Original Article

Prevalence of anemia and its possible attributing factors in psychologically healthy women of reproductive ages in Midnapore (Jangalmahal-area), India

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Abstract

Background: Worldwide, anemia in pregnant women is associated with low birth-weight, perinatal and maternal mortality. The Childhood malnourishment results in ill-health and psychosocial problems. In the present study, prevalence of anemia is determined in a community-based cross-sectional survey (June 2010 to May 2011) in non-pregnant, psychologically fit and economically backward women (total 241, 15-49 years).

Methods: The investigation is based on interviews on a pre-tested, semi-structured questionnaire after testing with Mental Status Examination. Body mass index is assessed to evaluate undernutrition and thinness. Data processing and descriptive statistics were done using the SPSS, 2010. The Pearson ÷^{2} and ANOVA tests were performed to predict the level of significance.

Results: Anthropometric indices and hemoglobin level indicate that the prevalence of anemia (Hb<12 g/dl, WHO) is 69.7% ($p<0.01$), which is severe in malnourished individuals (30%). It is found that, the anemia status (primary and mild) is better correlated with undernutrition and thinness. It is also noticed that the moderate to severe anemia is more indicative to pathological state than physiological state in grade II/ III thinness. Likewise, anemia also occurring in normal or overweight group indicates, beside nutrition, influence of possible pathological, psychological or environmental factors are also occurring.

Conclusion: Present findings necessitates extensive health program. An unplanned urbanization resulting unfriendly socio-demographic changes is more detrimental than natural adversity associated rudimentary character of a rural area. Beside supplementation, proper health awareness is more important at policy making level for global management of anemia.

Key words: Anemia, Body Mass Index, Women's Health, Socioeconomic status, psychological factors.

Introduction:

Anemia is a global public health problem which is associated with an increased risk of morbidity and mortality, especially in pregnant women and young children[1,2]. According to WHO, 2 billion people suffer from anemia worldwide[3]. It impairs the cognitive and physical development in children and work output in adults. The prevalence of anemia is disproportionately high in developing countries due to poverty, inadequate diet, certain diseases, frequent pregnancy and poor access to health services[4]. The investigators observed that the prevalence of anemia is 80% in pregnant and 60% in non pregnant women in South East Asia, which is 55.3% in India[5].

Iron deficiency has been established to be the commonest cause of nutritional anemia[6]. Other important causes are malaria, intestinal worms, antenatal care and low Body Mass Index (BMI)[7]. Anemia also results in an increased risk of premature delivery, low birth weights and physical abnormalities in childhood. When the iron stores are severely exhausted (ferritin level d 10 çg/ ml) different symptoms are manifested. Such as, increased infections, poor muscle coordination, shortness of breath, fatigue, sensitivity to cold, and decreased mental function[8]. Even moderate anemia makes women less able to work[9].

In this background, present study is designed to evaluate the prevalence of anemia among the psychologically healthy women in an Indian town and

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its neighboring areas and efforts are made to correlate the results to several attributing factors. The present study is absolutely important since it could be a representative of the studies involving analogous global populations with similar type of socio-demographic and economic profile. It is also important to recognize the multi-factorial etiology of anemia for developing its effective control programme.

Methods:

Study place and the participants

Midnapore (22.25°N 87.65°E) is a district town situated at eastern part of India. It is 23 meters above the sea-level and 127 km away from Calcutta metropolitan. In the 2011 census, Midnapore municipality had a population of 169,127, out of which 85,362 were males. The 0–6 year's population was 14,365. Effective literacy rate for the 7+ population was 90.01%[10]. The northwest part of the down town is locally named as 'Jungle-mahal' covered with a large belt of green forests and some natural wetland.

International and Government laid ethical norms were maintained throughout the investigation. The institutional review board approval was obtained for the study protocol and that informed consent was obtained from study participants. The investigation was carried out in psychologically healthy, non-pregnant, non-lactating women (total 241 of 15-49 years age) from low socioeconomic status as assessed by revised Kuppuswami's socioeconomic status scale[11]. The study period was June 2010 to May 2011.

