National Journal of Life and Health Sciences
Vol: 1(1), 2022
Research Article
ISSN: 3006-5852 & ISSN: 3006-5844

Evaluating Hematological Parameter Alterations in Cancer Patients: A Comprehensive Analysis

Muhammad Yousaf[1], Muhammad Talha[1], Asadullah Jan[1*]
[1]MBBS, Jinnah Medical College, Peshawar (25000), Pakistan.
Corresponding Author*: Dr. Asadullah Jan (asadjanktk007@gmail.com)

ABSTRACT
Background: As cancer stands as the primary cause of mortality in both developed and developing nations, the problem is anticipated to escalate worldwide due to aging and rapid population growth. This study aimed to investigate alterations in hematological parameters in patients affected by different cancers.
Materials and Methods: This cross-sectional study was conducted in Cancer Hospital, Abbottabad. Blood samples from cancer patients were analyzed in a pathology lab. In 2021, 92 cancer patients visited between January to June were recruited. Various characteristics of blood samples from cancer patients were examined using the hematology analyzer Nihon Kohden. All data were analyzed through in Microsoft Excel 2016.
Results: A total of ninety two (n=92) patients participated in the study, with 41 male patients and 51 female. Decrease observed in all hematological parameters such as hemoglobin, total leukocyte count, and platelet levels.
Conclusion: The study concludes that cancer patients display significant abnormalities in hematological parameters. A basic blood test emerges as the simplest and most crucial diagnostic tool for identifying illnesses.
Keywords: Hematological parameters, Cancer, leucocyte counts, Hemoglobin level, Platelets count

HOW TO CITE: Yousaf M, Muhammad M, Jan A. Evaluating Hematological Parameter Alterations in Cancer Patients: A Comprehensive Analysis. National Journal of Life and Health Sciences. 2022 Jun; 1(1), 1-3.
DOI: https://doi.org/10.62746/njlhs.v1n1.2
Date of Submission: 04/03/2022 Date of Revision: 29/04/2022 Date of Acceptance: 09/06/2022

INTRODUCTION

Cells in a tumor or neoplasm develop irregularly, resulting in lumps or irregular masses that are widely distributed. Even while the incidence rates of cancer in men are down and those in women are staying the same, the number of cancer survivors in the US is still rising.[1] In less developed nations, adopting lifestyle habits such as smoking, eating an unbalanced diet, not exercising, and delaying having a first child until a later age increases the risk of cancer.[2] Cancer is the second leading cause of death in the United States and a major global health problem. These four represent blood cell cancers.[3] About 30% of pediatric cancer cases are caused by leukemia, which is mostly diagnosed in youngsters.[4] But adulthood is when lymphoma often manifests. Cancers that start in connective tissues, such as bone, cartilage, nerves, and lipids, arise from mesenchymal cells that are not found in the bone marrow.[5] As our understanding of cancer biology advances, new treatment approaches are emerging to improve the quality of life.[6]

Certain disorders such as reticulocytosis, thalassemia, alcoholism, chemotherapy, vitamin B12 insufficiency, or folic acid deficiency alter the hematological parameters.[7] The mean hemoglobin content per red blood cell is represented in picograms.[8] A high white blood cell count is a sign of internal infection.[9] The number of platelets in the blood is ascertained, together with details on their dimensions and the range of sizes present. The average size of platelets is determined by the mean platelet volume.[10] This study aimed to observe the hematological parameters in cancer-affected patients.

MATERIALS AND METHODS

A cross-sectional study was conducted in Cancer Hospital, Abbottabad. Blood samples from cancer patients underwent examination in a pathology lab. Between January to June 2021, a total of ninety two patients were included. To ensure the uniform completion of patient data, name files for each patient were prepared. All patients of any type of cancer were recruited irrespective of age and gender.

About 3ml of blood samples were collected in EDTA tubes. The blood samples were thoroughly mixed by gently flipping the tubes. Using the hematology analyzer Nihon Kohden, blood sample characteristics were analyzed. Three major blood parameters were recorded including the WBCs, Hb, and PLTs. All data were added and analyzed through Microsoft Excel 2007. Percentage and number of patients were distributed and presented in tables.

RESULTS

Two hundred cancer patients were included in the research, with 45.5% (n=51) being female and 44.5% (n=41) being male (Table 1).

