squeezing of lemon while eating and avoiding the common custom of eating last in the family all significantly ( $p<0.05$ ) contributed to higher hemoglobin levels.

A study conducted by Bentley et al in Andhra Pradesh among pregnant women showed 32.4% of women had mild, 14.19% had moderate, and 2.2% had severe anemia. Protective factors include Muslim religion, reported consumption of alcohol or pulses, and high socioeconomic status, particularly in urban areas. Poor urban women had the highest rates and odds of being anemic. In the current study, some of the protective factors ( $p<0.05$ ) included dietary practice of taking green leafy vegetable, fruits, fleshy food in plenty, squeezing of lemon while eating, use of footwear

while walking outside and hand washing with soap and water before eating. <sup>10</sup>

Going by the neighboring countries, a study conducted by Awan et al in Multan showed a very high prevalence rate of anaemia (96%).<sup>11</sup> Similar studies in neighboring Bangladesh put the figure at around 49%.<sup>12</sup> A study by Shah et al in Nepal showed the prevalence of anemia among pregnant women to be 58.9% and helminthic infestation to be 48.5%.<sup>13</sup> That human hookworm infection results in intestinal blood loss which, in turn, can contribute to anaemia is well-established. Anemia in the Nepal study was significantly related to hookworm infestation. There was a highly significant relationship between literacy status and helminthic infestations ( $P<0.000$ ). In the present study, worm infestation was prevalent at 25% with 14% being hookworm, 11% ascariasis and 10% giardiasis. The parasite most commonly associated with anemia in the Nepal study was Hookworm followed by Ascaris ( $P<0.06$ ). A study done by Bauerfeind et al. in Papua New Guinea showed a significant linear correlation between the intensity of hookworm infestation and blood haemoglobin level. <sup>14</sup> In the current study, there was statistically significant relation of handwashing and religion with worm infestation on regression analysis.

## CONCLUSION AND RECOMMENDATION

The above study shows that protective factors like diet rich in green leafy vegetables, fruits and fleshy foods, simple practice of squeezing lemon while eating, use of sanitary latrines, handwashing properly with soap and water both before eating and after defecation, if addressed at the time of antenatal checkup can reduce the number of cases of anemia significantly. Besides it was also observed that handwashing with soap and water before eating was significantly protective against worm infestation.

The health workers who are the first contacts of these mothers should play a pivotal role in imparting health education regarding the aforementioned protective factors. Mere distribution of prophylactic/therapeutic iron and folic acid tablets will not help in addressing the problem of anemia unless dietary habits and personal hygiene practices are taken care of during pregnancy.

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