Psychological assessment

Consultant Neuro-psychiatrist, Midnapore Medical College and Hospital assessed all participants with Mental Status Examination (MSE)[12,13]. Only competent, consistent and psychiatrically healthy women were included and patients of diabetic, chronic cardiac, nephritic or infectious diseases were excluded from the present investigation.

Procedure

The study was designed as community based cross-sectional type. The standard investigation was based on interviews on a pre-tested, semi-structured questionnaire on demographic information, anthropometric data, personal hygiene and psychiatric MSE.

Anthropometric measurements

Anthropometric measurements were made by trained investigators[14]. Height was measured using Martin's anthrop meter. Body weight was recorded digitally and with weighing scale (Doctor Beliram and Sons, New Delhi, India). Errors of measurements were computed within acceptable limits[15].

The Body Mass Index (BMI) of participants were computed using the following standard equations; BMI (kg/m^2) = Weight (kg) / height (m^2). Nutritional status was evaluated using internationally accepted BMI guidelines[16]. The following cut-off points were utilized; Grade III Thinness: BMI < 16.0, Grade II Thinness: BMI = 16.0 – 16.9, Grade I Thinness: BMI <17.0 – 18.4, Normal: BMI = 18.5 – 24.9, Overweight: BMI e" 25.0. For the age of <18 years, thinness and overweight were estimated by investigators[17,18].

Age specific international BMI cutoff points for the assessment of nutritional status among girls (15 – 17 years) are as follows:

The recommendations of WHO, 1995 of the public health problem of low BMI was followed here. These are, low (5-9%): warning sign, monitoring required; medium (10-19%): poor situation; high (20-39%): serious situation; very high (e" 40%): critical situation.

Biochemical analyses

Trained investigators collected 2 ml of venous blood from the participants. An aliquot of the blood was placed immediately in a tube containing Drabkin's solution for haemoglobin (Hb) estimation following cyanmethaemoglobin method[19]. The participants were classified as mild, moderate or severely anemic based upon their Hb level (Hb <70 g/l – severe anemia, 70 – 99.99 g/l – moderate anemia and 100 – 119.99 g/l – correspond to mild anemia)[20].

The UNICEF/UNU/WHO (2001) resolutions on the public health problem related to anemia were followed here. This classification categorizes the prevalence of anemia as follows[21].

<5%: no public health problem; 5–19.9%: mild public health problem; 20–39.9%: moderate public health problem; >40%: 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). Descriptive statistics were used for all the variables studied. ANOVA test was done to test for age differences in weight, height, BMI and haemoglobin %. The p value d"0.05 was considered statistically significant.

Results:

In the present study, the correlation/ association of low socioeconomic conditions and under-nutrition status with anemia of women from rural areas has been tested. In this relation, the impact of socio-demographic parameters on these correlations has also been evaluated. This study is important to recognize the

etiological factors of anemia for developing its effective control program globally. The socioeconomic status and demographic profile of the participants suggests that they are marginalized in terms of healthy food, proper education, health awareness and benefits.

Age specific results on ANOVA of BMI and haemoglobin content of the participants are presented in Table 1. Mean and standard deviation of BMI and haemoglobin total of studied population are 19.95 ± 4.11 kg /m^2 and 10.94 ± 1.69 g /dl respectively. The mean BMI was highest (22.44 kg/m^2) at age group of e"40 years and lowest (17.92 kg/m^2) at age group of <18 years. There was a significant (F = 4.147, df = 3, P<0.01) positive age trend in mean BMI.

The overall age combined prevalence (Table 2) of thinness is 39.42 %. Out of these, 8.30%, 5.81% and 25.31% belonged to Thinness Grade III, Thinness Grade II and Thinness Grade I categories, respectively. And 9.96% of total participants belonged to the overweight category.

The prevalence of anemia among the women of all ages is 69.7% (Table 3). Out of these participants, 3.73%, 13.69% and 52.28% belong to severe, moderate or mild anemia respectively. Age wise distribution of severity of anemia has been elaborately presented in the table which demonstrate that participants of all age groups are more or less affected with moderate to mild anemia According to different gradation of BMI, the prevalence of anemia shows that it is highest in the severely undernourished group (Table 3). The normal BMI group, which is 68.03%, has the prevalence of anemia higher than the overweight group (66.67%) but lowers than under-nutrition group (72.63%).

