

## Haemoglobin Status of Cancer Patients and their Characteristics: A Hospital Based Descriptive Study

Rajendran S<sup>1</sup>, Arun Prasath S<sup>2</sup>, Thulasiyaya S<sup>3</sup>, Nithya K<sup>4</sup>

<sup>1</sup>Associate Professor, Department of General Surgery, Government Thiruvarur Medical College, Thiruvarur, Tamil Nadu

<sup>2</sup>Assistant Professor, Department of General Surgery, Government Thiruvarur Medical College, Thiruvarur, Tamil Nadu

<sup>3</sup>Senior Resident, Department of Surgical Gastroenterology, Karnataka Institute of Medical Sciences, Hubli, Karnataka

<sup>4</sup>Assistant Professor, Department of General Surgery, Government Thiruvarur Medical College, Thiruvarur, Tamil Nadu

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Corresponding Author: Dr. Nithya K

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### Abstract:

**Background:** The prevalence of anemia in cancer patients has been well-documented, with implications for both quality of life and treatment outcomes.

**Objectives:** The objective of the present study was to describe the mean levels of haemoglobin among patients with cancer along with their sociodemographic and clinical characteristics.

**Methods:** This was a hospital based descriptive cross-sectional study conducted in the outpatient department, Government Thiruvarur Medical College and Hospital, Tamil Nadu, India between December 2021 and November 2022 among patients with cancer.

**Results:** The mean (SD) age of the participants included in the present study was 54.3 years (11.9). Nearly three fourth (73.3%) patients were females. The primary site of malignancy was breast (36.7%), thyroid (28.3%), stomach (18.3%), pancreas (10.0%), rectum (5.0%), and soft tissues (1.7%), in that order of frequency. More than one in ten patients (13.4%) was in either third or fourth stage of malignancy, in terms of severity. Among the 60 patients included in the present study, 63.3% patients had no comorbidities. Nearly three fourth patients (71.7%) had no active bleeding. The results showed that the mean (SD) levels of haemoglobin among patients with cancer was 9.03 gm/dl (1.3) – 21.7% had mild, 45.0% had moderate and 33.3% had severe anemia.

**Conclusion:** The results underscore the importance of routine haematological assessments and tailored interventions to address anemia-related complications in the course of cancer care.

**Keywords:** Cancer, Anemia, Prevalence, Clinical characteristics, India.

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### Introduction

Cancer, a multifaceted and formidable group of diseases, continues to pose a global health challenge, affecting millions of lives each year.[1] The intricacies of cancer encompass not only the biological and clinical aspects but also extend to the sociodemographic and clinical characteristics of the individuals it afflicts.[2] Understanding the heterogeneity of cancer patients is essential for tailoring effective interventions and optimizing healthcare outcomes.

This study endeavours to shed light on the sociodemographic and clinical landscape of patients diagnosed with cancer, with a particular focus on haemoglobin levels, cancer staging, comorbidities, and the presence of active bleeding. These parameters collectively contribute to the

holistic understanding of the patients' health status and present opportunities for targeted interventions and improved patient care.

The prevalence of anemia in cancer patients has been well-documented, with implications for both quality of life and treatment outcomes.[3,4] the impact of cancer on haemoglobin status in cancer patients is a multifaceted aspect of their overall health. Haemoglobin, a vital component of red blood cells, plays a crucial role in oxygen transport throughout the body.[5] The presence of cancer can have profound effects on haemoglobin levels – attributed to factors such as chronic inflammation, nutritional deficiencies, impaired erythropoiesis, and the direct effects of certain malignancies on the bone marrow.[6] Anemia in cancer patients is

associated with increased fatigue, diminished quality of life, and potential complications in the course of treatment.[7]

The haemoglobin status of cancer patients is a crucial determinant of their ability to tolerate and respond to various treatment modalities.[8] Chemotherapy, radiation therapy, and surgery can further exacerbate anemia or contribute to the development of treatment-induced anemia. Suboptimal haemoglobin levels may compromise the delivery of oxygen to tissues, affecting the overall well-being of the patient and potentially necessitating treatment modifications.[9]

