

A Study of Spectrum of Anemia in Rural Population of Maharashtra

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Abstract

Prevalence of anemia in India is among the highest in the world. Prevalence is higher among pregnant women and preschool children. More than half of women of reproductive age group in India are anemic. While anemia disproportionately affects underprivileged groups, it is not known how the patterns of disparities in anemia have changed over time. The present study was an open study comprising of 500 anemic patients selected randomly, to screen for various patterns and severity of anemia and study clinical profile of anemia. The study revealed that anemia is more prevalent in certain high risk groups such as age group <35 years, female sex, rural population, those in below poverty line group, vegetarians, and those with low BMI. As it is impractical to screen an entire population nationwide we can aim to screen these risk groups which will be more cost effective.

Keywords: Anemia; Pregnant; Reproductive Age; Below Poverty Line; Vegetarians.

Introduction

Globally, anemia affects 1.62 billion people, which corresponds to 24.8% of the population [1]. South Asia suffers from some of the highest rates of anemia worldwide [2], and in India, more than half the

population is anemic and around one-third of women of reproductive age are underweight [3]. In this region, burdened by high maternal mortality [4], around 20-40% of maternal deaths are attributable to anemia [5]. Given the importance of addressing the nutritional and health needs of women of reproductive age, understanding the trends and patterns of anemia within this population is imperative. Estimates of anemia prevalence by themselves are only useful if they are associated with a picture of the various causal factors that contribute to the development of anemia in specific settings.

Aims & Objectives

This study was conducted to screen for various patterns and severity of anemia and study clinical profile of anemia.

Settings & Design

The study was conducted in 2015 in a tertiary care hospital affiliated to a medical college in Maharashtra, catering largely to the rural population.

Materials & Methods

The present study was an open study comprising of 500 anemic patients selected randomly, according to following inclusion and exclusion criteria, from those attending outpatient or admitted in Department of General Medicine.

Population Type	Hemoglobin in gm/dl		
	Mild	Moderate	Severe
Non Pregnant Women	11-11.9	8-10.9	<8
Pregnant Women	10-10.9	7-9.9	<7
Men	11-12.9	8-10.9	<8

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Inclusion Criteria

- ☞ Presence and severity of anemia as defined by WHO [6]:

Exclusion Criteria

- ☞ Presence of anemia due to acute blood loss.

A detailed history was recorded with particular emphasis on symptoms, dietary habits, addiction/s, residence and income. A thorough physical examination of every patient was carried out.

All the patients were subjected to following investigations.

Haemoglobin

Sahli's method was used to assess the level of hemoglobin in blood. This was used to grade the

severity of anemia.

Complete Blood Count (CBC)

The CBC consists of hemoglobin concentration, hematocrit (packed cell volume), mean corpuscular hemoglobin (MCH), mean corpuscular volume (MCV), total erythrocyte count, total and differential leukocyte count and platelets count. CBC was performed using automated analyzer.

Peripheral Smear Examination

It was done by preparing a thin and even film stained with Leishman's stain and was evaluated for red cell morphology, white cell morphology and platelet count. A special note was made regarding the percentage of 5 or more lobed neutrophils, and any other abnormal cells.

Observations**Table 1:** Distribution of cases according to severity of anemia

S. No.	Severity of anemia (Hb in gm/dl)	No. of cases	Percentage
1.	Mild	97	19.4
2.	Moderate	238	47.6
3.	Severe	165	33
	Total	500	100.0

Table 2: Distribution of cases according to type of anemia

S.No.	Type of Anemia	Mean MCV (fl.)	Mean MCH (pg.)	No. of Patients
1	Microcytic hypochromic	73.1	24.5	200(40%)
2	Macrocytic	104.9	29.0	130(26%)
3	Normocytic normochromic	85.64	29.3	115(23%)
4	Dimorphic	100.5	24.6	55(11%)