Table 1. Means and Standard deviations of biological variables of the participants.

Age (years)	N	Weight (Kg)	Height (cm)	BMI (Kg/m2)	Haemoglobin (g/dl)
<18	25	40.66±4.52	150.60±5.99	17.92±1.69	11.60±1.02
18-25	68	43.32±6.90	149.72±7.84	19.54±4.72	10.90±1.99
26-32	60	45.98±8.15	151.15±5.88	20.09±3.25	10.95±1.55
33-40	64	44.16±9.88	147.92±5.89	20.11±4.02	10.71±1.61
>40	24	47.88±9.64	146.71±10.32	22.44±5.02	11.00±1.84
Age combined	241	44.38±8.36	149.39±7.13	19.95±4.11	10.94±1.69
F Test		3.236a	2.735 a	4.147 b	1.273
Significant age difference a P<0.05, b P<0.01					

Table 2. Age wise prevalence of under-nutrition among the studied population

Age (years)	N	Thinness			Under-nutrition	Normal	Overweight
		Gr. III	Gr. II	Gr. I			
<18	25	2 (8.00)	2 (8.00)	9 (36.00)	13 (52.00)	12 (48.00)	0 (0.00)
18-25	68	7 (10.29)	5 (7.35)	18 (26.47)	30 (44.12)	33 (48.53)	5 (7.35)
26-32	60	4 (6.67)	1 (1.67)	18 (30.00)	23 (38.33)	30 (50.00)	7 (11.67)
33-40	64	6 (9.38)	5 (7.81)	13 (20.31)	24 (37.50)	33 (51.56)	7 (10.94)
>40	24	1 (4.17)	1 (4.17)	3 (12.50)	5 (20.83)	14 (58.33)	5 (20.83)
Age combined	241	20 (8.30)	14 (5.81)	61 (25.31)	95 (39.42)	122 (50.62)	24 (9.96)
$\chi 2$=14.221 df=16 P= 0.582, Data are represented as number (%)							

Table 3. Prevalence of anemia according to Age and BMI according to the studied population

Age (years)	N	Severe anemia (<7.0g/dl)	Moderate anemia (7.0-9.9g/dl)	Mild anemia (10.0-11.9g/dl)	Any anemia (<12.0 g/dl)	Normal (?12.0 g/dl)
<18	25	0 (0.00)	1 (4.00)	16 (64.00)	17 (68.00)	8 (32.00)
18-25	68	4 (5.88)	11 (16.18)	27 (39.71)	42 (61.76)	26 (38.24)
26-32	60	1 (1.67)	10 (16.67)	31 (51.67)	42 (70.00)	18 (30.00)
33-40	64	3 (4.69)	8 (12.50)	38 (59.38)	49 (76.56)	15 (23.44)
>40	24	1 (4.17)	3 (12.50)	14 (58.33)	18 (75.00)	6 (25.00)
Age combined	241	9 (3.73)	33 (13.69)	126 (52.28)	168 (69.71)	73 (30.29)
$\chi 2$=11.288 df=12 P=0.504, Data are represented as number (%)						
BMI	**N**	**Severe anemia (<7.0g/dl)**	**Moderate anemia (7.0-9.9g/dl)**	**Mild anemia (10.0-11.9g/dl)**	**Any anemia (<12.0 g/dl)**	**Normal (?12.0 g/dl)**
Gr. III Thinness	20	1 (5.00)	5 (25.00)	13 (65.00)	19 (95.00)	1 (5.00)
Gr. II Thinness	14	1 (7.14)	2 (14.29)	5 (35.71)	8 (57.14)	6 (42.86)
Gr. I Thinness	61	1 (1.64)	9 (14.75)	32 (52.46)	42 (68.85)	19 (31.15)
Undernutrition	95	3 (3.16)	16 (16.84)	50 (52.63)	69 (72.63)	26 (27.37)
Normal	122	6 (4.92)	14 (11.48)	63 (51.64)	83 (68.03)	39 (31.97)
Overweight	24	0 (0)	3 (12.50)	13 (54.17)	16 (66.67)	8 (33.33)
$\chi 2$=11.511 df=12 P= 0.486, Data are represented as number (%)						

Discussion:

WHO regional estimates generated for pregnant and non-pregnant women indicate that the highest proportion of individuals affected are present in Africa (47.5–67.6%), while the greatest number of affected are residing in South-East Asia (315 million). The prevalence of anemia in pre-school children shows that a major part of Africa, India and northern part of South America are affected with severe anemia where as North-East and some part of Western Asia are affected with moderate Anemia. But in all cases of pre-school children and woman, the Indian subcontinent and major part of Africa are severely affected (Worldwide prevalence of anemia, WHO 1993–2005).

