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Original Research Article

A study of anemia profile in a research hospital in Telangana, South India

Syeda Hajra Fatima[1]*, Tasleem Ahmad[2], Sree Latha[1], Ghazala Javed[3], Ahmed Minhajuddin[4]

[1]Department of Pathology, [2]Department of Biochemistry, [4]National Research Institute of Unani Medicine for Skin Disorders, Hyderabad, Telangana, India
[3]Central Council for Research in Unani Medicine, New Delhi, India

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***Correspondence:**
Dr. Syeda Hajra Fatima,
E-mail: dr.syeda.hajra04@gmail.com

ABSTRACT

Background: Anemia is widespread public health problem with 1.62 billion people affected globally. In India, Anemia is considered a major health problem. Children, women of child bearing age and pregnant women are more prone to develop anemia. Anemia affects the physical and mental growth of children, associated with increase maternal and fetal mortality, leads to reduced work productivity in adults. The present study was undertaken to determine prevalence and severity of anemia among patients who attended the outpatient clinics of a Unani research hospital in Telangana.
Methods: This hospital based retrospective observational study was conducted from January 2020 to December 2020 to investigate the prevalence, type, and determinants of anemia. The complete haemogram values of all the patients who underwent haemogram investigation were noted, information was compiled, tabulated, and analysed. Descriptive statistics were computed with percentages, mean, standard deviation, and student's t-test was used find the significance of study parameters.
Results: Prevalence of anemia was 26.2% (872/3326), high prevalence of anemia was observed in females (44.04%) compared to males (5.72%) ($p<0.0001$). The prevalence was more in reproductive age group (58.6%). Moderate anemia (58.6%) was more prevalent followed by mild anemia (36.6%). Microcytic hypochromic blood picture predominates with the incidence of 53.6% followed by normocytic blood picture 42.2%.
Conclusions: Results confirmed high prevalence of anemia in females and moderate anemia being more prevalent followed by mild anemia and majority of anemia cases were microcytic, suggesting iron deficiency as the main cause of anemia.

Keywords: Hemoglobin, Anemia, Microcytic, Hypochromic

INTRODUCTION

Anemia is defined by WHO as a condition in which the Haemoglobin content of blood is lower than normal as a result of deficiency of one or more essential nutrients, regardless of the cause of such deficiencies. Anemia is established if the haemoglobin is below the cut-off points recommended by WHO.[1] Anemia is a widespread public health problem associated with an increased risk of morbidity and mortality. According to the world health organization (WHO), globally around 1.62 billion people are affected with anemia, which is around 24.8% of the world population .[2] Anemia is still considered a major health problem in India. In the 2005- 2006 national family health survey (NFHS-3), revealed a high prevalence of anemia among in children (78.9%) aged 6-59 months, 55% in females aged 15-49 years, and 24% in males aged 15-49 years.[3]The most common cause of

anemia globally is thought to be Iron deficiency, but other nutritional deficiencies (folate, vitamin A and vitamin B12), acute and chronic nonspecific inflammation, parasitic infections, and inherited or acquired disorders that affect haemoglobin synthesis, red blood cell production or red blood cell survival, can all cause anemia.[4]

Anemia has serious long-term consequences as the disease progress. It will not only affect the growth of children and adolescence but also affects their attentiveness, memory and school performance.[5] It also causes delay in onset of menarche, affects immune system leading to frequent infections.[6] Anemia during pregnancy is associated with maternal mortality, preterm labour, low birth-weight, and infant mortality.[7] Anemia leads to reduced work productivity in adults which can have further social and economic impacts for the individual and family. Anemia can be classified from three points of view: pathogenesis, red cell morphology, and clinical presentation. In practice, classification based on basic parameters of red cell morphology such as mean corpuscular volume (MCV), allows for a quicker diagnostic approach.[8] Mean corpuscular volume (MCV) measures the average size and volume of a red blood cell expressed in femtoliters (fl), while mean corpuscular hemoglobin (MCH) measures the mean hemoglobin per erythrocyte expressed in pictograms (pg).[9] Mean corpuscular hemoglobin concentration (MCHC) measures the concentration of hemoglobin in a given volume of packed red blood cell expressed in g/dl.[9]

Anemia is classified based on its morphology into Microcytic Hypochromic, Normocytic normochromic and macrocytic depending on MCV and MCH.[9,10] Microcytic anemia is a type of anemia where the average erythrocyte is smaller than normal (MCV, 80 fl), Commonly seen in chronic iron-deficient anemia, anemia of chronic disease, sideroblasticanemia, and thalassemias but can also occur in other conditions. Macrocytic anemia is a type of anemia where the average red blood cell volume is larger than normal (MCV >100 fl) seen in folate deficiency, vitamin B12 deficiency, hepatic insufficiency, chronic alcoholism among other causes. Normocytic anemia is anemia with a low hemoglobin but MCV in the normal range of 80 to 100 fl, causes include nutritional deficiency, renal failure and haemolytic-anemia.[8,10] The present study was conceived and designed with the objective to determine prevalence and severity of anemia stratified by age and gender among patients who attended the outpatient clinics of a Unani hospital in Telangana, India.