Blood samples were collected from patients before and after therapy. Average hemoglobin level was 13.1g/dL before and 12.1g/dL after therapy. Moreover, the total leucocyte count was 103,860/uL before and decreased to 62,020/uL after therapy. Similarly, platelet count was 170000/uL before and then decreased to 120000/uL after therapy (Table 2).

Research Article
ISSN: 3006-5852 & ISSN: 3006-5844

Table 1: Distribution of patients according to Gender-wise

Gender	Male	Female	Total
Frequency	41	51	92
Percentage	44.5%	54.5%	100%

Table 2: Hematological parameters (Hb, TLC, & Platelets) in Cancer patients

Parameters	Hb (g/dL)	Total Leucocyte count (10^3/µl)	Platelets (10^3/µl)
Pre-therapy	13.1	103	170
Post-therapy	12.1	62	120

DISCUSSION

The incidence of cancer appears almost equal in men and women, with chemotherapy emerging as the most efficient aggressive treatment method, utilizing various medications with various mechanisms of action in combination.[11] The chance of developing acute cancer increases with age, especially among individuals over 60, as disclosed in the study with a median age of 62–64.[12] In many countries, the percentage of cancer patients also rises with age. As the number of older cancer patients rises, clinical hematologists are finding that caring for these individuals becomes increasingly critical. However, clinical analysis for cancer in younger groups remains inadequate when compared to older ones.[13] Due to their often-poor health, older folks may not always respond well to chemotherapy. The elderly are also more likely to get secondary cancer brought on by radiation and/or anticancer medications.[14] Asian folks have a reduced incidence rate of cancer (15), and the aged are more likely to have cancer.[15]

Similar results were found in the most recent study: every participant was senior, and only one person under 40 had cancer, suggesting that older people are more likely to have the disease.[16] Male cancer patients who were older than thirty were observed, indicating that older people are more likely to have cancer. No cancer patients younger than thirty were present.[16] In cancer patients, only the WBC count was aberrant and higher than usual. Cancer is rare in youngsters and increases with age.[17] It was found that the median age of cancer patients upon diagnosis was around 65 years old.[18] Additionally, a male preponderance was seen. Asian populations have a low cancer incidence rate.[19] In most cases, minimal amounts of platelets were detected. In certain instances, WBC concentrations were also greater.[20] Patients with cancer did not feel appreciably more distressed than usual. In certain situations, HGB was detected in decreasing levels. HGB, however, was constant within acceptable levels in most persons. In certain instances, it was demonstrated that the quantity of WBCs and platelets was connected. Additionally, platelets were within normal ranges in those whose WBCs were within normal ranges. In several cases, however, both were seen to be in a deteriorating position. Patients with cancer saw an abrupt rise or decline.[21] The first five years of life are when cancer incidence peaks, at around 5.7 per 100,000 persons annually.[22] There was a time when cancer was considered a death sentence. Nonetheless, during the past 50 years, children's cancer survival rates have increased.[23] Patients with cancer today have improved odds of survival. However, there may be some possible negative effects, and patients must endure protracted therapy, which upsets the patient's entire family.

CONCLUSION

Combining these findings allows the use of hematological characteristics as predictive indicators. The basic blood test remains the simplest and most crucial diagnostic tool for identifying illnesses. The primary drawback of the research lies in the absence of follow-up, making it impossible to determine if differences in hematological indices were caused by chemotherapy or surgery, and whether these differences could be utilized to predict overall survival.