Haemoglobin levels have prognostic implications in cancer patients.[10] Low haemoglobin levels are often associated with advanced disease stages and may serve as an independent predictor of poor outcomes. Monitoring changes in haemoglobin status over the course of treatment can provide valuable insights into disease progression and treatment response. Cancer-related anemia is often characterized by a complex interplay of factors, including iron deficiency and chronic inflammation. The inflammatory response associated with cancer can disrupt iron metabolism and erythropoiesis, contributing to anemia.[11] Understanding these underlying mechanisms is crucial for developing targeted interventions to address cancer-related anemia. Beyond its physiological consequences, the impact of cancer on haemoglobin status extends to the patient's overall quality of life.[12] Fatigue, a common symptom of anemia, can significantly impair daily functioning and reduce the patient's ability to cope with the challenges of cancer treatment and recovery.

Against this background, the objective of the present study was to describe the mean levels of haemoglobin among patients with cancer along with their sociodemographic and clinical characteristics.

## Methods

This was a hospital based descriptive cross-sectional study conducted in the outpatient department, Government Thiruvapur Medical College and Hospital, Tamil Nadu, India between December 2021, and November 2022 among patients with cancer. The study was approved by the Institutional Human Ethics Committee (IHEC) of the institute. The content of Participant Information Sheet (PIS) in local language was provided to the study participants and contents were read to them in their own language to their satisfaction.

The study subjects were enrolled in the study after obtaining written informed consent. The study included patients with cancer (regardless of origin),

more than 18 years of age and willing to provide written informed consent. However, the study excluded patients with cancer having blood cell dyscrasias and those allergic to iron sucrose, vitamin B12 and folic acid.

Edosa Kifle et al. (2019) estimated the prevalence of anemia among cancer patients to be 20.0%.[13] Using this information, considering the alpha error to be 10.0% (type I error), beta error to be 20.0% (type II error) or power to be 80.0%, the estimated minimum required sample size was 60. Patients presenting to the outpatient department, Government Thiruvapur Medical College and Hospital, and fulfilling the prespecified inclusion and exclusion criteria were enrolled in the present study. A purpose predesigned, semi structured, pretested questionnaire was used to collect data that included – patient sociodemographic characteristics, history, findings of general physical and systemic examination and haemoglobin values.

The data collected was manually entered into Microsoft Excel and analysed using Statistical software for data science (STATA) v16. Descriptive analysis was presented using numbers and percentages for categorical variables; mean (standard deviation) or median (interquartile range) for continuous variables. To test for association, we used Chi square test (for categorical variables) and independent “t” test (for continuous variables) – odds ratio (OR) and mean difference was estimated with 95% confidence (95% CI). Statistical significance was considered at  $p < 0.05$ .

## Results

The mean (SD) age of the participants included in the present study was 54.3 years (11.9); ranging between 32 and 85 years. More than one third (35.0%) patients were between 51 and 60 years of age, followed by 28.3% more than 60 years of age, 20.0% between 31 and 40 years of age and 16.7% between 41 and 50 years of age, in that order. Nearly three fourth (73.3%) patients were females. The primary site of malignancy was breast (36.7%), thyroid (28.3%), stomach (18.3%), pancreas (10.0%), rectum (5.0%), and soft tissues (1.7%), in that order of frequency.

More than one in ten patients (13.4%) was in either third or fourth stage of malignancy, in terms of severity. More than half (58.3%) were in stage II and 28.3% were in stage I. Among the 60 patients included in the present study, 63.3% patients had no comorbidities.

However, it was found that 18.3% patients had diabetes mellitus, 10.0% had hypertension, 6.7% had both diabetes mellitus and hypertension, and 1.7% patients had bronchial asthma. Nearly three fourth patients (71.7%) had no active bleeding. However, it was found that 28.3% patients had

active bleeding – 3.3% had bleeding per rectum, 3.3% had Malena, and 21.7% had menstruation. The results of the present study showed that the mean (SD) levels of haemoglobin among patients

with cancer was 9.03 gm/dl (1.3) – 21.7% had mild, 45.0% had moderate and 33.3% had severe anemia.

