



FUTURE JOURNAL OF PHARMACEUTICALS AND HEALTH SCIENCES

Published by Pharma Springs Publication

Journal Home Page: <https://pharmasprings.com/fjphs>

Pattern, risk factors and clinical presentation of anemia at a tertiary care hospital – a prospective observational study

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Article History:

Abstract



Received on: 23 Dec 2024
Revised on: 04 Feb 2025
Accepted on: 11 Feb 2025

Keywords:

Anemia,
microcytic hypochromic
Anemia,
shortness of breath,
dizziness,
fatigue,
nutritional deficiency.

Anemia is a worldwide health concern, and it is defined by reduced haemoglobin levels below 18 g/dL in males and 12g/dL in females prompt identification of anemia can decrease mortality and morbidity rates by recognizing morphological patterns, clinical manifestations, and risk factors. A six-month prospective observational study was conducted on 150 patients in the inpatient wards of general surgery and general medicine departments. The study focused on demographic information, clinical symptoms, and laboratory test for identification of pattern, risk factors, and treatment approaches. Findings revealed that 76% of cases were female patients, and 73% of patients having microcytic hypochromic anemia as a predominant pattern. Nutritional deficiency was determined to be a risk factor in 46% of anemic patients. The most frequent clinical symptoms were shortness of breath (60.8%) and combination of fatigue, dizziness and shortness of breath (34.2%). The research underscored the significance of assessing anemia for timely diagnosis and treatment, emphasizing that morphological patterns provide crucial insights into underlying pathophysiology. Early intervention can reduce the morbidity and mortality rates and improve patient's quality of life.

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eISSN: 2583-116X

DOI: <https://doi.org/10.26452/fjphs.v5i1.710>

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INTRODUCTION

Anemia is a widespread global health concern due to its high prevalence and its association with significant morbidity and mortality. It is particularly common among older adults and is linked to various conditions including iron deficiency, chronic inflammatory diseases, malignancies, and decreased erythropoietin levels [1]. Anemia is defined by a reduction in hemoglobin levels below the normal thresholds of 13g/dL per men and 12g/dL for women. The World Health Organization (WHO) classifies

anemia as mild when hemoglobin levels are between 10 and 11.9 g/dL for women and between 10 and 12.9 g/dL for men, moderate when levels fall between 7 and 9.9 g/dL for both sexes, and severe when hemoglobin levels fall below 7 g/dL for both men and women[2]. A number of hematological parameters such as packed cell volume, hemoglobin levels, total RBC count, and red cell indices including mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), and mean corpuscular hemoglobin concentration (MCHC), can be used to classify anemia morphologically [3]. Macrocytic Anemia is distinguished by larger-than-normal red blood cells, with an MCV greater than 100 fL. Normocytic Normochromic Anemia is distinguished by normal-sized red blood cells with MCV values ranging from 80 to 100 fL. Microcytic hypochromic anemia is characterized by red blood cells being smaller than normal, with an MCV value under 80 fL[4]. Biological, lifestyle, and socioeconomic factors all have an impact on anemia risk. Age-related changes can lead to anemia, including a decreased ability to absorb vital nutrients, reduced hematological reserve, and diminished sensitivity to erythropoietin[1]. Clinical history and drug use, such as the presence of diverse medical conditions or certain medications, can also increase risk of getting anemia[5]. Socioeconomic factors, including economic status, important lifestyle factors, such as reduced physical activity, heavy drinking or smoking, and sleep disruption, further contribute to anemia risk. Nutritional factors play a crucial role, with deficiencies iron, calcium, folate, and vitamin A, intake of protein, vitamin C being significant contributors of anemia[6], [7], [8]. Additionally, chronic diseases like kidney disease, gastritis, colitis, rheumatoid arthritis, thyroid diseases, and heart failure increase susceptibility to anemia. Blood loss from surgery, injury, excessive blood draws, or heavy menstrual cycles can also lead to anemia by reducing red blood cell levels. Additionally, conditions that affect iron absorption, like intestinal disorders (e.g. Crohn's disease) can contribute to iron deficiency. Women of childbearing age are particularly at risk due to menstrual blood loss and pregnancy-related demands[4]. Common symptoms of anemia include fatigue, weakness, and shortness of breath, which often worsening with age [1]. Anemia's primary consequence is

hypoxia impacts various organs, particularly the heart, brain, and muscles, leading to issues such as palpitations, discomfort, easy fatigue, fainting, and dizziness. Although anemia itself is not a standalone diagnosis, it indicates an underlying health condition [9]. The high prevalence of anemia in critical care patients poses a significant challenge for healthcare providers. Due to the frequency of anemia, many patients are exposed to blood transfusions as part of their treatment. However, managing anemia in critical care remains difficult, and there is currently a lack of comprehensive guidelines specifically addressing the prevention or treatment of anemia in this population [10].

