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ORIGINAL RESEARCH

Evaluation of prevalence, clinical features and etiological factors of moderate to severe anemia in patients coming in GMCH, Jammu

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Abstract

Aim: To evaluate prevalence, clinical features and etiological factors of moderate to severe anemia in patients coming in GMCH, Jammu.

Material and methods: The present Prospective Clinical Hospital Based Study, was conducted in Post Graduate Department of General Medicine, Government Medical College and Associated Hospitals, Jammu (J&K), for a period of one year, w.e.f1st November 2020 to 31st October 2021. The study population included in the trial were the patients admitted with Hemoglobin< 10 Gm% having age >18 years of age. Respective investigations were done and data was collected.

Results: The most common symptom of Anemia was Weakness & fatigability (138/150, 92%), followed by Irritability (101/150, 67.33%). Most of the patient of anemia presented with Pallor (136/150, 90.67%), followed by Lymphadenopathy (51/150, 34%), Tachycardia (43/150, 28.67%).There were maximum subjects with Microcytic hypochromic anemia (n=103, 68.67%), followed by Macrocytic anemia (n=38, 25.33%), and least were with Normocytic normochromic anemia (n=9, 6%).Univariate analysis was done between severe anemia and factors which causes severe anemia and it was found that age of the subject (p =0.041), SES (p=0.043), Diet (veg/non veg) (p=0.04), Nutritional status (p=0.007), Serum Iron (p<0.01), Serum Vit B12 (p<0.01), and Serum folate (p<0.006) all were statistically significant. But only blood in stool was not a significant factor.

Conclusion: Factors like age of the subject, SES, Diet (veg/non veg), Nutritional status, Serum Iron level, Serum Vit B12 level, and Serum folate level all were statistically significant cause of severe anemia, forms a worrying trend of increasing cause of severe Anemia and an urgent need to evaluate the cause of this trend is required.

Keywords: Anemia, Vit B12, Nutrition

Introduction

The world health organization (2011) defines ane mia as hemoglobin level less than 13g/dl in adult males and less than 12 g/dl in adult females and less than 11g/dl in pregnant females. Anemia is a condition in which the number of red blood cells (RBCs), and consequently their oxygen capacity, is insufficient to meet the body's physiological needs. Anemia is a significant public health problem that occurs worldwide in both developed and developing countries. The WHO Global Database on Anemia for 1993–2005, estimated the prevalence of anemia worldwide at 25 % with higher percentage noted in developing countries (43%) **(De Benoist B *et al*., 2008)[1]**. In absolute numbers anemia affects 293 million children, out of which 89 million live in India. India is one of the countries with very high prevalence of nutritional anemia in the world **(De Benoist B *et al*., 2008[1])**. According to NFHS-3 data, 79% of infants in the age group between 6-35 months of age are anemic in India. (International Institute for Population Sciences, 2007)[2] Causes of anemia are varied and range from iron deficiency, vitamin B12 and folic acid deficiency, malaria, hookworm infestations, schistosomiasis, renal diseases and other chronic infections that play an important role in tropical climate. Nutritional anemia is a worldwide problem; its prevalence is highest indeveloping countries. **(Balarajan Y *et al*., 2011)[3]**. Although many studies have been conducted in the past to know the various etiological factors of anemia but the data is not sufficient to reach the conclusion especially in this area. Therefore, this study of hematological and etiological profile of moderate to severe anemia in tertiary care hospital (Government Medical College, Jammu) has been conducted to know the etiological factors of anemia in the northern part of country.

Material And Methods

This prospective study was conducted in the Post Graduate Department of General Medicine, Government Medical College and Associated Hospitals, Jammu (J&K) during 1st November 2020 to 31st October

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2021.Ethical clearance was taken from the Institutional Ethical committee before commencement of the study.Written informed consent was taken from all study participants/attendants.