Table 3: Demographic profile

Variable	Severity of anemia			Total	Type of anemia			
	Mild (%)	Moderate (%)	Severe (%)		MH	MA	NN	DA
AGE (years) p<0.01								
18-34	45 (19.1)	101 (43)	89 (37.9)	235(47)	125	70	15	25
35-54	29 (19.3)	65 (43.3)	56 (37.4)	150 (30)	50	40	40	20
≥55	23 (20)	72 (62.6)	20 (17.4)	115 (23)	25	20	60	10
SEX								
P<0.05								
MALE	55 (24.6)	96 (43.1)	72 (32.3)	223 (44.6)	80	58	65	20
FEMALE	42 (15.2)	142 (51.3)	93 (33.5)	277 (55.4)	120	72	50	35
Socioeconomic status[7]								
p>0.05								
APL	19	68	43	130	40	33	37	20
BPL	78	170	122	370	160	97	78	35

Table 4: Distribution of cases according to residence and body mass index

Variable Residence P<0.05	Severity of anemia			Total
	Mild	Moderate	Severe	
RURAL	80(21.2)	166(43.9)	132(34.9)	378
URBAN	17(13.9)	72(59)	33(27.1)	122
Body mass index [8] p<0.05				
<18.5	45(15.8)	138(48.6)	101(35.6)	284
18.5-24.9	36(20)	85(47.2)	59(32.8)	180
≥25	16(44.4)	15(41.7)	05(13.9)	36

Table 5: Distribution of cases according to presenting symptoms and signs

S. No.	Symptoms	No. of Patients (%)	Clinical signs	No. of patients (%)
1.	Weakness & fatigue	500(100%)	Pallor	500(100)
2.	Decreased work performance	400(80%)	Splenomegaly	118(23.6)
3.	Breathlessness	117(23.4%)	Hepatomegaly	105(21)
4.	Swelling over body	88(17.6%)	Pedal Edema	88(17.6)
5.	Anorexia	71(14.2%)	Hemic Murmur	75(15)
6.	Palpitation	50(10%)	Koilonychia	45(9)
7.	Pica	15(3%)	Glossitis	40(8)
8.	-	-	Stomatitis	32(6.4)
9.	-	-	Icterus	30(6)
10.	-	-	Lymphadenopathy	8(1.6)

Table 6: Distribution of cases according to dietary habit and addiction

Dietary habit p<0.01	Type of anemia				Total
	Microcytic hypochromic	Macrocytic	Normocytic normochromic	Dimorphic	
Vegetarian	135	95	55	40	325
Mixed	65	35	60	15	175
ADDICTION p<0.01					
Tobacco only	40(38.1)	25(23.8)	35(33.3)	05(4.7)	105
Alcohol only	05(14.3)	20(57.1)	05(14.3)	05(14.3)	35
Both T & A	10(25)	15(37.5)	15(37.5)	0(0)	40

Discussion

In present study, moderate anemia was most common among all the age groups. 47.6% of study subjects were moderately anemic whereas 33% had severe anemia and only 19.4% had mild anemia [Table 1]. These findings were in accordance with the study of Bansal et al [7] who reported that highest number (45.2%) of the cases were moderately anemic, whereas 40.5% had mild anemia and only 14.3% had severe anemia. This difference in the number of patients with severe anemia may be due to lack of health awareness, lack of access to health care facilities, and many superstitious beliefs in our study population which prevent them to be diagnosed at early stages of anemia.

Out of 500 patients in the present study, peripheral smear examination revealed microcytic hypochromic picture in 200 patients (40%), macrocytic in 130 (26%),

normocytic normochromic in 115 (23%), and dimorphic in 55 patients (11%) [Table 2]. These findings correlate with that of Joshi et al [8] in which out of 740 anemic patients 407(55.5%) were microcytic hypochromic, 208 (28.1%) were normocytic normochromic, and 125 (16.8%) were macrocytic anemia.

