RESEARCH ARTICLE

Moderate Alcohol Intake for Even a Short Duration Has Deleterious Effects on Hematologic Profile in Indian Men

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ABSTRACT

Background: The damage that long-term alcohol abuse can do to the hematologic profile, is well documented; but, whether moderate alcohol intake for a short duration; alters hematologic profile or not, has not been established.

Objective: In the present study, we examined hematologic profile in a group of short-term moderate alcohol drinkers and age and sex matched controls.

Materials and Methods: The present cross sectional study was conducted in one of the tertiary care hospital. We recruited thirty young (20-40 years) men with history of daily 2 to 3 units of alcohol intake/day for the past 1 to 3 years duration. Another thirty age matched men, who were alcohol abstainers, served as controls. Two ml of blood was collected from anterior cubital vein after 12 hours of fasting. Hematological parameters were measured by using KX-21 Sysmex Automated Hematology Analyzer. Data were presented as means ± SD, and analysed using the one tailed unpaired (equal variance) 't' test. The level of significance was taken at P values < 0.05.

Results: We observed that the MCV value was significantly higher and platelet count was significantly lower in the moderate drinkers as compared to controls.

Conclusion: Moderate alcohol intake for even a short duration has deleterious effects on hematologic profile in Indian men.

Key Words: Alcohol; Moderate; Short-Term; Hematologic Profile

INTRODUCTION

People who abuse alcohol are at risk for numerous alcohol-related medical complications, including those affecting the blood (i.e., the blood cells as well as proteins present in the blood plasma) and the bone marrow, where the blood cells are produced.[1] Previous studies have shown that, long-term alcohol abuse has unfavorable effects on hematologic profile, but whether, moderate alcohol intake for a short duration; alters hematologic profile or not has not been established. The present study was designed to determine whether or not alcohol, in amounts commonly consumed by "moderate drinkers," could alter the hematologic profile. The results of these investigations form the basis of this report.

METHODS

This study was approved by ethics committee of the institute, KIMS, Hubli. We recruited thirty young (20-40 years) men with history of daily 2 to 3 units of alcohol intake/day for the past 1 to 3 years duration. {The definition of one unit of alcohol varies from one region in the world to another, but it is generally recognized that 250–300 ml of beer, 150 ml of wine, and 30–50 ml of spirits contain a similar quantity of alcohol, averaging 10 g of pure ethanol. Physicians operationally define "light" drinking as 1.2 drinks/day, "moderate" drinking as 2.2 drinks/day, and "heavy" drinking as 3.5 drinks/day. Abusive drinking is defined as 5.4 drinks/day}.[2] Another thirty age matched men, who were alcohol abstainers, served as controls.

All the participants were non-smokers, non-obese and were not showing any clinical signs of having nutritional deficiency or any pre-existing cardiopulmonary or hepatobiliary disorders. Diabetics and hypertensives were excluded from the study. All subjects provided written informed consent. This study conformed to the standards set by Declaration of Helsinki and the procedures followed were in accordance with the ethical standards as laid by the ICMR-Ethical Guidelines for Biomedical Research on Human Participants

The health status, the patterns and amounts of ethanol intake, and smoking habits were assessed with the use of specifically designed questionnaires. Participants who reported no alcohol intake in the past were classified as abstainers. Moderate drinkers were participants in whom the amount of alcohol consumed was 2 to 3 units of ethanol/d, and the maximum amount of alcohol during the past 24 hours before sampling was 2 standard drinks (each providing 10 g of ethanol). The survey excluded persons who had clinical or laboratory evidence of any current or recent illnesses or infections, had donated blood during the past 5 months, or had used any prescription drugs during the preceding 1 week. None of the moderate drinkers had any social or medical records of heavy drinking or associated medical disorders.

Two ml of blood was collected from anterior cubital vein under all aseptic precautions. Subjects were fasted for 12 hours and rested for 10 minutes in the seated position prior to the venepuncture. Hematological parameters were measured by using KX-21 Sysmex Automated Hematology Analyzer.

Data Analysis

The data are expressed as means ± SD, and analyzed using the one tailed unpaired (equal variance) t- test using the Microsoft Excel 07 software. The level of significance was taken at P values < 0.05.

