

RESEARCH ARTICLE

Study to compare hematological parameters in alcoholic and non-alcoholic individuals

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ABSTRACT


Background: Alcoholism represents one of the most serious worldwide socioeconomic health problems. It is one of the leading causes of preventable mortality, second only to cigarette smoking. Multiple organs can be involved such as hepatobiliary system, cardiovascular system, central nervous system, and hematopoietic system. Impact of alcohol on hematopoietic system divided into direct and indirect effects. Anemia is a predominant feature among chronic alcoholics. **Aim and Objective:** The study is done to know hematological parameters in alcoholics as compared to non-alcoholic individuals. **Materials and Methods:** Twenty-five adult patients who are moderate alcoholics, 25 patients who are severe alcoholics, and 25 adult patients who are non-alcoholics were selected. Hematological parameters such as hemoglobin, red blood cell (RBC) count, total white blood cells count, Mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), MCH concentration (MCHC), and platelet (PLT) count were taken for the study. Statistical analysis was done. $P < 0.05$ was considered as statistically significant. **Results:** Mean hemoglobin, mean RBC count, mean MCH, and MCHC were normal among the non-alcoholic group and it started decreasing among moderate alcoholics and more so with severe alcoholics, and a similar type of result was also seen with total count and PLT count and the difference was found to be statistically significant. **Conclusion:** This shows that alcoholic subjects were suffering from anemia. This study will help to create awareness of the diagnosis of anemia by estimating low hemoglobin levels in alcoholic subjects.

KEY WORDS: Alcoholics; Hemoglobin; Red Blood Cell Count; Platelets

INTRODUCTION

Alcohol consumption is one of the leading causes of death.^[1] It contributes to 3.5% of the global burden of disease and is causally related to more than 60 different medical conditions.^[2] A large epidemiological study observed a significant rise in health-related problems among alcohol users in India.^[3] Regular excessive alcohol consumption may affect

a wide variety of hematological parameters. The principal, well-known abnormality is an increase in erythrocyte mean cell volume (MCV).^[4] The exact mechanism responsible for the increase is still unknown, but it is evidently due to the direct toxic effect of alcohol on the developing erythrocyte.^[5] Studies reported the effect of substance use on various red cell parameters. Abnormalities involving leukocytes, platelets (PLTs), and erythrocytes may occur alone or in various combinations. Alcoholism is characterized by increased tolerance and physical dependence on alcohol, affecting an individual's ability to control alcohol consumption safely. According to the National Council on Alcoholism and Drug Dependence, alcoholism is a primary chronic disease with genetic, psychosocial, and environmental factors influencing its developmental manifestations. As per reports by World

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Health Organization in 2011, it has been shown that alcohol is responsible for causing about 2.5 million deaths per annum, that accounts to 4 percent of all deaths worldwide. Worldwide, 6% of all male deaths are related to alcohol, just over 1% of deaths in women. Almost 1 in 10 deaths among young people aged 15–29 years from alcohol.^[6] Hence, alcohol consumption is known for morbidity and mortality, being a serious health hazard of the world. Multiple organs can be involved such as hepatobiliary system, cardiovascular system, central nervous system, and hematopoietic system. Impact of alcohol on hematopoietic system divided into direct and indirect effects. Direct effect seen in bone marrow and involves red cell, white cell, and PLT lines. Indirect effect due to metabolic or physiologic alterations resulting in liver disease and nutritional abnormality such as folate deficiency.^[7] Anemia is a predominant feature among chronic alcoholics. A look at the hemoglobin levels can alert a physician if the patient is a chronic alcoholic, even when there is no anemia.^[8] Need of the study is early detection and treatment of hematological changes in alcoholics so can prevent complications and reduce the mortality. As of today only very few studies had been done in India to compare the hematological manifestations among alcoholics and non-alcoholics, so this study was undertaken to assess and compare the blood parameters among these two groups, which would help when detected earlier in preventing serious complications due to alcoholics. The aim of the study was to study the hematological manifestation among alcoholics based on the quantity and duration of alcohol intake and compare them with non-alcoholics.

