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Prevalence of anaemia in varied nutritional state among the women of reproductive ages belonging to low socioeconomic status of rural India

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Abstract

Anaemia is a serious public health problem throughout the world and the women of childbearing age are more vulnerable to anaemia. Furthermore low socio-economic status aggravated this situation. In this scenario, a community based cross-sectional study has been undertaken among the women aged 15–49 years living in the rural areas of Paschim Medinipur District belonging to the low socioeconomic status to find out the prevalence of anaemia and also to study the influence of age and nutritional status on the haemoglobin level of these women. This study showed that, 34.97% and 11.60% of the women were suffering from the under nutrition and overweight while prevalence of anaemia was 74.02%. It was also noted that anaemia was more predominant among the underweight group (76.17%) than the normal weight (74.01%) and overweight women (67.61%). This study also indicated that, age of the women greatly influenced the anthropometric parameters not the haemoglobin level. Interestingly, prevalence of anaemia was variable in different nutritional status at different age group. Further study is needed to establish the cause of variation of anaemia prevalence in nutritional state among the women.

Keywords: Rural, women, haemoglobin, BMI

Introduction

Anaemia is a public health problem that increases the occurrence of multiple diseases globally [1]. It occurs at all stages of the life cycle, though the young children, pregnant women and non-pregnant women of childbearing age are more vulnerable group [1, 2]. The recent report WHO in 2015 estimated that, 496.3 millions non-pregnant women and 32.4 million pregnant women aged 15–49 years were suffering from anaemia [3]. The report also revealed that the South-East Asia were the most affected WHO Region in the world due to the complex interplay of dietary factors, infectious disease, genetic variability and other factors [1, 3, 4]. The current report of fourth National Family Health Study (NFHS-4) conducted during 2015–2016 in India found that the prevalence of anaemia was 53.1% among the women aged 15–49 years in India as a whole, while in West Bengal state of India, the prevalence of the same being 62.5% [5].

It is well known that anaemia is a preventable and easily treatable health complication, if it is detected in time and proper management is given [6]. Despite these facts, it has been continued to be a common cause of mortality and morbidity [7]. In developing countries, the situation of the women is more serious, particularly while considering the condition of the health, access of health care facilities, food availability [1]. In Asia, anaemia (irrespective of the severity) is the second leading cause of maternal death [8]. Among the women and men it is responsible for morbidity, lowered physical activity and lowered productivity that leads to decreased work performance and insufficient earning. Thus, anaemia is not only associated with major health consequences but also social and economic development [9].

Anaemia has a potential influence on the overall women health, particularly in the developing countries and low socio-economic status aggravated this situation [10, 11]. Thus, women belonging to low socio-economic group are at high risk for anaemia, especially during their reproductive age (15 to 49 years). In this scenario, the present study has been undertaken among the women aged 15–49 years living in the rural areas of Paschim Medinipur district

belonging to the low socioeconomic status to find out the prevalence of anaemia and also to study the influence of age and nutritional status on the haemoglobin level of these women.

Methodology

Study area and human participants

A community based cross-sectional study was undertaken in the rural areas of Paschim Medinipur district during time period of November 2017 to April 2018. The researchers randomly studied 612 non-pregnant and non-lactating (NPNL) women of 15–49 years of age group living in the area. The data was collected by personal interviews on a pre-tested, semi-structured questionnaire. The questionnaire was based on demographic information, anthropometric data and personal hygiene. Each of the participants was identified by name, age and address.

Ethical consideration

The study is approved by the Institutional Research Ethics Committee. The researcher explained this study objective to the potential participants prior to the study. The anonymity of the participants is absolutely conserved. The researchers also obtained permission from the administrative authority and before the study. A written permission was obtained from the participants before conduction of the study. In case of the minor (<18years) group the consent was taken from their legal guardians.

Inclusion and exclusion criteria

Only the competent, NPNL women aged 15-49 years belonging to low socioeconomic condition were included in this study. The probable participants who were suffering from significant health complication viz. diabetes, hypertension and chronic infectious diseases were excluded in the study.

Socio-economic status

The socioeconomic status of the women was assessed by Kuppuswamy's socioeconomic status scale updated for 2017 [12]. This original Kuppuswamy's socioeconomic status scale was based on the composite score considering the education and occupation of the head of the family along with monthly income of the family [13].