MATERIALS AND METHODS

Study Site: It was carried out in the Departments of General Medicine and General Surgery wards of Sri Venkateshwara Ramnarayan Ruia Government General Hospital, (SVRRGGH), Tirupati.

Study Period: The study duration of our study is 6 months from September 2023 to February 2024.

Study Design: It was a Prospective observational study.

Study population: A total of 150 patients were included in our study who are diagnosed as anemic with or without comorbidities.

Study Approval: The study was approved by institutional ethical committee with proposal no: SPSP/2023-2024/PD01

Study Materials: Patient data collection proforma and Informed consent form were used as study materials in the study.

Inclusion Criteria: Adults of age greater than 15 years having Hb levels < 12 g/dL who are willing to provide their information for the present study. The study population with a known diagnosis of anemia undergoing treatment and readmitted for blood transfusions were included in the study.

Exclusion Criteria: Patients having Hb levels >12g/dL and are not willing to participate. Patients hospitalized for less than 24 hours were also excluded from the study.

Study Method: The study commenced with the selection of patients based on predefined inclusion and exclusion criteria to ensure a suitable sample. Demographic details were

retrieved from case sheets and primary complaints were documented to understand the symptoms presented. The clinical profile was analyzed to identify the patterns of anemia within the study population. Additionally, risk factors and co-morbidities such as dietary habits and conditions like diabetes or kidney disease were assessed. Data on drug therapy were collected to determine the most commonly used medications for anemia treatment. Finally, all gathered data were analyzed and reported to evaluate the prevalence, patterns, clinical presentations, risk factors and treatment approaches for anemia in the study population.

Statistical Analysis: The results of the study were analyzed using Microsoft Excel. It is used for the systematic organization of the collected data of patient demographics, clinical profiles, risk factors, co-morbidities, and drug therapy information as descriptive statistics.

RESULTS

A total of 150 anemic patients were included in our study. Among them majority of patients 47(37%) belonging to 41-50 years of age group. As per the demographic details of 150 in-patients obtained 74(49%) were male and 76(51%) were female. Micro cytic anemia 73(49%) was predominantly seen followed by normocytic normochromic anemia 22(15%) which was described in **Figure 1**.

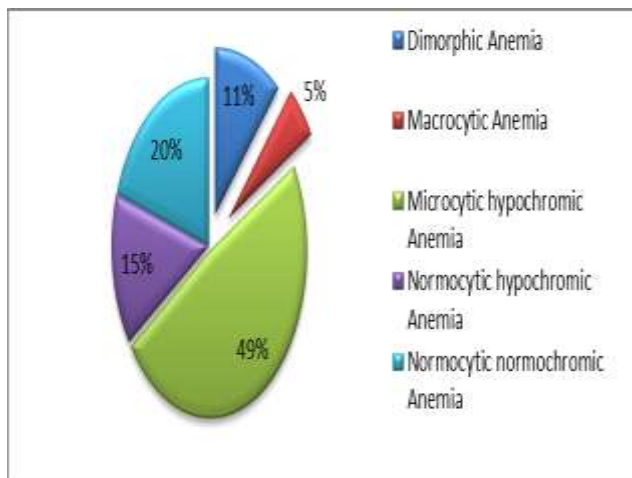


Figure 1 Pattern of Anemia based on Peripheral Smear Examination

Out of 150 patients 126(84%) were with risk factors 24(16%) without risk factors. Among 126 with risk factors majority with nutritional

deficiency 46(36.50%) followed by CKD 24(19.04%) and DCLD 16(12.69%) as mentioned in **Table 1**.

Table 1 classification of study population based on risk factors

RISK FACTORS	NO.OF PATIENTS (N=126)	PERCENTAGE (%)
AGE+NUTRITIONAL DEFICIENCY	8	6.34
CKD+NUTRITIONAL DEFICIENCY	3	2.38
DCLD+NUTRITIONAL DEFICIENCY	2	1.58
DCLD+CKD	3	2.38
AGE	15	11.90
CKD	24	19.04
DCLD	16	12.69
NUTRITIONAL DEFICIENCY	46	36.50
SURGERIES	6	4.76
OTHERS	3	2.38
TOTAL	126	100