MATERIALS AND METHODS

A retrospective medical chart review was conducted for patients who sought treatment for alcohol use problems for a period of 1 year and healthy non-alcoholic subjects who visited laboratory for routine hematological investigations. A detail history was taken in alcoholics about quantity, type of alcohol, and number of years of alcohol consumed. Name, age, gender, occupation, and socioeconomic status were noted. General and systemic examination was done. The study was approved by the Institutional Ethics Committee.

Samples Size

- Twenty-five adult patients who are moderate alcoholics
- Twenty-five patients who are severe alcoholics and
- Twenty-five adult patients who are non-alcoholics.

Inclusion Criteria

- All adult patients who are moderate alcoholics that are who consume alcohol <80–90 mg alcohol which is about 11 drinks per day
- All adult patients who are severe alcoholics that are who consume more than 80–90 mg alcohol or more than 11 drinks per day

- 20–25 adult patients who are non-alcoholics taken as control.

Exclusion Criteria

- All patients who are <18 years
- Patients with other hepatic disorders
- Patients receiving hepatotoxic drugs.

Following hematological parameters, information of all subjects under the study was collected:

Red blood cell (RBC) count, hemoglobin content, packed cell volume, mean corpuscular hemoglobin (MCH), MCH concentration (MCHC), and PLT count. These hematological parameters were compared between alcoholic and non-alcoholic subjects. All data were entered and analyzed using SPSS. Mean and standard deviation were derived for all parametric variables. Chi-square tests were applied for comparing discrete variables and ANOVA was applied for comparing continuous variables and $P < 0.05$ was considered as statistically significant.

RESULTS

Table 1 shows the duration of alcohol consumption in alcoholic subjects. About 40% of subjects had alcohol consumption for more than 20 years. Table 2 shows the number of subjects having important findings in general examination. About 74% of alcoholic subjects had icterus. About 30% of subjects had pedal edema. About 60% of subjects had pallor. Mean hemoglobin, mean RBC count, mean corpuscular hemoglobin MCH, and MCHC were normal among the non-alcoholic group and it started decreasing among moderate alcoholics and more so with severe alcoholics and a similar type of result was also seen with total count and PLT count, and the difference was found to be statistically significant. This shows that alcoholic subjects were suffering from anemia [Table 3].

Table 1: Duration of alcohol

Duration in years	Number of subjects (%)
1–10	15 (30)
11–20	15 (30)
>20	20 (40)
Total	50 (100)

Table 2: General physical examination

On examination	Number (n=50) (%)
Pallor	30 (60)
Icterus	37 (74)
Clubbing	19 (38)
Pedal edema	30 (60)
Parotid swelling	12 (24)
Others	6 (12)

Table 3: Comparison of hematological parameters between alcoholic and non-alcoholic subjects

Complete blood count	Moderate alcoholic subjects (n=25)	Severe alcoholic subjects (n=25)	Non-alcoholic subjects (n=25)	Significance P value
Hemoglobin (g%)	9.01±1.20	9.31±2.31	11.14±2.24	<0.001
WBC count (cells/mm ³)	8274±2100	6304±2002	8340±1826	<0.001
RBC count (cells/mm ³)	3.26±0.79	3.11±0.68	4.05±0.58	<0.001
MCV (fl)	85.40±8.26	93.42±11.62	88.24±2.46	<0.001
MCH (pg)	26.42±1.82	24.86±1.64	30.42±2.46	<0.001
MCHC (%)	32.88±2.02	30.26±1.46	36.26±1.14	<0.001
PCV (%)	33.52±4.21	28.16±6.02	39.24±2.68	<0.001
Platelet count (cells/mm ³)	1.82±0.32	1.46±0.58	2.80±0.82	<0.001

RBC: Red blood cell, WBC: White blood cell, MCH: Mean corpuscular hemoglobin, MCHC: MCH concentration, PCV: Packed cell volume, fl: Femtoliter

DISCUSSION

The results of the present investigation indicate that hematological parameters are altered in individuals with chronic alcohol intake. It is observed that anemia and thrombocytopenia are more common in individuals with moderate and chronic alcoholics. In the present study, moderate and severe alcoholic subjects had low hemoglobin level, mean MCH, and MCHC which were normal among the non-alcoholic group and it started decreasing among moderate alcoholics and more so with severe alcoholics. All individuals have total white blood cell (WBC) count within normal range; RBC count was low in alcoholic subjects as compared to non-alcoholic subjects. Alcoholic subjects have decreased PLT count.