METHODS

This was a hospital based retrospective observational study conducted in the department of pathology at National research institute of Unani medicine for skin disorders, Hyderabad, Telangana for duration of one years from January 2020 to December 2020, to investigate the prevalence, type, and determinants of anemia among patients coming to hospital. The complete haemogram values for the all the patients who underwent haemogram investigation were noted and all the patients with haemoglobin percentage less than the normal level defined by WHO criteria according to the age and sex were included in the study.[4] Exclusion criteria- all the patients whose haemoglobin percentage is within the normal range as per the WHO criteria were excluded from the study.[4] Further based on the haemoglobin percentage, they were classified into mild moderate and severe anemia as per WHO criteria (Table 1).[4] A total of 3326 samples that underwent haemogram investigation during the study period were included in the study. The study was conducted after getting the clearance from the institutional ethical committee.

Table 1: Classification of anemia as per WHO criteria.

Age	Mild anemia	Moderate anemia	Severe anemia
Children: 6-59 months	10-10.9	7-9.9	<7
Children: 5-11 years	11-11.4	8-10.9	<8
Children: 12-14 years	11-11.9	8-10.9	<8
Female: 15 years and above	11-11.9	8-10.9	<8
Male: 15 years and above	11-12.9	8-10.9	<8

Statistical analysis

Data obtained were compiled, tabulated, and analysed. Descriptive statistics were computed with percentages, mean, standard deviation, and student's t-test was applied to test the association of age with occurrence of anemia, $p<0.05$ was considered statistically significant.

RESULTS

Out of 3326 samples, 872 (26.2%) patients were diagnosed with anemia (Table 2). Among 872 patients, 788 (90.3%) were female patients and 84 (9.6%) were male patients (Table 3). Anemia is most commonly observed in 30 -40 years age group (37.5%) followed by 21.1% in 21-30 age group (Table 4). Most common being moderate anemia constituting 58.6% followed by mild anemia (36.6%) (Table 5). Peripheral smear examination showed, out of 872 patients, microcytic hypochromic blood picture was predominant constituting (53.6%) followed by normocytic normochromic blood picture constituting (42.2%) and macrocytic smear being 2.3%. 1.8% cases were dimorphic anemia (Table 6). Haematological indices revealed the Mean RBC count for

males was4.37 million cells/mcl and in females it was 4.38 million cells/mcl. Mean haematocrit value in males was 32.43% and in females 31.24%. Mean MCV value in anemic patients in our study is 71.51fl and mean MCH value is 23.67 Pg while Mean MCHC value was observed to be 32.94 g/dl (Table 7).

Table 2: Prevalence of anemia

Total samples	Patient with anemia	%
3326	872	26.2

Table 3: Gender wise distribution of anemic patients.

Gender	Anemia	Non anemia	%	P value
Female	788	1789	44.04	<0.0001
Male	84	1537	5.72	

DISCUSSION

Anemia is a global health problem with major impact on health and wellbeing. Worldwide around 1.62 billion people are affected with anemia, which is around 24.8% of the world population. Despite recent economic growth and awareness among people, the prevalence of anemia among various age groups still persist in India and is the important contributor to extreme health conditions such as fatigue, malaise, neurological dysfunction, poor focus and attention.

Many studies have reported previously the possible causes of anemia in the Indian population, such as poor intake of iron and other essential nutrients, reduced intake of vitamin C, repeated child bearing, lactation, and inadequate access to nutritional supplements after menarche and during pregnancy.

In this observational study using routine clinical data from a large number of patients attending the outpatient clinics of a Unani research hospital in India, anemia was present in 26.2% of blood sample. The high proportion of anemia was observed in females (44.04%) compared to Males (5.72%) and the difference was statistically significant (p<0.0001).

This finding was consistent with prior studies done by Kandasamy et al, Sanjay et al and Vitull et al.[11-13] These findings coincides with NFHS-4 data of Telangana state where 56.6% of women age 15-49 were anemic while only 15.3% males aged 15-49 were reported to be anemic, indicating more prevalence of anemia among females compared to males.[14]

The present study revealed that the prevalence of anemia is more in reproductive age group (20-40 years) which accounts for 58.6% of total anemic patients. This finding is similar to studies done Raghuram et al where prevalence of anemia was more among women aged 26-40 years (63.2%) and Thankachan et al where prevalence rate of anemia in reproductive age group women was observed to 39%. Kandasamy et al study also demonstrated the higher prevalence of anemia in age group 18- 30 (40.4%) and 31-50 (42.4%).[11,15,16]

It was found in many studies that anemia is a common problem in reproductive age group women due to low income leading to low dietary intake of iron rich food, multiparity, lack of awareness, chronic blood loss or disease, mal-absorption, or a combination of all these factors. Our study depicted that out of 872 patients, 511 (58.6 %) patients had moderate anemia, while 320 (36.6%) of patients had mild anemia and only 41 (4.7 %) were having severe anemia.