*CKD- Chronic Kidney Disease, DCLD- Decompensated chronic liver disease

Table 2 Distribution of clinical presentation in study population

CLINICAL PRESENTATIONS	NO.OF PATIENTS (n=150)	PERCENTAGE (%)
DIZZINESS	4	1.33
FATIGUE	19	12.66
MALAISE	4	2.66
PALPITATIONS	2	1.33
SHORTNESS OF BREATH	45	30
FATIGUE+DIZZINESS+MALAISE	13	8.66
FATIGUE+DIZZINESS+SOB	26	17.33
FATIGUE+PALPITATIONS+SOB	16	10.66
FATIGUE+SOB	18	12
PALPITATIONS+SOB	3	2
TOTAL	150	100

*SOB-Shortness of breath

Among 150 patients 45 (30%) with shortness of breath as a major symptoms in our study, 26 (17.33%) were presented with the combined symptoms of fatigue, dizziness and shortness of breath and then followed by fatigue 19(12.66%) these were shown in **Table 2**.

Out of 150 patients, 82(54.6%) were having comorbidities in their medical history and remaining 68(45.3%) doesn't having any comorbidities other than anemia. Among 82 patients, according to our study 23(28.05%) with HTN as a comorbidity. According to our study in 150 patients, 76(50.67%) were treated with iron supplements along with vitamin supplements and followed by 57(38%) with iron supplements.

DISCUSSION

The study explores the prevalence, pattern, risk factors, clinical presentations, and treatment related to anemia in 150 patients. Key observations from the data include a predominance of female patients (49%)[3] [1] which aligns with other studies, [9][13][14][17] suggesting that factors like lower dietary nutrient intake and menstruation-related blood loss may contribute to higher anemia rates among women. The significant proportion (31.33%) of patients is in the 41-50 age group. This trend is consistent with findings from similar studies[3] [9][13] and supports the understanding that age-related decreases in bone marrow function and erythropoietin response can exacerbate anemia risk in older populations. The most common clinical presentation observed was shortness of breath (60.81%), followed by fatigue (25.68%). Shortness of breath in anemia happens because there's a lack of healthy red blood cells to carry enough oxygen throughout the body. Our results conflicted with those of previous studies [13]. In the present study, microcytic hypochromic anemia was predominant, with an incidence of 48.6%, followed by a normocytic normochromic blood picture at 20%, which aligns with findings in studies [3][12][13][14][15]. However, this contrasts with the results of studies [5][9]. Microcytic hypochromic anemia often results from iron deficiency, as iron is essential for producing hemoglobin, the protein in red blood cells that carries oxygen. Without sufficient iron, red blood cells become smaller (microcytic) and contain less hemoglobin (hypochromic), leading

to anemia. In our study, nutritional deficiency was the most commonly observed risk factor (41.82%) among 150 patients, followed by chronic kidney disease (CKD) at 21.82%. These findings align with studies[16][11] which reported that nutritional status significantly impacts the incidence of anemia. A lack of nutrient intake, specifically micronutrients and macronutrients, can lead to weight loss, recurrent illness, and anemia. Analysis of patients with anemia and comorbidities revealed that 28.05% had hypertension (HTN), followed by 20.73% with diabetes mellitus (DM), findings that contrast with study [15]. In our study, 50.67% of the study population used a combination of iron and vitamin supplements to treat anemia, while 38% used only iron supplements, and 4% used only vitamin supplements.

CONCLUSION

Anemia, a prevalent but often neglected condition in both developed and developing countries. Clinical presentations frequently include shortness of breath, while non-specific symptoms such as fatigue and malaise should not be dismissed as merely age-related. Regular blood tests are crucial for early anemia detection, enabling timely intervention that can enhance overall health outcomes, reduce morbidity and mortality rates, and improve patient's quality of life. Routine check-ups for early detection and management are essential for prolonging life expectancy and ensuring better health outcomes.

ACKNOWLEDGEMENT

We are extremely thankful to department members of General Medicine and General Surgery, Sri Venkateswara Ramnarayan Ruia Government General Hospital (SVRRGGH), Tirupati for providing a platform to complete this research work. We are also thankful to health care professionals who helped us in providing required case sheets and other information for completion of our research work.

Author Contribution

All authors made substantial contributions to the conception, design, acquisition, analysis, or interpretation of data for the work. They were involved in drafting the manuscript or revising it critically for important intellectual content. All authors gave final approval of the version to be

published and agreed to be accountable for all aspects of the work, ensuring its accuracy and integrity.

Funding Support: The Author declares that there is no funding.

Conflict of Interest: The Author declares that there is no conflict of interest.

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