Alcohol abuse is a growing epidemic in India, especially among men, and nowadays, it is becoming a major problem among young adults. The clinical manifestations of alcohol-induced hematologic disorders are profoundly influenced by the patient's social and economic status, and the presence or absence of other factors such as nutritional deficiency or alcoholic cirrhosis. Most of these changes result, either directly or indirectly, in anemia and when extensive liver disease is present, the patient may develop an abnormally functioning fibrinogen or other coagulation disorders, which may initiate or exacerbate bleeding. Studies had shown that even before anemia appears, approximately 90% of alcoholics have a macrocytosis (mean corpuscular volume (MCV) between 100 and 110 femtoliter (fL) Alcohol-induced macrocytosis occurs even though patients are folate and cobalamin replete and do not have liver disease. The mechanism is unknown, but it takes 2–4 months for the macrocytosis to disappear after the patient becomes abstinent. The results of the study are in concordance with that of the previous study. Earlier studies have found that prolonged and excessive consumption of alcohol through direct or indirect effect suppresses hematopoiesis in individuals with alcohol dependence leads to decrease in RBCs, WBCs, and PLT counts. The previous investigators have found an increase prevalence of anemia in individuals with alcohol consumption for long duration. The results of the present study are in concordance with that of the earlier studies.^[4,9-13]

Alcohol as well as alcohol-induced cirrhosis lead to decreased RBC production. Hypersplenism can cause premature RBC destruction. Folic acid deficiency impairs RBC production and results from decreased ingestion, decreased absorption, and abnormal metabolism of folic acid.^[7] Hypersplenism, blood loss, liver disease, folic acid deficiency, and reduced RBC production are causes of low hemoglobin levels in alcoholics.^[14] Alcoholism has effect on PLT count, blood indices, and total leukocyte count also.^[15] Nigerian Journal of Clinical Practice Vol. 6(2) 2003: 84-86 routine hematological indices were studied in problem drinkers to help in the diagnosis of alcohol-related disorders. A look at the hemoglobin profile, especially MCV and PLT count, can alert a physician if the patient is a chronic alcoholic, even when there is no anemia. Our study further proves that thrombocytopenia is common among severe alcoholics as the mean PLT count was found to be lower than the non-alcoholics and it was almost in par with the studies done by Thoma *et al.* and in another study done in Kebbi State in Nigeria.^[16-22] A case-control study performed in Nigeria had observed significant reduction of WBC, RBC, hemoglobin, hematocrit, and PLT count, while MCV values are significantly elevated.^[23] Another study done in India had shown a significant reduction of hemoglobin, RBC, WBC, hematocrit, and PLT, while MCV and MCH were significantly elevated.^[24]

The present study has certain merits and limitations. The sample size is inadequate. Selection bias is avoided. The sample is not representative of the general population of such patients as the study was done in tertiary care hospital. A much larger representative sample with multiple center approach would be suggested. The current investigation is a retrospective analysis; longitudinal follow-up study matched with control and correlation with other hematological parameters may provide larger scope for interpretation. Future studies are required to draw definite conclusions.

CONCLUSION

Alcoholism was more common in middle-aged subjects. Anemia was more in severe alcoholics than in moderate

alcoholics and non-alcoholics. Early detection of anemia in alcoholics can help to prevent the future complication of anemia and reduce mortality. This study will help to create awareness of the diagnosis of anemia by estimating low hemoglobin levels in alcoholic subjects. Detection of hematological changes in chronic alcoholics and giving psychiatric counseling and treatment for alcohol dependence will decrease the future complications such as cirrhosis liver, cardiac and renal disease, cerebellar degeneration, neuropathy, and pancreatitis and reduce the morbidity and mortality in alcoholics. The prevalence of hematological abnormalities is higher in individuals with alcohol dependence. Our findings substantiate the importance of the assessment of hematological parameters in patients with alcoholic consumption for years.

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