Such morphological typing of Anemia allows an estimate of the prevalent etiology in the absence of confirmatory tests in screening studies. The etiology can be derived from those parameters which need further confirmation by more specific tests like Iron studies, Vitamin B 12/ Folate levels or Electrophoresis e.g.; to detect Iron deficiency anemia, Thalassemia syndromes, Anemia of chronic disorders, megaloblastic anemia etc.

MCV, which is the average volume of the red blood cell, is a useful parameter that is used in classification

of anemia and may provide insights into pathophysiology of red cell disorders [9,10,11]. Joosten et al [12] reported that mean MCV < 80 fl and mean MCH < 26 pg is most sensitive indicator of iron deficiency anemia. In the present study, the mean MCV in microcytic anemia was 73.1 fl and mean MCH was 24.5 pg. According to study done by Guyatt et al [13], out of 43 patients with iron deficiency anemia, 36 (83.72%) patients had mean MCV less than normal and 7 (16.21%) patients had MCV greater than normal, while 40 (93.02%) patients had mean MCH less than normal and 3 (6.97%) had normal. In macrocytic anemia, mean MCV was 104.9 fl and mean MCH was 29.0 pg. According to Craig [14], in a group of 58 elderly patients with megaloblastic anemia the mean MCV and MCH were 112.6 fl and 26.5 pg. Out of 500 cases highest number were below 35 years (47%), whereas 30% were in the age group of 35-55 years and only 23% were in >55 years age group. These findings correlate with study of Joshi et al [8] in which maximum cases - 474 out of 740 (64.19%) were found to be in age group of 20-40 years. These are productive years of life. Menstruation and child-bearing probably account for most of the anemia discovered in females of 15 to 35 years age group. Thus by early screening and proper diagnosis one can intervene early and can prevent further anemia related serious complications.

Microcytic hypochromic was the predominant type of anemia in age groups 15-34 yrs and 35-54 yrs. On the other hand the most common type of anemia in >55 years age group was normocytic normochromic (52.17%) followed by microcytic hypochromic in 21.8%, macrocytic in 17.4% and dimorphic in only 8.69% respectively [Table 3]. These findings correlate well with study done by Bhasin and Rao [15] which reported most common anemia in elderly as normocytic normochromic (62%) followed by microcytic hypochromic (30%).

The present study reported female preponderance with 55.4% of total cases being females and 44.6% males [Table 3]. These findings correlate well with the study of Joshi et al [8] which reported 57.5% (426/740) females and 42.5% (314/740) males among total 740 anemic patients. In present study severe anemia was also found to be more prevalent in females.

Most of the (75.6%) patients in the study group were from rural areas, while only 24.4% were from urban areas [Table 4]. These findings correlate with the study by Kaur & Kocher [16] in which majority (91.3%) patients were from rural area. Bansal et al [7] also found in their study that the prevalence of anemia was much more in rural areas as compared to urban areas. In the present study, severe anemia was also

found to be more prevalent in the rural population. Poor nutrition, lack of health awareness and access to health care facilities in rural areas may be responsible for more number of patients with anemia in rural population.

Majority (74%) of cases in present study belonged to below poverty line group (low socio-economic level) [Table 3]. Verma et al [17] also reported that among 1159 cases, incidence of anemia was highest in low socio-economic group (88.9%). Bansal et al [7] also found that the prevalence of anemia was more in individuals belonging to low socio-economic status group. Nutritional inadequacy due to improper diet can be a major cause of anemia in low socioeconomic group.

All the degrees of anemia were more common in below poverty line (BPL) group, though it was statistically insignificant. In severe anemia too, more number of patients belonged to BPL group 76/97 (78.3%). This is in conformity with the findings of George Kaplan et al [18] who stated that anemia was among the diseases which were more severe in people with low socio-economic level. The percentage of persons below the Poverty Line in 2011-12 has been estimated as 25.7% in rural areas, 13.7% in urban areas and 21.9% for the country as a whole [19].