RESULTS

Table-1: Hematological Parameters of Short-Term, Moderate Alcohol Drinkers and Abstainers

Parameters	Moderate Drinkers (Mean ± SD) N = 30	Abstainers (Mean ± SD) N = 30	P Value
RBC Count (x 10^6/µL)	5 ± 0.6	5 ± 0.5	> 0.05
Hb % (gm/dL)	15 ± 2	15 ± 1	> 0.05
PCV (%)	47 ± 5	45 ± 3	> 0.05
MCV (fL)	89 ± 8	85 ± 4	< 0.001*
MCH (pg)	29 ± 4	29 ± 3	> 0.05
MCHC (gm/dL)	33 ± 2	33 ± 1	> 0.05

* Significant; SD: Standard Deviation; N: Number; RBC: Red Blood Cell count; Hb: Hemoglobin; PCV: Packed Cell Volume; MCV: Mean Corpuscular volume; MCHC: Mean Corpuscular Hemoglobin Concentration

Table-2: Hematological Parameters of Short-Term, Moderate Alcohol Drinkers and Abstainers

Parameters	Moderate Drinkers (Mean ± SD) N = 30	Abstainers (Mean ± SD) N = 30	P Value
TLC (x 10^3/µL)	6.5 ± 2	6.7 ± 2	> 0.05
Lymphocytes (%)	35 ± 6	36 ± 7	> 0.05
Monocytes (%)	13 ± 5	14 ± 7	> 0.05
Neutrophils (%)	52 ± 7	50 ± 7	> 0.05
Platelet count (x 10^3/µL)	209 ± 64	258 ± 83	< 0.001*

* Significant; SD: Standard Deviation; N: Number; TLC: Total Leucocyte Count

The main clinical characteristics of the study and control groups are presented in the above section. We observed that the MCV value was significantly higher and platelet count was significantly lower in the short-term, moderate alcohol drinkers as compared to abstainers (see tables 1 & 2).

DISCUSSION

The results of this study show that, the MCV value was significantly higher and platelet count was significantly lower in the moderate drinkers as compared to controls. Anemia was not observed in our study, may be because majority of the study subjects were non-vegetarians and well nourished and the duration of alcohol intake in our study subjects is also lesser compared to the other studies.

A number of clinical trials in men have suggested that alcohol may act as a hematological toxin in the body. Alcohol has numerous adverse effects on the various types of blood cells and their functions. For example, heavy alcohol consumption can cause generalized suppression of blood cell production and the production of structurally abnormal blood cell precursors that cannot mature into functional cells. Alcoholics frequently have defective red blood cells that are destroyed prematurely, possibly resulting in anemia. Alcohol also interferes with the production and function of white blood cells, especially those that defend the body against invading bacteria. Consequently, alcoholics frequently suffer from bacterial infections. Finally, alcohol adversely affects the platelets and other components of the blood-clotting system. Heavy alcohol consumption thus may increase the drinker's risk of suffering a stroke.[2]

Shaper AG et al.[3] reported that alcohol intake has highly significant positive associations with hemoglobin, PCV and TLC and highly significant negative associations with RBC count. In our study, the MCV was significantly higher ($P < 0.001$) in moderate drinkers than the abstainers. Elevated MCV in heavy drinkers has been reported by previous workers.

John L et al.,[4] found a marked decrease in platelet count in alcoholics without any change in the other parameters. David S et al.[5] found an increase of MCV and thrombocytopenia much more commonly associated with heavy alcohol intake. Similar findings were observed in studies conducted by Oduola T et al.,[6] John BW et al.,[7] Avasroglu D et al.[8] and Whitehead TP et al..[9]

Water AH et al.[10] observed that disturbances of hemopoiesis were common in alcoholics even in the absence of anaemia. However, anemia with decreased RBC count and WBC count was found in a study conducted by Subir KD et al.,[11] Latvala J et al.[12] and Louis WS et al..[13]

The adverse effects of alcohol on the hemopoeitic system are both direct and indirect. The direct consequences of excessive alcohol consumption include toxic effects on the bone marrow, blood cell precursors and the mature RBCs, WBCs and platelets. The indirect effects include nutritional deficiencies, like that of folic acid and other vitamins, which impair the production and function of RBCs, resulting in macrocytosis.[1]

The exact mechanisms underlying alcohol related thrombocytopenia remain unknown. But the available data suggest that alcohol can interfere with a late stage of platelet production by suppressing the maturing megakaryocytes, with little effect on the CFU-megakaryocyte. Alcohol also shortens the life span of existing platelets.[1]

Beard JD et al. reported reductions in hematocrit, hemoglobin, and leukocytes in normal dogs fed ethanol while ingesting an "adequate diet".[14] Farland and Libre[15] noted a leukopenic response to severe bacterial infections in ten alcoholics and found a suboptimal leukocyte response to injected endotoxin. They concluded that their patients had a decreased marrow granulocyte reserve of unknown etiology. Because of the frequent finding of folate deficiency in alcoholism the unknown factor might have been folate deficiency.

CONCLUSION

Moderate drinking of even a short duration, has been shown to affect haematological parameters like MCV and Platelet count, hence these parameters that have association with moderate drinking could be used in conjunction with clinical history for the diagnosis and management of alcoholism.

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