Table 4: Grading of anemia based on age.

Age (years)	Mild anemia (11-11.9)	Moderate anemia (8-10.9)	Severe anemia (< 8)	Total	%
<10	12	13	2	27	3
11-20	43	50	3	96	11
21-30	62	113	9	184	21.1
31-40	117	195	15	327	37.5
41-50	51	91	10	152	17.4
51-60	28	33	0	61	6.9
>60	7	18	0	25	2.8

Table 5: Grading of anemia based on severity.

Anemia severity	N	%	Mean	Standard deviation	P value
Mild anemia (11-12 g/dl)	320	36.6	11.47	0.28	<0.0001
Moderate anemia (8 -10.9 g/dl)	511	58.6	9.80	0.79	<0.0001
Severe anemia (<8 g/dl)	41	4.7	7.38	0.60	<0.0001

These finding do not coincide with NFHS-4 data of Telangana state in which mild anemia was commonest (37%).[8,10,11,14] The reason for higher incidence of moderate anemia cases in our study could be either poor compliance of women in taking iron and folic acid tablets

supplied to them by the government or concurrent nutritional deficiency.

Table 6: Type of anemia based on peripheral smear examination.

Peripheral smear examination	Total subjects	%
Normocytic Normochromic	368	42.2
Microcytic Hypochromic	468	53.6
Macrocytic	20	2.3
Dimorphic smear	16	1.8

The findings of present study coincide with study done by Kandasamy et al where moderate anemia was 45.89% and mild anemia was 52.73%. Study done by Verma et al also showed 48.7% mild, 19.9% moderate and 1.5% severe Anemia cases in females, while 34.3% mild, 17.7% moderate and 1.2% severe anemia cases in males.[11,17]

In our study, microcytic hypochromic blood picture predominates with the incidence of 53.6% followed by normocytic blood picture 42.2% while macrocytic and dimorphic smear accounts to 2.3% and 1.8% respectively. As iron deficiency anemia (IDA) is depicted as microcytic hypochromic blood picture, finding in our study is comparable to the report of NFHS-4 showing prevalence of 44.8% as the most significant contributor to the onset of Anemia is iron deficiency. This is also in concordance with the study by Gerado et al which showed microcytic Anemia was more prevalent in children and women, the proportion of normocytic anemia increased progressively with age in male adults and women after menopause age.[18]

Table 7: Hematological indices in anemic patients.

Blood indices		Normal reference range, N	Low value, N	High value, N	Mean	Standard deviation
RBC count (million cells/mcl)	Male	42	40	2	4.37	0.78
	Female	717	54	17	4.38	0.54
HCT (%)	Male	21	63	0	32.43	6.35
	Female	151	637	0	31.24	3.97
MCV (fl)		188	669	15	71.51	11.37
MCH (pg)		149	723	0	23.67	3.50
MCHC (g/dl)		776	96	0	32.94	1.07

In present study, the Hematocrit value in anemic patients in our study was 31.24% in females and 32.43% in male which is lower compared to normal value. No statistical significant difference was observed in Hematocrit value in females compare to males. The mean MCV value in anemic patients in our study is 71.51 fl and Mean MCH Value is 23.67 Pg , these values are lower compared to normal reference values, suggesting microcytic hypochromic anemia probably due iron deficiency to be more common in the present study.[19,20]

In present study the vast majority of anemia cases were microcytic, suggesting that iron deficiency was the main cause of anemia. The present study re-emphasize that anemia still is an important public health burden especially in women, although the prevalence is less when compared to decade ago. The presence of anemia need to be evaluated in details as the aetiology is multifactorial and the underlying cause should be treated first. The screening programs to identifying the high risk population and Educational programs to sensitize high risk people about the balanced diet and dietary modifications are needed to lower the prevalence of anemia in population. However the present study is only a Hospital based study, we recommend a well-planned, prospective, large scale study on anemia should be done to estimate the prevalence as well as the cause of anemia at the community level across all age group among males and female which will help in devising a proper prevention and treatment plan for anemia.

CONCLUSION

The present retrospective observational study confirmed 26.2% prevalence of anemia among the patients attending the study hospital with high prevalence in females and moderate anemia being more prevalent and majority of anemia cases were microcytic, suggesting iron deficiency as the main cause of anemia.

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