Inclusion Criteria:

- Patients Admitted with Hemoglobin< 10 Gm%
- Aged >18yrs

Exclusion Criteria:

- Patients less than 18 years of age
- Pregnant and lactating females
- Patients not giving written consents
- Patients with renal failure on treatment
- Post traumatic cases
- Patient who had diagnostic workup somewhere else and on treatment
- Blood product transfusion in past 6 weeks

Procedure: The study included patients of age > 18yrs of either sex, with hemoglobin<10gm% required admission to the Department of Medicine, of a tertiary care and referral centre of North India or admitted patients recruited from emergency of GMCH, during the study period after fulfilling the inclusion and exclusion criteria. All the cases were interrogated and examined as per the pre-planned proforma and the investigations were also performed, they include:

- Haemoglobin (Hb): was estimated by sahli acid haematin test, normal values are:
  - 14+-2 in adult female
  - 16+/-2 in adult males
- Total RBC Count: Normal values
  - adult male 4.4+- $5.9*10^{12}$
  - adult female 3.8 +-5.2 $*10^{12}$
- Packed Cell Volume (PCV) was also estimated by a venous sample in wintrobes haematocrit tube centrifugating at 3000/rpm for 30 min.
  - Normal adult male 40 -52 ml
  - Normal adult female 35-47 ml
- Reticulocyte Count
  - Normal adult male 0.8 – 2.5 %
  - Normal adult female 0.8 – 4%
- Reticulocyte Index (RI)

R.I. = Reticulocyte Count* Patient PCV/Normal PCV* 1/Maturation Time

R.I. more than 2 reflects adequately working marrow and less than 2 reflects hypoplastic marrow.

- S. Ferritin Levels (in microcytic anemia)

  Normal values 20 -200 Ug/L males

  10 -120 Ug/L females
- Chest X-ray PA view
- Vitamin b12 and folic acid levels
- Other Special Investigations including: S. Electrophoresis, Haptoglobin levels, LDH, ANA, Upper GI Endoscopy, CT (Abdomen, Pelvis Chest),bone marrow aspiration cytology tumour markers, inflammatory markers etc.

Statistical Analysis: Data was entered and analysed using SPSS version 2.0 for Windows and Microsoft Excel. Data was presented as Mean ± SD for quantitative variables and as n (%) for qualitative variables. The suitable statistical tests were applied accordingly.

Results: In the present study total of 150 subjects were recruited, with age range between 22-78 years, of them maximum belong to 18-30 years age group (n=42, 28%), followed by 41-50 years age group (n=36, 24%), 28 (18.67%) subjects were in 51-60 years age group, 27 (18%) in 31-40 years age group, and least were in >60 years age group (n= 17, 11.33%). Maximum subjects with anemia were females (n= 87, 58%) and rest were males (n=63, 42%). The male to female ratio was 1:1.38.In present study, 72 (48%) subjects were vegetarians and rest of 78 (52%) subjects had mixed dietary habits. In present study, 79 (52.67%) subjects were undernourished and remaining 71 subjects (47.33%) were normal. (graph 1)

