A Study on Morphological Classification of Anemia in Patients with Non-Hemopoietic Cancer

Shikha Singh[1], Ashok Singh[2], Arvind Bhake[3]
[1]M.D. Pathology, Dept. of pathology JNMC Sawangi-Meghe, Wardha-442001, (MS), India
[2]M.D. Radiation Oncology, Dept. of Radiation Oncology, M.G.I.M.S., Sevagram, Wardha-442102, (MS), India
[3]M.D. Pathology, Prof & head Dept. of Pathology JNMC Sawangi-Meghe, Wardha-442001, (MS), India

Abstract:- Anemia is a condition that develops when there are insufficient healthy red blood cells in the blood. Anemia in cancer patients observed as a result of the malignancy itself, anti-cancer treatment, blood losses, nutritional deficiencies, hemolysis, endocrine disorders, or an inflammatory cytokine associated with chronic diseases. Anemia is a frequent complication in cancer patients, both at diagnosis and during treatment, with a multifactorial etiology in most cases. The present study included 97 cases diagnosed of solid malignancy. Maximum number of cases were of breast cancer (35.05%) followed by head and neck cancers (28.87%) and gynecological cancers (22.68%). The majority of the anemia in our study was microcytic hypochromic (30.93%) type. It is very much evident that anemia among cancer patients is a major healthcare problem and should be taken seriously. It impacts overall QoL (quality of life) more than is perceived by doctors.

Keywords:- Anemia, Cancer.

I. INTRODUCTION

Anemia is a condition that develops when there are insufficient healthy red blood cells in the blood. It is characterized either by reduction in hemoglobin concentration, red blood cell count or packed cell volume below normal levels[1–4]. As per National Comprehensive Cancer Network (NCCN) guideline, anemia is defined as Hb $\leq$ 14 g/dl for men and <12 g/dl for women. Cancer is one of the most frequent conditions associated with anemia of chronic diseases[5]. The estimated prevalence of anemia varies ranging from 30% to 90% of cancer patients during the course of their diseases[2,4,6].

Grade		Scale (hemoglobin level in g/dl)
1.	Mild	10 - <lower limit of normal
2.	Moderate	8 - < 10
3.	Severe	6.5 - <8
4.	Life threatening	<6.5
5.	Death	Death

Table 1:- Grading of anemia according to NCCN guidelines.

➤ *Pathophysiology of Anemia*
The pathophysiological origins of anemia can be grouped into different categories: blood loss, increased destruction of red blood cells and decreased production of functional red blood cells[2,6]. The origin of anemia in cancer patients is often multifactorial. A number of underlying mechanisms may contribute to anemia of cancer, for instance the underlying co-morbidities such as coagulation disorders, bleeding, hemolysis, hereditary diseases (e.g. thalassemia, hemoglobinopathies, etc.), renal insufficiency, nutritional deficiencies (e.g. due to cancer-induced anorexia or resection of gastrointestinal malignancies), inflammatory disease, or a combination of these mechanisms[2,7].

Cancer-related anemia may occur as a direct effect of neoplasm (by direct invasion of bone marrow, by releasing proteins or substances), by the sensitization of the immune system, or as a result of the cancer treatment whether surgery, radiotherapy or chemotherapy. For examples, procoagulants released from some cancers like gastrointestinal and prostate, development of antibodies in cancer like adenocarcinoma, deposit of amyloid leading to bone marrow replacement in cancer like plasma cell dyscrasia, which all may lead to some type of anemia[8,9].

➤ *Aim*
To study morphological spectrum of anemia in patients with non-hemopoietic cancer.

> *Objectives*
- To find out the cases of non-hemopoetic cancer patients having anemia by hemoglobin and red blood cell mass.
- To examine the peripheral blood smear of these cases and then classify them into different morphological subclasses of anemia

II. MATERIALS AND METHODS

The present study was carried out in Department of Pathology, Jawaharlal Nehru Medical College and Acharya Vinoba Bhave Rural Hospital, Sawangi (Meghe), Wardha from January 2017 to December 2018.

> *Study Design*

97 cases of non-hematological malignancy cases received from different departments of AVBRH, from 2017 to 2018 formed the source of data. This study is an observational analytical study.

> *Inclusion criteria*
- Blood samples will be collected from cancer patients 10 days before or after the treatment, and from those cases whose treatment modalities are known.
- Serum creatinine reports will be observed before collection of the sample to rule out cases with secondary anaemia due to renal failure.

> *Exclusion criteria*
- Cases of primary erythrocytosis will be excluded from the study, as they might result in abnormally low levels of serum Epo.

- Cases where patients were already suffering from anemia before being

> *Materials for study*

Complete blood count as per the cell counters and Peripheral blood smears stained with Leishman stain. diagnosed of the neoplasm Informed consent was taken from the patients. The detailed clinical history taken and general physical examination of patients was done. Results of all relevant investigations done was collected from patient files. Routine complete blood count was done along with peripheral smear examination stained with leishmans stain.

> *Operational Definitions*

Anemia: Anemia is defined as Hb ≤11g/dl or ≥ 2 g/dl below baseline[5]

Mild/**Grade 1**anemia: Hb value of 10-Lower Limit of Normal (LLN) g/dl[10]

Moderate/**Grade 2** anemia: Hb value of 8-10 g/dl[10]

Severe/**Grade 3** anemia: Hb value of 6.5-8 g/dl[10]

Life threatening or unstable/**Grade 4** anemia: Hb value of 6.5 g/dl[10]

III. OBSERVATIONS AND RESULT

The present study included 97 cases diagnosed of solid malignancy. Cases were classified according to the grade of anemia and sex wise distribution. There were 25 male patients 72 cases were females. There were two age groups 18-65 years and age more than 65 years. It was inferred from the table above that maximum cases belonged to age group of more than 65 years and most of them were having moderate grade of anemia.