The present study was undertaken to assess the prevalence of anemia among the psychologically healthy women belong to low socioeconomic groups from Midnapore town and neighboring part of 'Jangalmahal' area, in eastern India. A few studies have been conducted on health aspects in this area. Similar to a major population of African and south-East Asian subcontinent, the living standard of the present participants is economically marginalized. In the study period, they had inadequate sanitation, nutritious diet and health awareness. They experience different types of urinary tract infections over the years. A large number of respondents suffer from dysmenorrhoea, premenstrual syndrome along with heavy menstrual bleeding which is one of the most important risk factor for anemia at the reproductive age group[22,23]. In addition, repeated pregnancies which are common to this society lead to progressive depletion of iron and result a sustained anemic state. One of the earlier studies also showed that female experience lower nutritional state and impaired immune status than male. They are sensitive to different infectious diseases like tuberculosis[24] and carcinogenic tissue damage due to heavy metal toxicity[25] and parasitic diseases etc.

Government has started many intervention programmes to eradicate the problem of anemia which are based on supplementation. But more importantly, health awareness is the prime requirement to eradicate anemia[24]. In addition, proper planning of urbanization may restrict the generation of slum areas. Reports reveal that urban poor are at greater risk of anemia, reproductive tract infection, gynecological morbidity and sexually transmitted diseases than rural poor[26,27]. Women have a substantially higher need for iron during pregnancy, because of the increase in red cell volume of the maternal, placental and fetal growth[28]. According to the UNICEF/UNU/WHO classification, the prevalence of anemia in present participants is in critical situation in all age groups.

Present results (Table 2 and 3) suggest that lower age group is vulnerable to under-nutrition and at the onset of reproductive abilities they are more sensitive to anemia. An unhealthy mother delivers an unhealthier child and these female children face a severe malnourished state when they become a mother. So, on the course of this vicious cycle, low socioeconomic community gradually become severe malnourished. The urgent need is the planned urbanization with scientific sanitation and nutritional/ health awareness. Though not significant, a consistent decrease in haemoglobin level was noticed in higher age groups. Similar type of age wise decrease in Hb level and the number of immune competent cells were also noticed in female TB diagnosed[29]. In low socioeconomic group the burden of repeated maternity with less substantial diet and unhygienic sanitation impairs health status of most of the women. Inequity in distribution of healthy-diet and health benefits in some rural society makes the situation more miserable.

The number of participants in mild anemia and under-nutrition group (Table 2) is predominant in all ages probably due to unhygienic and unhealthy birth arrangements and post birth maternal care. It may suggest that unplanned urbanization with increased pollution-associated slum-hazards is more detrimental than natural adversity associated rudimentary character of a rural area. In the present investigation, Hb level is partially restored at >40 years age group due to a possible cessation of reproductive mechanism. The present study is important since it may reflect the prevalence of anemia/ nutritional status of similar population from several developing and developed countries.

Conclusion:

Approximately 2 of every 3 women at the study area are diagnosed to be anemic during the study period June 2010 to May 2011. This necessitates for implementing a ubiquitous public health programme for early diagnosis and prevention of anemia. It is also important to recognize the different factorial association to and periodic screening of anemia for developing its effective control programme.[29] Some actions has been taken in the present studied area at government and local administration level by supplying fortified food grain

via easy accessible rationing systems to upgrade the nutritional/ health status of the local community and to restore the equity in the distribution of benefits and government aids. A massive program on health awareness and conducting health camp regularly to evaluate the residents health status may terminate the under nutrition condition in the long run. The understanding of how several factors attributing to anemia, vary by geography, socio-demographic and economic profiles will make it easier to design global interventions that are more integrative and effective.

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