Weakness and easy fatigability were the chief presenting symptoms encountered in all patients (100%) in the study group. Next most common symptom was decreased work performance in 80%. Symptoms pertaining to cardiovascular system, like breathlessness on exertion, were present in 23.4%; swelling over dependent parts in 17.6% patients; palpitation in 10%. Pica (3%) was the least common presenting symptom [Table 5]. These findings correlate well with study of Bhasin and Rao [15] who found fatigue to be the most common symptom, found in 74% of patients; palpitations and anorexia were the next most common symptoms which were present in 13% patients, breathlessness on exertion was present in 11%.

Among clinical signs, pallor was most frequent sign present in all patients, followed by splenomegaly in 23.6%, hepatomegaly in 21%, edema in 17.6%, hemic murmur in 15% patients, koilonychia in 9% patients, glossitis in 8% [Table 5]. The least frequent sign was lymphadenopathy present only in 8 (1.6%) cases. These findings correlate well with study of Mehta and Patel [20] who found pallor in 100%, hepatomegaly in 37.3%, splenomegaly in 24%, hemic murmur in 21% glossitis in 9% patients and koilonychia in 5% patients in their study as important clinical findings.

The results revealed that 284/500 (56.8%) patients

had low BMI (<18.5), 180(36%) had normal BMI (18.5-25) and only 36(7.2%) had high BMI (>25) [Table 4]. These findings are in accordance with study of Maitiet al [21] wherein 68.2% of the cases had low BMI, 29.4% had normal BMI and only 2.32% had high BMI values. Severe anemia was more common in cases with low level of BMI. These findings are suggestive of nutritional deficiency (dietary factors) as the major cause of anemia. A WHO expert consultation addressed the debate about interpretation of recommended body-mass index (BMI) cut-off points for determining overweight and obesity in Asian populations, and considered whether population-specific cut-off points for BMI are necessary [22].

In present study, majority (65%) of the patients were vegetarian whereas only 35% had mixed dietary habits [Table 6]. These findings are similar to the findings of Rawat et al [23] who reported in their study that majority (80.76%) of the subjects were vegetarians. Morley [24] has also reported that elderly vegetarians are more susceptible to anemia.

Among different types of anemia, macrocytic and dimorphic anemias were more common in those with vegetarian diet which was statistically highly significant. Bhasin and Rao [15] in their study reported that all the patients of macrocytic anemia were vegetarians, in normocytic normochromic anemia 32/62 patients were vegetarians and 13/30 patients with microcytic hypochromic anemia were vegetarians.

Among 105 patients addicted to only tobacco, 40 (38.1%) had microcytic anemia and out of 35 patients addicted to only alcohol, 20 (57.1%) had macrocytic anemia. Among those addicted to both, macrocytic and normocytic normochromic picture was equally observed [Table 6]. According to a study by Sainzet al [25], 26.87% patients with tobacco addiction had peptic ulcer. Savage et al [26], observed that out of 121 anemic patients with alcoholic addiction, 33.9% patients had macrocytic anemia. These findings state that any type of addiction can be an etiological factor in anemia and substantiate the need for further follow up studies to confirm that whether de-addiction can be a part in the management of anemia.

Recommendation

The present study revealed that anemia is more prevalent in certain high risk groups such as age group <35 years, female sex, rural population, those in below poverty line group, vegetarians, and those with low BMI. As it is impractical to screen an entire population nationwide we can aim to screen these risk groups which will be more cost effective.

Based on Clinical history, Physical examination, Peripheral blood smear examination and by other hematological parameters like MCV and MCH, anemia can be classified morphologically which can give an insight into etiology. Later, in specific cases, confirmation can be done by specific tests.

The present study also revealed that non-specific symptoms like weakness, easy fatigability and decreased work performance were amongst the chief symptoms of anemia and people should not ignore them and should seek early medical attention so that anemia can be diagnosed at early stage and treated accordingly.

Such screening studies are important in order to assess the prevalence in various areas of the country so that preventive and curative measures can be taken to control anemia in the society. More studies of this type should be done in a national scale in order to get even more meaningful data.

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