Sex	Severity of anemia				X2	P-value
	Mild	Moderate	Severe	Life threatening		
Male	14(56.0%)	7(28.0%)	2(8.0%)	2(8.0%)		
Female	30(41.7%)	30(41.7%)	9(12.5%)	3(4.2%)	2.609	0.498

Table 2:- Distribution of cases according to gender and grade of anemia
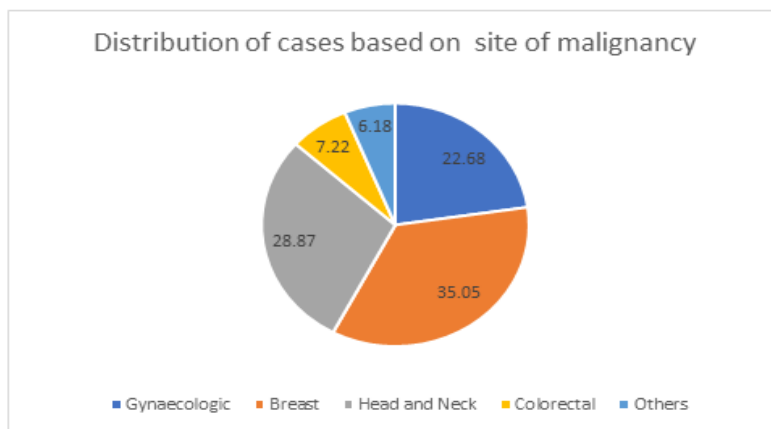
Graph 1:- Distribution of cases based on site of malignancy

The pie diagram shown above shows that the maximum number of breast cancer cases in which anemia was found. This was followed by head and neck cancers and gynecological cancers. Hence it was concluded here that cancer related anemia is very common in carcinoma breast patients.

Range	MCV & MCHC Classes		
	<80	80-100	>100
<32	30.93%	28.80%	1.03%
32-36	16.49%	22.88%	1.03%
>36		1.03%	

Table 3:- Distribution of cases based on the MCV and MCHC values

The table above took into consideration the distribution of cases based on the mean corpuscular volume and the mean corpuscular hemoglobin concentration. According to this table 30.93% cases were having MCHC value of <32 and 16.49% cases had MCHC value between 30-36 and all these cases were having corresponding MCV of less than 80fl. So, it can be concluded from this table that most of the cases were showing microcytic hypochromic blood picture followed next in sequence by normocytic normochromic anemia cases. The macrocytic normochromic group represented a very few number of cases.

IV. CONCLUSION

It is very much evident that anemia among cancer patients is a major healthcare problem and should be taken seriously. Its causes are well established and already reported in literature of repute. It impacts over all QoL (quality of life) more than is perceived by doctors. If not treated, it can shorten survival as well. What are the different guidelines existed for management of such patients should be explored. This small study was merely an attempt to surface this important health issue among cancer patients and to contribute in previously available literature in a bid to end up with more conclusive and acceptable evidence.

RECOMMENDATION

➢ The prevalence of anemia among patients on different cycles of therapy need the attention of other researchers since prevalence of chemotherapy-induced anemia is about two-fold as high as prevalence of cancer-related anemia.
➢ Stool examination and nutritional deficiency screening test should be performed for the exclusion of cancer patients suffering from parasitic infection and having nutritional deficiency from the study participants

REFERENCES

[1]. Schrijvers D, de Samblanx H, Roila F. Erythropoiesis-stimulating agents in the treatment of anaemia in cancer patients: ESMO clinical practice guidelines for use. Ann Oncol. 2010;21(SUPPL. 5).

[2]. Steegmann JL, Sánchez Torres JM, Colomer R, Vaz Á, López J, Jalón I, et al. Prevalence and management of anaemia in patients with non-myeloid cancer undergoing systemic therapy: a Spanish survey. Clin Transl Oncol. 2013 Jun 19;15(6):477–83.

[3]. Cheng K, Zhao F, Gao F, Dong H, Men H-T, Chen Y, et al. Factors Potentially Associated with Chemotherapy-induced Anemia in Patients with Solid Cancers. Asian Pacific J Cancer Prev. 2012 Oct 31;13(10):5057–61.

[4]. Wan S, Lai Y, Myers RE, Li B, Palazzo JP, Burkart AL, et al. Post-diagnosis hemoglobin change associates with overall survival of multiple malignancies – results from a 14-year hospital-based cohort of lung, breast, colorectal, and liver cancers. BMC Cancer. 2013 Dec 10;13(1):340.

[5]. Rodgers GM, Becker PS, Blinder M, Cella D, Chanan-Khan A, Cleeland C, et al. Cancer- and chemotherapy-induced anemia. J Natl Compr Canc Netw. 2012 May 1;10(5):628–53.

[6]. Knight K, Wade S, Balducci L. Prevalence and outcomes of anemia in cancer: a systematic review of the literature. Am J Med. 2004 Apr 5;116(7):11–26.

[7]. Dicato M, Plawny L, Diederich M. Anemia in cancer. Ann Oncol. 2010 Oct 1;21(Supplement 7):vii167-vii172.

[8]. Jamil K, Kalyani P, Perimi R KS. Assessment of severity of anemia and its effect on the quality of life (QOL) of patients suffering with various types of neoplasia. Biol Med. 2009;1(3):63–72.

[9]. Saba HI. Anemia in cancer patients: Introduction and overview. Cancer Control. 1998;5(2 SUPPL.):3–5.

[10]. Cancer Therapy Evaluation Program, Common Terminology Criteria for Adverse Events, Version 3.0.