Anthropometric measurements

All anthropometric measurements were taken by the trained investigators using the standard techniques [14]. Height of the women was measured to the nearest 0.1 cm using Martin's anthropometer while the body weight of the participants was recorded to the nearest 0.5 kg on a weighing scale (Doctor Beliram and Sons, New Delhi, India). The women were requested to wore the light cloths during the time of anthropometric measurements and also remove the shoes during that period.

Body mass index (BMI) was computed using the following standard equations:

$$\text{BMI (kg/m}^2\text{)} = \text{Weight (kg)} / \text{height}^2 \text{(m}^2\text{)}$$

Nutritional status of the participants was evaluated by using internationally accepted World Health Organization (1995) BMI (kg/m²) guidelines [15]. The following cut-off points were used:

Underweight: BMI < 18.5 kg/m²;
Normal: BMI = 18.5 – 24.9 kg/m²;
Overweight: BMI > 25.0 kg/m².

In case of the female aged below 18 years, thinness and overweight were determined as per Cole *et al* [16, 17].

Determination of Haemoglobin Level

Two millilitres of venous blood were drawn from each participants. An aliquot of the blood was placed immediately in a tube containing Dakin's solution for haemoglobin estimation. The haemoglobin concentration was measured using cyanmethaemoglobin method [18]. Three levels of severity of anaemia for the non-pregnant women are classified as the following [5].

Mild anaemia: 10.0-11.9 g/dl;
Moderate anaemia: 7.0-9.9 g/dl and
Severe anaemia: <7.0 g/dl.

The researchers followed the UNICEF/UNU/WHO (2001) of the public health problem of anaemia, based on adult populations worldwide [19]. This classification categorises the prevalence of public health problem according to the prevalence of anaemia, which is as follows.

<5% anaemia signifies no public health problem,
5–19.9% anaemia signifies mild public health problem,
20–39.9% anaemia signifies moderate public health problem and
>40% anaemia signifies severe public health problem.

Statistical Analysis

Data processing and statistical analyses were done using the SPSS for Windows statistical software package (SPSS Inc., Chicago, IL, USA 2001). Data is expressed as means and standard deviations, and group comparison was done using one way ANOVA. Pearson's chi-square test was used to determine significant differences observed within the various categories of nutritional status.

Results & Discussion

A total of 612 non-pregnant non-lactating (NPNL) women were studied. The mean age of the population was 29.49±9.88 years (Table 1). While the distributing the women into four groups viz. <20, 20-29, 30-39 and 40-49 years, it was noted that most of the women were in the age group of 20-29 years (159), followed by 40-49 years (157), <20 years (155) and 30-39 years (141). The weight, height, BMI and haemoglobin of the women were 47.04±9.30 kg, 152.13±6.32 cm, 20.30±3.66 kg/m² and 10.88±1.48 g/dl respectively.

Table 1: Age, haemoglobin and anthropometric parameters of the female aged 15-49 years

Parameters	Mean ± SD	95 % CI
Age (year)	29.49±9.88	28.70–30.27
Weight (Kg)	47.04±9.30	46.30–47.77
Height (cm)	152.13±6.32	151.63–152.63
BMI (kg/m ²)	20.30±3.66	20.01–20.59
Haemoglobin (g/dl)	10.88±1.48	10.76–10.99

The impact of age on the anthropometric parameters and haemoglobin level of the women is shown in table 2. It was noted that weight (F=5.013; P<0.01) and BMI (F=5.778; P<0.001) were significantly increasing with age but no such association was noted in case of haemoglobin level (F=1.158; P>0.05). This may be due to the economic status, availability of healthy food and marriage and conception at a very early age group. In this condition physiological development was not sufficient.

Table 2: Impact of age on the anthropometric parameters and haemoglobin level of the women

Age (years)	N	Weight (Kg)	Height (cm)	BMI (Kg/m ²)	Haemoglobin (g/dl)
<20	155	46.17 ± 8.57	152.67 ± 5.79	19.80 ± 3.47	11.05 ± 1.39
20-29	159	45.68 ± 8.46	151.87 ± 6.14	19.77 ± 3.20	10.81 ± 1.59
30-39	141	46.91 ± 9.20	151.61 ± 6.74	20.37 ± 3.65	10.88 ± 1.40
40-49	157	49.38 ± 10.48	152.32 ± 6.61	21.26 ± 4.11	10.76 ± 1.52
ANOVA		F=5.013; P<0.01	F=0.831; P>0.05	F=5.778; P<0.001	F=1.158; P>0.05

The prevalence of underweight, overweight was 34.97% and 11.60% respectively. This study also indicated that the prevalence of overweight was increased with increasing of age while the prevalence of underweight was decreasing with increasing of the age, though no statistical significant was

found (Fig 1). The percentage of underweight is higher than the overweight that suggests the community belongs to low socioeconomic group to afford healthy food. Not only may their lower nutritional status be the causes of several health anomalies.