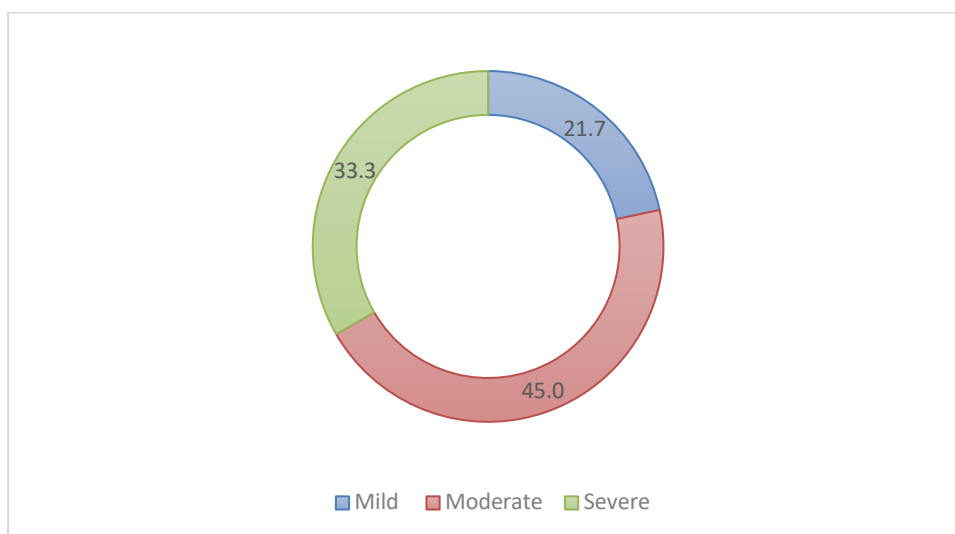


Figure 1: Distribution of cancer patients, by severity of anemia

Table 1: Distribution of patient characteristics

		Number N = 60	Percentage (%)
Age (in years)	31 to 40	12	20.0
	41 to 50	10	16.7
	51 to 60	21	35.0
	More than 60	17	28.3
Gender	Male	16	26.7
	Female	44	73.3
Primary site of malignancy	Thyroid	17	28.3
	Stomach	11	18.3
	Breast	22	36.7
	Pancreas	6	10.0
	Rectum	3	5.0
	Soft tissue sarcoma	1	1.7
Stage of malignancy	I	17	28.3
	II	35	58.3
	III or IV	8	13.4
Comorbidities	Absent	38	63.3
	Diabetes mellitus	11	18.3
	Hypertension	6	10.0
	Both diabetes mellitus and hypertension	4	6.7
	Bronchial asthma	1	1.7
Active bleeding	Absent	43	71.7
	Present – Bleeding PR	2	3.3
	Present – Malena	2	3.3
	Present – Menstruation	13	21.7
Recent blood transfusion	Present	3	5.0
	Absent	57	95.0

**Discussion**

The findings of our study revealed that the mean haemoglobin level among patients with cancer was 9.03 gm/dl with a standard deviation of 1.3. This

indicates a considerable variability in haemoglobin levels within the studied population. Such variations in haemoglobin levels among cancer patients are consistent with previous literature,

where anemia is a well-documented complication in individuals undergoing cancer treatment.[3,14]

Our results further highlight the prevalence of anemia among the cancer patient population, with 21.7% classified as having mild anemia, 45.0% with moderate anemia, and 33.3% with severe anemia. These findings are in line with other studies reporting a high incidence of anemia in cancer patients, particularly in those undergoing chemotherapy.[15,16] the severity distribution of anemia in our study emphasizes the significant impact of cancer and its treatments on the haematological profile of affected individuals. Understanding the prevalence and severity of anemia in cancer patients is crucial for clinical management. Low haemoglobin levels can contribute to increased fatigue, reduced quality of life, and impaired treatment response.[17] Clinicians should be attentive to monitoring haemoglobin levels throughout the cancer trajectory, especially during active treatment phases.