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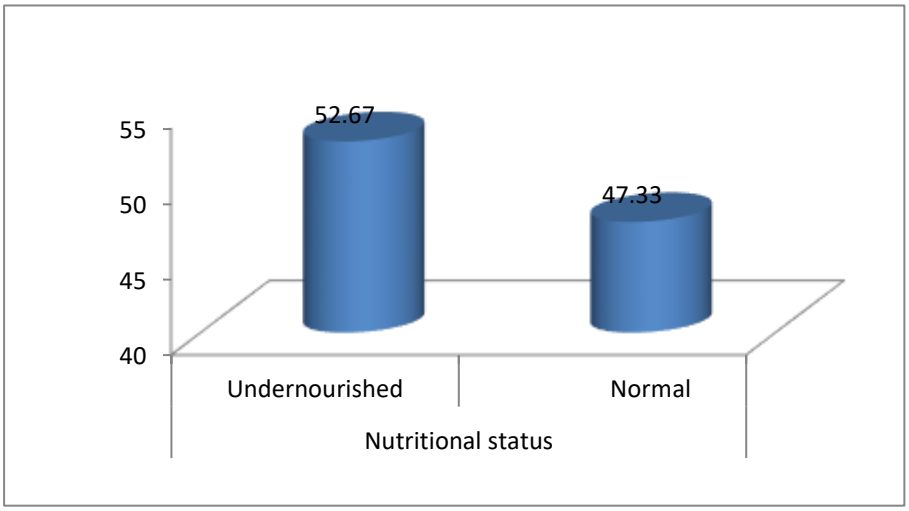
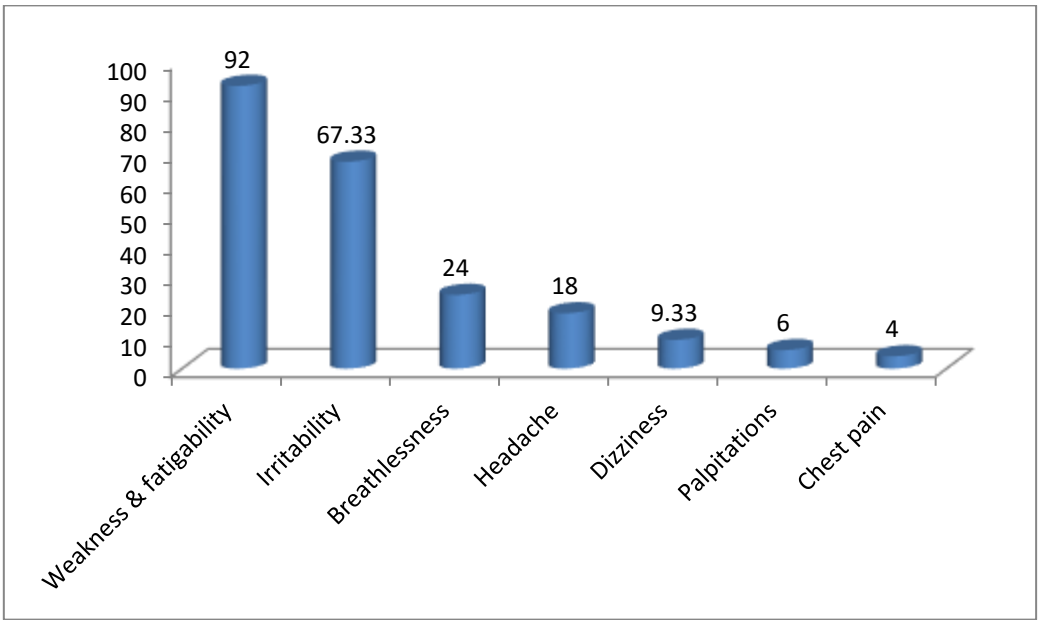


Graph: 1 Nutritional status of study subjects

The most common symptom of anemia was weakness & fatigability (138/150, 92%), followed by irritability (101/150, 67.33%). other complains were breathlessness (36/150, 24%), headache (27/150, 18%), dizziness (14/150, 9.33%), palpitations (9/150, 6%) and chest pain (6/150, 4%). (graph 2)



Graph: 2 Symptoms of anemia among the study subjects

Most of the patient of anemia presented with Pallor (136/150, 90.67%), followed by Lymphadenopathy (51/150, 34%), Tachycardia (43/150, 28.67%). Other signs were Glossitis (16%),Cheilitis (12.67%), Koilonychias (12%), Skin pigmentation (knuckles) (12%), Edema (10%), Hepatomegaly (9.33%) and Hemic murmur (4.67%). (graph 3)