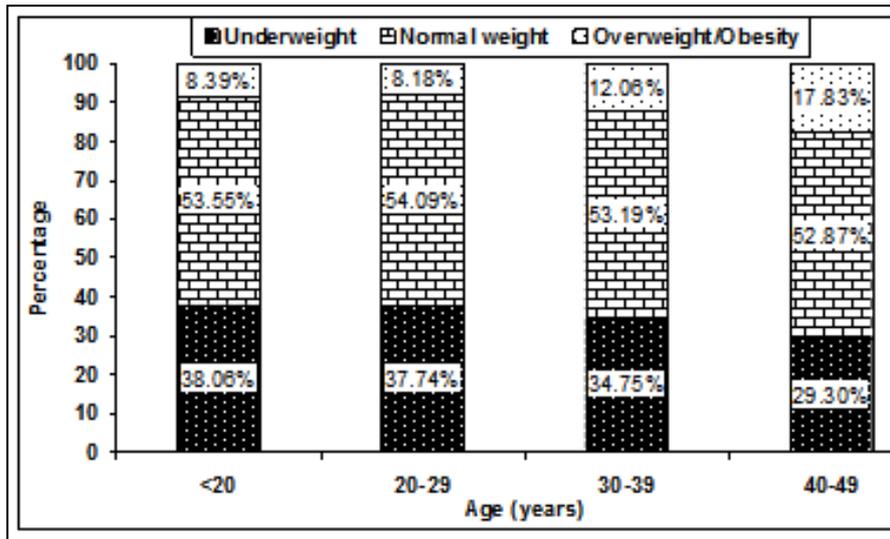


Fig 1: Impact of age on the nutritional status of the female aged 15 – 49 years

The present study demonstrates that the overall prevalence of anaemia was 74.02% among the women. While comparing the previous studies conducted in India, our study shows the higher prevalence of anaemia than the recent report of IIPS (2017), where this prevalence was 53.1% among the non-pregnant women living in India [5]. The prevalence of mild, moderate and severe anaemia among the study group was 54.74%, 16.67% and 2.45% respectively (Fig. 2). While comparing the prevalence of anaemia in different age group, it was found that the highest prevalence of anaemia was noted

among the women belonging to 30-39 years (75.89%) and lowest in case of age group 20-29 years (72.33%). The prevalence of anaemia was observed among the women <20 years and 40-49 years was 74.84% and 73.25% respectively (Data not shown). This study also noted that the BMI of the women suffering from severe, moderate, mild anaemia was 19.48±2.83 kg/m², 20.23±3.83 kg/m², 20.26±3.62 kg/m² respectively while non-anaemic normal women had little bit higher BMI (20.50±3.72 kg/m²) than the anaemic group (Fig. 2).

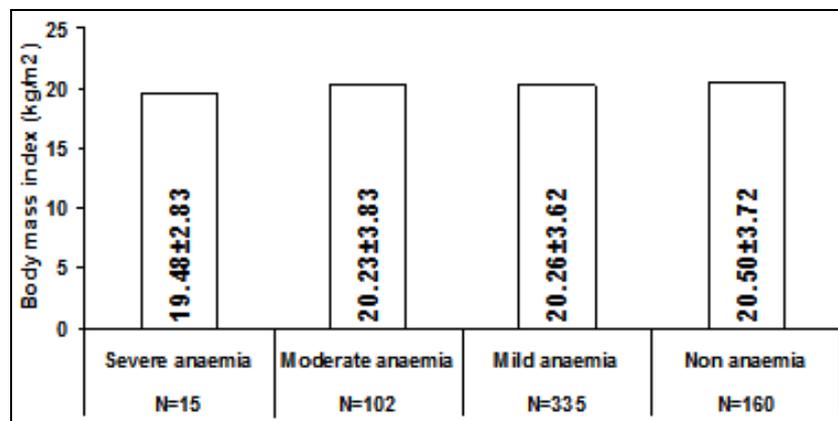


Fig 2: Impact of hemoglobin level on the body mass index of the female aged 15–49 years. The association was not significant with F=0.433 and P>0.05.

This study showed the anaemia was more predominant among the underweight group (76.17%) than the normal weight (74.01%) and overweight (67.61%) (Data not shown). Thus, it

showed the fact that low body mass index is associated with high rate of anaemia among the women.