REFERENCES

1. Parry C, Kent EE, Mariotto AB, Alfano CM, Rowland JH. Cancer survivors: a booming population. Cancer epidemiology, biomarkers & prevention. 2011;20(10):1996-2005
2. Spring B, King AC, Pagoto SL, Van Horn L, Fisher JD. Fostering multiple healthy lifestyle behaviors for primary prevention of cancer. American Psychologist. 2015;70(2):75
3. Jemal A, Bray F, Center MM, Ferlay J, Ward E, Forman D. Global cancer statistics. CA: a cancer journal for clinicians. 2011;61(2):69-90
4. Hijiya N, Ness KK, Ribeiro RC, Hudson MM. Acute leukemia as a secondary malignancy in children and adolescents: current findings and issues. Cancer. 2009;115(1):23-35
5. Strioga M, Viswanathan S, Darinskas A, Slaby O, Michalek J. Same or not the same? Comparison of adipose tissue-derived versus bone marrow-derived mesenchymal stem and stromal cells. Stem cells and development. 2012;21(14):2724-52
6. El Hachem G, Gombos A, Awada A. Recent advances in understanding breast cancer and emerging therapies with a focus on luminal and triple-negative breast cancer. F1000Research. 2019;8
7. Sankar V, Villa A. Hematologic Diseases. Burket's Oral Medicine. 2021:627-64
8. Khan Z, Nawaz M, Khan A, Bacha U. Hemoglobin, red blood cell count, hematocrit and derived parameters for diagnosing anemia in elderly males. Proceedings of the Pakistan Academy of sciences. 2013;50(3):217-26
9. Baran S, Price C, Hak DJ. Diagnosing joint infections: synovial fluid differential is more sensitive than white blood cell count. European Journal of Orthopaedic Surgery & Traumatology. 2014;24:1469-74

10. Solomon C, Ranucci M, Hochleitner G, Schöchl H, Schlimp CJ. Assessing the methodology for calculating platelet contribution to clot strength (platelet component) in thromboelastometry and thrombelastography. Anesthesia and analgesia. 2015;121(4):868
11. DeSantis CE, Lin CC, Mariotto AB, Siegel RL, Stein KD, Kramer JL, et al. Cancer treatment and survivorship statistics, 2014. CA: a cancer journal for clinicians. 2014;64(4):252-71
12. Miller KD, Siegel RL, Lin CC, Mariotto AB, Kramer JL, Rowland JH, et al. Cancer treatment and survivorship statistics, 2016. CA: a cancer journal for clinicians. 2016;66(4):271-89
13. Azoulay E, Schellongowski P, Darmon M, Bauer PR, Benoit D, Depuydt P, et al. The Intensive Care Medicine research agenda on critically ill oncology and hematology patients. Intensive care medicine. 2017;43:1366-82
14. Burris III HA, Hurtig J. Radiation recall with anticancer agents. The oncologist. 2010;15(11):1227-37
15. McCracken M, Olsen M, Chen Jr MS, Jemal A, Thun M, Cokkinides V, et al. Cancer incidence, mortality, and associated risk factors among Asian Americans of Chinese, Filipino, Vietnamese, Korean, and Japanese ethnicities. CA: a cancer journal for clinicians. 2007;57(4):190-205
16. White MC, Holman DM, Boehm JE, Peipins LA, Grossman M, Henley SJ. Age and cancer risk: a potentially modifiable relationship. American journal of preventive medicine. 2014;46(3):S7-S15
17. Chiaretti S, Vitale A, Cazzaniga G, Orlando SM, Silvestri D, Fazi P, et al. Clinico-biological features of 5202 patients with acute lymphoblastic leukemia enrolled in the Italian AIEOP and GIMEMA protocols and stratified in age cohorts. haematologica. 2013;98(11):1702
18. Quaresma M, Coleman MP, Rachet B. 40-year trends in an index of survival for all cancers combined and survival adjusted for age and sex for each cancer in England and Wales, 1971–2011: a population-based study. The lancet. 2015;385(9974):1206-18
19. Miller BA, Chu KC, Hankey BF, Ries LA. Cancer incidence and mortality patterns among specific Asian and Pacific Islander populations in the US. Cancer Causes & Control. 2008;19:227-56
20. Schiffer CA, Anderson KC, Bennett CL, Bernstein S, Elting LS, Goldsmith M, et al. Platelet transfusion for patients with cancer: clinical practice guidelines of the American Society of Clinical Oncology. Journal of clinical oncology. 2001;19(5):1519-38
21. Linet MS, Ries LA, Smith MA, Tarone RE, Devesa SS. Cancer surveillance series: recent trends in childhood cancer incidence and mortality in the United States. Journal of the National Cancer Institute. 1999;91(12):1051-8
22. Ekanem I-OA, Parkin DM. Five year cancer incidence in Calabar, Nigeria (2009–2013). Cancer epidemiology. 2016;42:167-72
23. Smith MA, Seibel NL, Altekruse SF, Ries LA, Melbert DL, O'Leary M, et al. Outcomes for children and adolescents with cancer: challenges for the twenty-first century. Journal of clinical oncology. 2010;28(15):2625