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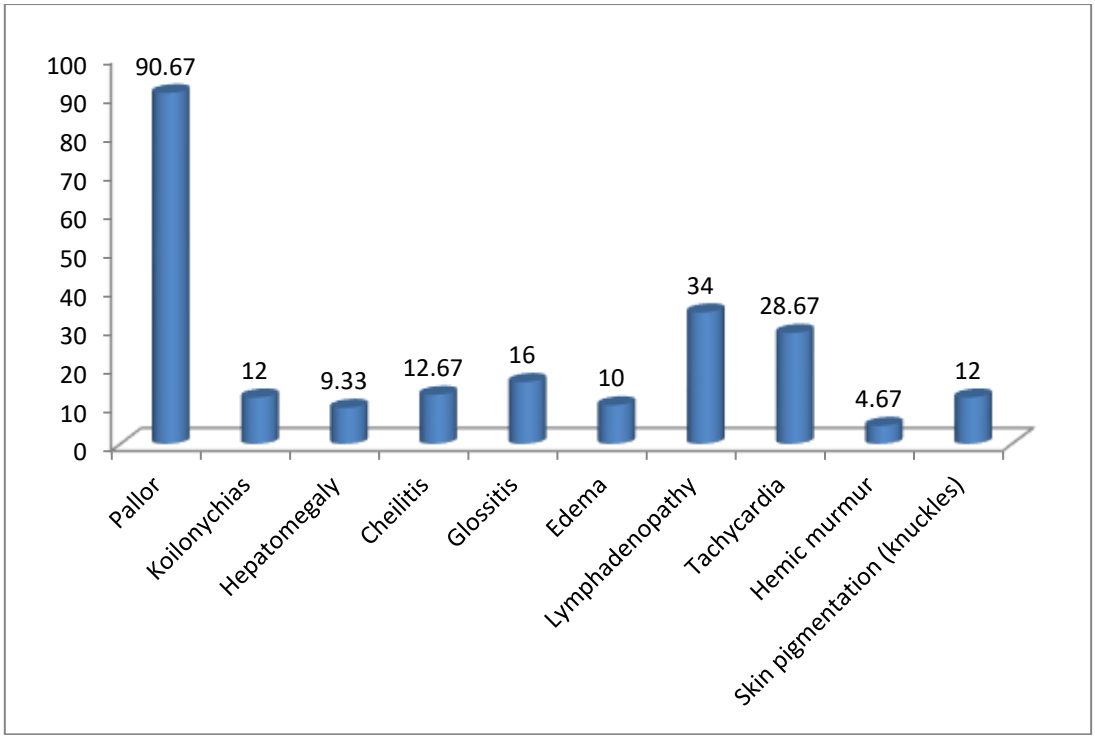

Graph: 3 Signs of anemia among the study subjects

According to hemoglobin level, there were 104 subjects (69.33%) with moderate anemia and 46 subjects (30.67%) with Severe Anemia. Anemia was classified according to RBC Morphology. There were maximum subjects with Microcytic hypochromic anemia (n=103, 68.67%), followed by Macrocytic anemia (n=38, 25.33%), and least were with Normocytic normochromic anemia (n=9, 6%). Hematopoietic micronutrient deficiency among study subjects was recorded. Maximum subjects had iron deficiency anemia (n=106, 70.67%), followed by deficiency of vitamin B12 (n=34, 22.67%) and folate deficiency was recorded in 10 subjects (6.67%). Mean level of serum Ferritin (Ng/dl) was 9.21±2.73, Vit B12 (micg/d) 0.03±0.01, and Folate (micg/d) was 24.31±3.49. (Table 1)

Table 1: Distribution of study subjects according to Hb and on the basis of RBC Morphology

Anemia	**N**	**%**
Moderate Anemia	104	69.33
Severe Anemia	46	30.67
RBC Morphology		
Microcytic hypochromic anemia	103	68.67
Normocytic normochromic anemia	9	6.00
Macrocytic anemia	38	25.33
Micronutrient Deficiency		
Iron	106	70.67
Vit B12	34	22.67
Folate	10	6.67
Total	150	100.00

The most common cause of Microcytic anemia was Nutritional (46/103, 44.66%), followed by Chronic blood loss including hook worm infection (33.98%), Tuberculosis (8.74%), Aplastic anemia (7.77%), Cirrhosis (due to variceal bleed) (2.91%) and only 1.94% had Hypothyroidism. The most common cause of Macrocytic anemia was Nutritional (29/38, 76.32%), followed by Cirrhosis (10.53%), Hemolytic A (7.89%), and 2.63% each was because of Tropical sprue and Malaria. The most common cause of normocytic normochromicanemia was Haematological Malignancy (3/9, 33.33%), other causes were CRF (22.22%), one subject each of Tuberculosis, Chronic blood loss, GI malignancy, Hemolytic A.(Table 2)

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Table: 2 Causes of Microcytic and Macrocytic Anemia