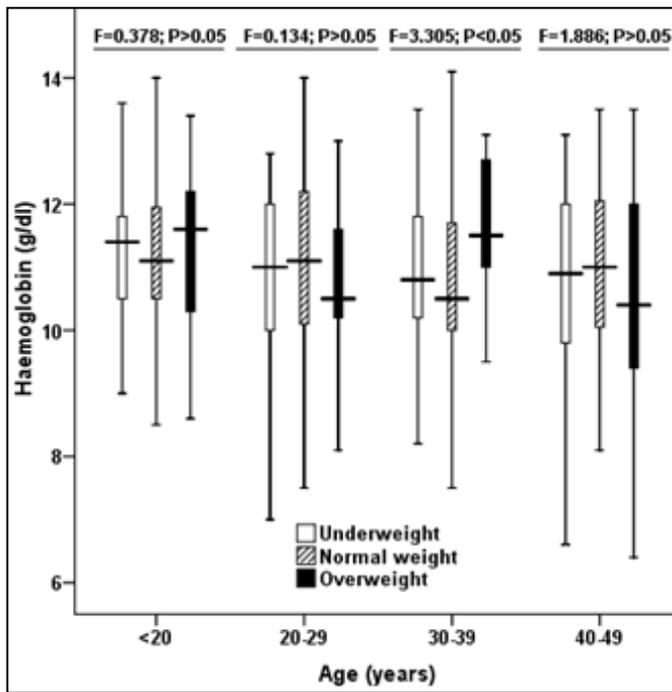


Fig 3: Impact of age and nutritional status on the haemoglobin level of the female aged 15-49 years

Impact of age and nutritional status on the haemoglobin level of the female aged 15–49 years was shown in Fig 3. This study indicated that the underweight women not always had the low haemoglobin level than the normal weight women. In the age group <20 years and 30-39 years, the haemoglobin

level was higher in case of underweight women than the normal weight ones. The overweight group had higher level of haemoglobin than the underweight and normal weight women in this age group. But other two age group viz. 20-29 years and 40-49 years the haemoglobin level among the overweight group was much lower in compared to underweight and normal weight women. It showed that nutritional status of the women had influenced the haemoglobin level of the women. It is well known that both the overweight and underweight are abnormal situation. In lower age group, metabolism and physiological condition is more active so it can recover from any insufficient situation. So, it was found the haemoglobin level is higher in both overweight and underweight women belonging to the age group less than 20 years. But the next age group, at child bearing age both the overweight and underweight women had lower level of haemoglobin than the normal. Whereas in the third age group i.e., 30-39 years, the childbearing age is over and it was found that both the malnourished women can recover and their haemoglobin level was higher than the normal control group. But in the last phase i.e., age group 40-49 years the women were very near to menopausal state and initiate ageing process. At this state both overweight and underweight group could not show the ability to recover, so, their haemoglobin level once again below the normal weight women.

Interestingly, while studying the impact of age and nutritional status on the prevalence of anaemia among the female aged 15–49 years, it was indicated that the prevalence of anaemia was higher among the undernourished women in all age groups except 30-39 years (Fig. 4).

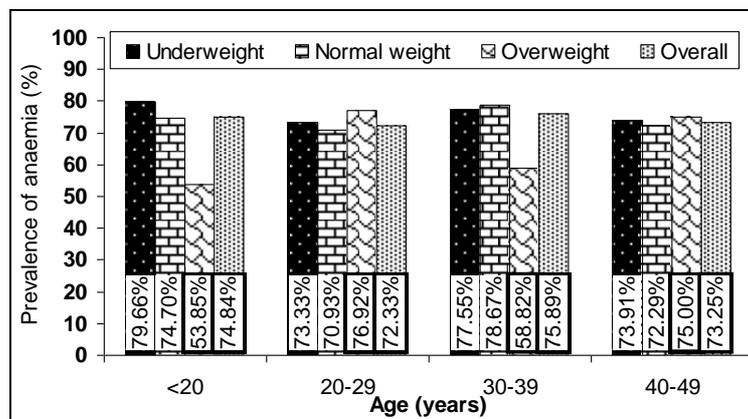


Fig 4: Impact of age and nutritional status on the prevalence of anaemia among the female aged 15–49 years

Conclusion

This study clearly showed that three fourth women of the experimental population were suffering from anaemia and this is a very serious situation. The poor nutritional status aggravates the situation.

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