

Comparison of Alterations in Red Blood Cell Count and Alterations in Hemoglobin Concentration in Patients Suffering from Rectal Carcinoma Undergoing 5-Fluorouracil and Folic Acid Therapy

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Summary

We compared alterations in the red blood cell count and alterations in hemoglobin concentration in patients suffering from rectal cancer that have been undergoing 5-fluorouracil and folic-acid therapy. The red blood cell count and hemoglobin concentrations were measured by automated analyzer. We analyzed that at the middle of the dose cycle, each red blood cell had maximum concentration of hemoglobin than at the start of the treatment. But at end of the chemotherapy, each red blood cell had lower concentration of hemoglobin.

Key Words: RBC count, Hemoglobin concentration, carcinoma of rectum, 5-fluorouracil and folic-acid

Introduction

With 655,000 deaths worldwide per year, rectal carcinoma is the fifth most common form of cancer in the United States and the third leading cause of cancer-related death in the Western world (1-3). It has been well established that malignancy and chemotherapy leads to anemia (4). But the extent and relationship of red blood cell count with hemoglobin concentration in patients suffering from cancers and undergoing chemotherapy is a burning issue that may lead to the better management (5,6).

Purpose of this study was to compare alterations in red blood cell count with alterations in hemoglobin concentration in patients suffering from rectal cancer and have been undergoing 5-fluorouracil and folic-acid therapy.

Materials and Methods

Subjects

Blood samples were collected from 50 patients with carcinoma of rectum admitted in NORI (Nuclear medicine, Oncology & Radiotherapy Institute) Hospital, Islamabad, Pakistan. They were informed to participate in the study.

Project Design

These patients were undergoing a treatment with 5-Flourouracil. First blood sample was taken before the start of chemotherapy; labeled as AD 0 (After Dose 0). Second sample was taken after first dose; labeled as AD 1 (After Dose 1) next after second dose and so on; upto last (sixth) dose. One dose of 5-Flourouracil consists of 12 mg/Kg body weight, once a day for five consecutive days. The patients were also receiving 0.6 mg/Kg body weight folic acid with each medication.

Estimation of RBC Count & Hemoglobin

Red blood cell count and hemoglobin concentrations were measured by automated analyzer.

Statistical Analysis

Means \pm standard deviations for Red blood cell count and hemoglobin concentrations were calculated by using computer program SPSS 11.0 version.

Results

Normal Value of RBC count for men is $4.2-5.4 \times 10^6/\mu\text{L}$ and for women is $3.6-5.0 \times 10^6/\mu\text{L}$ while the normal Value of Hemoglobin for men is 14-18 g/dL and for women is 12-16 g/dL (3). It was very interesting that not a single female with rectal cancer was seen. Means along with standard deviation of the values of RBC count and Hemoglobin concentration of the patients receiving 5-Flourouracil and folic acid after each dose are given in the table 1. RBC count before the start of chemotherapy was $4.35 \times 10^6 /\mu\text{L}$ with Hemoglobin concentration as $4.18 \times 3 \text{ g/dL}$. RBC count after the completion of chemotherapy was $4.4 \times 10^6 /\mu\text{L}$ with Hemoglobin concentration as $3.92 \times 3 \text{ g/dL}$.

Table 1: Means values of RBCs Count with Hemoglobin (Hb) after Each Dose

AFTER DOSE	RBC($\times 10^6 /\mu\text{L}$)	Hb ($\times 3 \text{ g/dL}$)
AD0	4.35	4.18
AD1	4.3	4.23
AD2	4.24	4.21
AD3	4.07	4.23
AD4	4.23	4.18
AD5	4.27	4.05
AD6	4.4	3.92

Comparison of RBC count with hemoglobin concentration (mean values) after each dose of patients with carcinoma of rectum taking 5-flourouracil and folic acid is represented in figure 1.

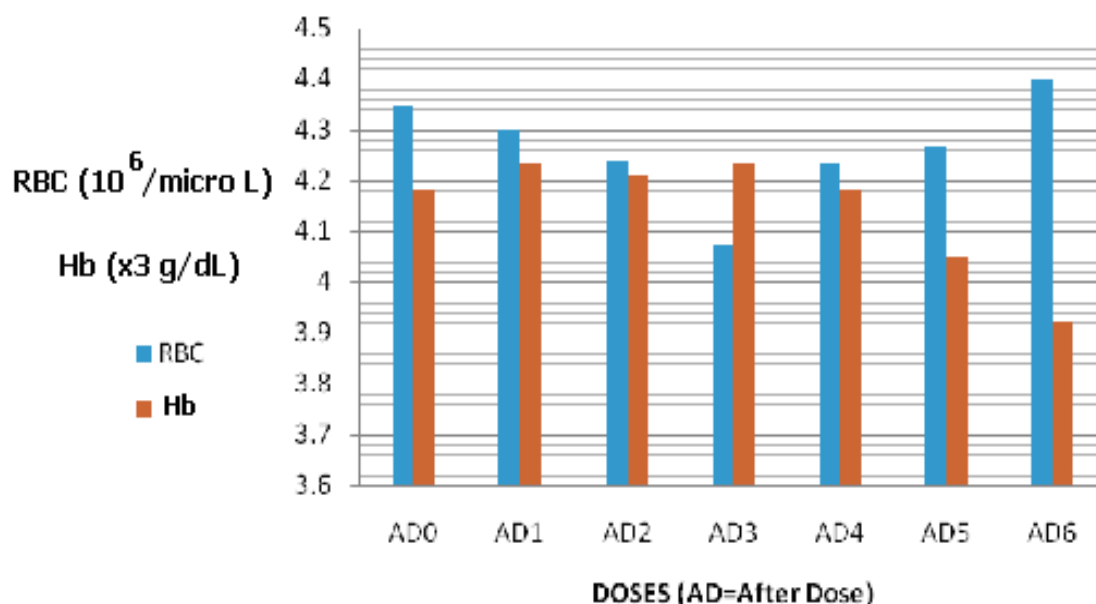


Figure 1: Comparison of RBC count with hemoglobin concentration

Discussion

The incidence of rectal malignancy is slightly higher in males than in females (2). But in this study, not a single case of rectal carcinoma in female indicates that in Pakistani population, incidence of rectal malignancy is greatly higher in males than in females. But this may be proved by increasing the study size.

Overall three factors are affecting on hemoglobin concentration and red blood cell count: Cancer, 5-Flourouracil and Folic acid. Rectum carcinoma decreases both hemoglobin concentration and red blood cell count (7). 5-Flourouracil is an analog of uracil, a nucleotide used for the synthesis of RNA and ultimately proteins including globin of hemoglobin. Thus it causes decrease synthesis of hemoglobin. Folic acid is a precursor of folate which is used for synthesis of both RNA and DNA. Thus folic acid increases both hemoglobin concentration and red blood cell count. Therefore, we may see that at the middle of the dose cycle, each red blood cell has more concentration of hemoglobin than at the start. But at the end, each red blood cell has less concentration of hemoglobin.

It is concluded from this study that at middle of the treatment, red blood cells have maximum concentration of hemoglobin; but after the completion of treatment, red blood cells have lesser concentration of hemoglobin. Thus it is concluded that we have to increase the concentration of hemoglobin rather the number of red blood cells in these patients.

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