Microcytic Causes	**N**	**%**
Nutritional	46	44.66
Chronic blood loss including hook worm infection	35	33.98
Tuberculosis	9	8.74
Aplastic Anemia	8	7.77
Cirrhosis (due to variceal bleed)	3	2.91
Hypothyroidism	2	1.94
Total	**103**	**100**
Macrocytic Causes		
Nutritional	29	76.32
Cirrhosis	4	10.53
Hemolytic A	3	7.89
Tropical sprue	1	2.63
Malaria	1	2.63
Total	**38**	**100**
Normocytic Normochromic Causes		
Haematological Malignancy	3	33.33
CRF	2	22.22
Tuberculosis	1	11.11
Chronic blood loss	1	11.11
GI malignancy	1	11.11
Hemolytic A	1	11.11
Total	**9**	**100**

Among 3 subjects of Haematological Malignancy, 2 were of acute myelogenousleukemia (AML), and one was of acute lymphoblastic leukemia (ALL). Univariate analysis was done between severe anemia and factors which causes severe anemia and it was found that age of the subject (p =0.041), SES (p=0.043), Diet (veg/non veg) (p=0.04), Nutritional status (p=0.007), Serum Iron (p<0.01), Serum Vit B12 (p<0.01), and Serum folate (p<0.006) all were statistically significant. But only blood in stool was not a significant factor. (Table 3)

Table: 3 Univariate analysis between severe anemia and factors

Parameters	**OR**	**p value**
Age	2.87	0.041*
SES	2.89	0.043*
Diet (veg/non veg)	2.72	0.04*
Blood in stool	0.93	0.58
Nutritional status	3.56	0.007*
Serum Iron	5.03	<0.01*
Serum Vit B12	4.96	<0.01*
Serum folate	3.57	<0.006*

*: statistically significant

DISCUSSION

Anemia is one of the most common disease affecting humans all over the world.WHO has reported an overall prevalence rate of over 20% (more than 1 billion) amongthe world population.Anemia has been considered only as a part of global nutritional problem. Although no nationwide statistics are available from India, the problem of Anemia is enormous in this country. It has been studied from various angles in different parts of the country. (Chatterjee JB, 1967)[4] In present study total of 150 subjects were recruited, with age range between 22-78 years, of them maximum belong to 18-30 years age group (n=42, 28%), followed by 41-50 years age group (n=36, 24%), 28 (18.67%) subjects were in 51-60 years age group, 27 (18%) in 31-40 years age group, and least were in >60 years age group (n= 17, 11.33%). These findings were almost similar to the result of study done by Prasad PD et al., (2017)[5]**,** who found that maximum patient of iron deficiency Anemia were young i.e., 15-30 years age group, and of middle (31-45 years) age groups accounting to be almost 42.5% and 33.33% respectively. But according to study done by **Sundhir N*et al.*, (2018)[6],** majority of the patients of Chronic kidney disease with anemia belonged to the age group of 51-60 years (35.4%) followed by 41-50 years age group (25.6%). In present study of the total 150 patients, maximum subjects with anemia were females (n= 87, 58%) and rest were males (n=63, 42%). The male to female ratio was 1:1.38. Anemia is more commonly seen in women as blood loss may be due tomenstruation or pregnancy **(Bentley ME et al., 2003)[7]**. These findings