To contextualize our findings, we explored potential sociodemographic and clinical correlates of haemoglobin levels among the cancer patients. The demographic profile of participants in our study offers valuable insights into the age and gender distribution among individuals diagnosed with cancer. The mean age of the participants was 54.3 years (SD = 11.9), with a range spanning from 32 to 85 years. This diversity in age reflects the broad spectrum of cancer occurrences across different life stages. Our findings align with existing literature emphasizing that cancer can affect individuals across a wide age range, underscoring the importance of age-stratified analyses in cancer research.[18] Notably, more than one-third (35.0%) of the participants fell within the age group of 51 to 60 years, followed by 28.3% aged more than 60 years. These proportions are consistent with the trend of increasing cancer incidence with advancing age, a phenomenon observed in various cancer types.[19] The age distribution in our study reflects the demographic landscape of cancer diagnoses, emphasizing the need for targeted interventions and screenings in older age groups.

The gender distribution in our study revealed that the majority of participants (73.3%) were females. This is in line with the gender patterns observed in certain cancer types, such as breast and thyroid cancers, which are more prevalent among women.[20] The higher representation of females in our study population may be attributed to the predominance of breast and thyroid cancers as primary malignancies. The distribution of primary cancer sites provides a glimpse into the prevalence of specific malignancies within our study cohort. Breast cancer emerged as the most common

primary site, constituting 36.7% of cases, followed by thyroid (28.3%), stomach (18.3%), pancreas (10.0%), rectum (5.0%), and soft tissues (1.7%). These findings align with global cancer statistics, reflecting the varying incidence rates of different cancer types across populations.[21] The dominance of breast and thyroid cancers in our study mirrors the overall landscape of cancer diagnoses, warranting targeted screening and management strategies for these prevalent malignancies.

The distribution of cancer staging in our study highlights the diverse spectrum of disease severity among the participants. More than half of the patients (58.3%) were diagnosed at stage II, indicating a substantial proportion of individuals in an intermediate stage of malignancy. It is crucial to note that early detection is associated with improved treatment outcomes, underscoring the importance of routine screening programs.[22] However, our findings also reveal that more than one in ten patients (13.4%) were already in the advanced stages (third or fourth stage), emphasizing the challenges associated with late-stage diagnoses and the need for enhanced diagnostic strategies.

The prevalence of comorbidities among cancer patients is a critical aspect of their overall health and well-being. In our study, a notable proportion (63.3%) of patients did not report any comorbid conditions. This finding could potentially suggest that a substantial portion of the study population was relatively healthy aside from their cancer diagnosis.

However, it is imperative to acknowledge the presence of comorbidities, as they can significantly impact treatment decisions, outcomes, and overall survival.[23] Specifically, 18.3% of patients had diabetes mellitus, 10.0% had hypertension, 6.7% had both diabetes mellitus and hypertension, and 1.7% had bronchial asthma. The coexistence of these comorbidities with cancer requires a multidisciplinary approach to treatment, considering potential interactions between cancer therapies and management strategies for other health conditions.[24]

The prevalence of active bleeding among our study participants is a significant clinical aspect that warrants attention. While the majority (71.7%) had no active bleeding, 28.3% of patients reported active bleeding. This subgroup included patients with bleeding per rectum (3.3%), melena (3.3%), and menstruation (21.7%). Active bleeding in cancer patients can have implications for treatment decisions, especially in the context of surgical interventions or certain chemotherapeutic regimens.[25] The identification and management of bleeding events are crucial to prevent

complications and optimize patient care. The present study is not without limitations. It includes limited generalizability (or external validity), inability to establish causal relationships or infer temporal sequences (inherent limitation of study design), selection bias (patients from one tertiary care hospital), recall bias, and failure to account for heterogeneity of cancer types.

Future research endeavours could focus on longitudinal studies to better elucidate the dynamic changes in haemoglobin levels during different stages of cancer treatment. Exploring the impact of specific cancer types and treatment regimens on anemia prevalence and severity would also contribute to a more nuanced understanding of these relationships.

In conclusion, our study provides a comprehensive analysis of haemoglobin levels among patients with cancer, emphasizing the prevalence and severity of anemia in this population. These findings underscore the importance of routine haematological assessments and tailored interventions to address anemia-related complications in the course of cancer care.

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