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were similar to the result of a trial done by **Prasad PD *et al*., (2017)[5],** they found that females (55.84%) compared to males (44.16%) being more in number to be suffering from iron deficiency Anemia. The male to female ratio was 1:1.26. In present study, most of the subjects were of lower middle class (n=62, 41.33%) according to socio economic status. Least subjects were of upper class (n=8, 5.33%). This may be because patient with low income group does not pay much attention to their diet. According to study done by **Kandauda I *et al*., (2020)[8],** Anemia was higher among those whose monthly income was less than Rs. 30,000 (51.32%) 17 (11.33%) subjects complain of blood in stool, while 133 (88.67%) subjects had no such complain. Occult gastrointestinal bleeding commonly manifests as iron deficiency anemia or fecal occult blood. Iron deficiency anemia results from chronic occult gastrointestinal bleeding **(Rockey DC, 2005)[9].** The most common symptom of Anemia was Weakness & fatigability (138/150, 92%), followed by Irritability (101/150, 67.33%). Other complains were Breathlessness (36/150, 24%), Headache (27/150, 18%), Dizziness (14/150, 9.33%), Palpitations (9/150, 6%) and Chest pain (6/150, 4%). Findings of the present study was in accordance to findings of **Kaur N *et al*., (2018)[10],** who found that Easy fatigability (87.5%) was the most common complain of patients, Anorexia (70%), Breathlessness on exertion (60%), and Palpitations (47.5%). In a study done by **Chatterjee JB, (1967)[4],** he noted that, Tiredness, lassitude, easy fatigability and generalized weakness are the most common and often the earliest symptoms of anemia. Most of the patient of anemia presented with Pallor (136/150, 90.67%), followed by Lymphadenopathy (51/150, 34%), Tachycardia (43/150, 28.67%). Other signs were Glossitis (16%),Cheilitis (12.67%), Koilonychias (12%), Skin pigmentation (knuckles) (12%), Edema (10%), Hepatomegaly (9.33%) and Hemic murmur (4.67%). Findings of the present study was in accordance to findings of **Kaur N *et al*., (2018)[10],** who found that most of the patients presented with Pallor (92.5%), followed by Bald tongue (65%), Glossitis (42.5%), Knuckle pigmentation (37.5%), Jaundice (37.5%), Angular cheilitis (35%), Hepatomegaly (32.5%), Hair changes (25%), Pedal edema (15%) and Splenomegaly (12.5%). According to **Prasad PD *et al*., (2017)[5]** study, among the various clinical features Pallor (66.67%) was the commonest in occurrence followed by fever (54.16%). Few other features reported were hepato-splenomegaly, breathlessness, cough, hyperpigmentation etc. with decreasing frequency. There were maximum subjects with Microcytic hypochromic anemia (n=103, 68.67%), followed by Macrocytic anemia (n=38, 25.33%), and least were with Normocytic normochromic anemia (n=9, 6%). Almost similar were the findings of **Prasad PD *et al*., (2017)[5],** who found that most of the subjects had Microcytic hypochromic anemia (65.83%), followed by Normocytic normochromic anemia (27.50%) and only 6.67% subjects had Macrocytic anemia. But according to the study done by **Jain R *et al*., (2019)[11],** maximum subjects had Normocytic normochromic anemia (48/75, 64%), followed by Microcytic hypochromic anemia (16/75, 21.33%), least subjects were with Macrocytic anemia (11/75, 14.66%). According to **Sundhir N*et al*., (2018)[6],** there were maximum subjects with normocytic normochromic anemia (76%), followed by microcytic hypochromic picture seen 22% patients and only 2% with macrocytic anemia.

Hematopoietic micronutrient deficiency among study subjects was recorded. Maximum subjects had iron deficiency anemia (n=106, 70.67%), followed by deficiency of vitamin B12 (n=34, 22.67%) and folate deficiency was recorded in 10 subjects (6.67%). Almost similar were the findings of **Prasad PD *et al*., (2017)[5],** who found that most of the subjects had iron deficiency anemia (60%). Univariate analysis was done between severe anemia and factors which causes severe anemia and it was found that age of the subject ($p = 0.041$), SES ($p=0.043$), Diet (veg/non veg) ($p=0.04$), Nutritional status ($p=0.007$), Serum Iron ($p<0.01$), Serum Vit B12 ($p<0.01$), and Serum folate ($p<0.006$) all were statistically significant. But only blood in stool was not a significant factor. It depicts that by improving nutritional status of subjects and early diagnosis severe anemia can be prevented.

Limitation: The main limitation of the present study was the small sample size and that the study group included were just from one hospital, so the finding of this study cannot be generalized. So, further studies are required with larger sample size including more hospitals.

Conclusion: Anemia is still highly prevalent in developing countries like India, affecting the work output and hence having massive socio economic impact on the nation. In our study we found nutritional Anemia as a major etiological factor with iron deficiency more commonly seen as compared to vitamin B-12 and folate deficiency. Also chronic blood loss including hook worm infection form a major group. As these factors are easily modifiable byimproving nutrition and food supplementation, hence a major cause of Anemia can be reduced if not eradicated by simple measures. Also factors like age of the subject, SES, Diet (veg/non veg), Nutritional status, Serum Iron level, Serum Vit B12 level, and Serum folate level all were statistically significant, cause of severe anemia, forms a worrying trend of increasing cause of severe Anemia and an urgent need to evaluate the cause of this trend is required.

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