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Original Article

Hematological Profile of Alcohol Dependent subjects: Report from a Tertiary Care Treatment Centre in India

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ABSTRACT

Background & Objectives: A wide variety of hematological parameters are affected by regular excessive alcohol consumption even before any organic complications develop. This study aims to analyze the hematological profile of patients based on quantity of alcohol used and compare it to non-drinking healthy controls.
Method: A retrospective medical chart review was conducted.
Findings and discussion: A total of 200Alcohol dependent (AD) male patients who sought treatment from the centre and age matched 77 healthy controls were included in the study. The patients were divided in to groups based on their self-reported alcohol use and hematological parameters were compared.AD group represented an increased mean levels of erythrocyte mean cell volume (MCV) mean corpuscular hemoglobin (MCH) and a decreased mean values of RBC, total leucocyte and platelet counts. The amount of alcohol consumed was significantly associated with the mean increment of MCV and decreased platelet count with regular alcohol use of more than half a bottle/day.
Conclusion: Alcohol dependence result in diverse patterns of hematological effects and its extent is significantly associated with the amount of alcohol consumed highlighting the importance of routine assessment of hematological parameters.
Key Words: Hematology, Alcohol dependent, Treatment seeking

1. INTRODUCTION

Alcohol consumption is one of the leading cause 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 haematological parameters. The principal, well-known abnormality is an increase in erythrocyte mean cell volume (MCV) [4]. The exact

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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 effect of substance use on various red cell parameters[5-6].Abnormalities involving leukocytes, platelets, and erythrocytes may occur alone or in various combinations.

A clinic-based cross-sectional study in Indian population with moderate use of alcohol reported significantly higher MCV and lower platelet count[7]. The present literature lacks organized work on the effect of amount of alcohol consumed on the hematological profile of alcohol dependent patients (AD). This study was planned with an aim to analyze the hematological profile of treatment seeking alcohol dependent men as compared to non-drinking controls.

2. MATERIALS AND METHODS

A retrospective medical chart review was conducted for patients who sought treatment for alcohol use problems for a period of one year (Jan to Dec 2013) and healthy controls who visited laboratory for routine hematological investigations. Inclusion criteria of the study: male, age 18-65 years, clinical diagnosis of Alcohol Dependence – only for AD group (Diagnostic and Statistical Manual of Mental Disorders IV Text Revision, American Psychiatric Association 2000)[8], no other major physical or mental health problem and no other substance use (except for nicotine use).The socio-demographic and substance use profile was recoded. The study was carried out in accordance with the ethical standards of declaration of Helsinki[9] and complete confidentiality has been ensured.

Reports of the hematological profiling analyzed in the study includes hemoglobin (Hb), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), and mean Corpuscular hemoglobin concentration (MCHC), red and white cell and platelet count (RBC, WBC & PLT). The hematological profiling was performed on Acti Diff Analyzer (Beckman Coulter Diagnostics Pvt Ltd, India).

Control group comprised of healthy men coming to the laboratory for routine hematological profiling. Self- reported alcohol consumption was recorded for the preceding month of assessment and three groups were formed i.e. Group A: control subjects (no alcohol use), Group B:regular alcohol use of less than half a bottle/day (of distilled spirits, typically with 42% v/v absolute alcohol) & Group C: Regular alcohol use of more than half a bottle/day. The recording format permitted collection of data on amount of alcohol consumption in the form of numbers of bottles per day only.

The data were analyzed using SPSS version 21.0. Descriptive statistics have been used for group presentation. In view of non-normal/skewed distribution of data, Kruskal–Wallis test was used as a nonparametric test for group median differences for hematological parameters. A *P* value of 0.05 was taken for statistical significance.

3. RESULTS AND DISCUSSIONS

The chart review resulted in retrieval of records of 200 AD patients and 77 healthy controls. The mean age of AD subjects and control were 36.31 ± 9.2 and 38.39 ± 11.9 years respectively with no significant difference. The hematological profile of the study population is presented in Table 1. The mean Hb of AD patients was found to be comparable with controls subjects. The values of MCV and MCH were found to be significantly higher in three forth of AD patients. No significant difference was observed in MCHC in this study population. The mean levels of RBC, TLC and platelet counts in AD patients were significantly lower compared to controls. Leucopenia (TLC less than 10,000/Cu mm) was found to be present in 22 % and leucocytosis (TLC more than 20,000/Cu mm) in 9.5 % patients with AD.

Based upon the amount of alcohol consumed, numbers of subjects were: 101 in group B, 99 in group C and 77 in group A. The result of inter-group comparison is presented in table 2. The mean MCV and MCH was significantly higher in AD groups than controls which was significantly associated with amount of alcohol consumed. This study could not find dose dependent association of alcohol consumption with Hb and MCHC between AD sub groups. Both RBC count and total leucocyte count was significantly lower in AD groups than control without any dose affect. Platelet counts were significantly lower in AD groups than controls with a significant decrease with higher (more than a bottle) alcohol consumed.

Alcohol use is associated with a variety of hematologic abnormalities and adverse effect on many cell lines[10]. MCV has long been used as part of the screening procedure for detecting alcohol abuse[11]. An elevation of MCV in AD patients may be caused by a deficiency of folate or vitamin B12 or as a direct result of exposure to ethanol per se or its metabolite (i.e., acetaldehyde).The significantly higher value of MCV in AD patients compared to healthy controls seen in this study is in agreement with previous studies[12-13].The association of MCV with amount of alcohol consumed indicates a dose dependent pattern. Thus heavy chronic users may report a higher MCV levels as compared to moderate users. Even moderate users presented elevated MCV levels when compared to controls[7].Anttila et al reported that elevated MCV correlates closely with the duration and extent of drinking episodes[14].

The significant elevation of mean corpuscular hemoglobin (MCH) in our alcohol dependent patients compared to healthy control has been found in previous reports too[15].No significant difference was observed in MCHC amongst study populations except for the fact that subjects with higher amount of alcohol consumption had significantly raised MCHC.

The current study findings showed that RBC count was significantly lower in both subgroups of the alcohol dependent subjects than control group. Cylwik et al reported

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up to 64% of patients with alcohol dependence had lower number of RBC count. It has been hypothesized that reduced number of RBC may be due to direct toxic effects of alcohol including interference of their maturation in the bone marrow[16-17].

In both the subgroups of alcohol dependent patients, total leucocyte count was significantly lower compared to healthy control group. The results are of interest, as rather few reports dealing with leucopoiesis have been published[18].Studies on effects of alcohol on leucocytes found varied results, for example, Latavla et al[10]found leucopenia in approximately 26 % , whereas leucocytosis in 21% AD patient whereas in our sample we found leucopenia in 22 % and leucocytosis in 9.5 % patients with alcohol dependence.

This study found that platelet count was significantly lower among alcohol dependent subjects, particularly among those with higher amount of alcohol consumption indicating dose dependent effects of alcohol on thrombocytes. The decrease in circulating platelet levels with alcoholism is reported by previous investigators[19].The mechanism for ethanol-induced thrombocytopenia is suggested to be multifactorial. Indirect effects like malnutrition and folate deficiency including direct toxic effect of ethanol on platelet production, function and survival time are factors resulting in alcohol-related absolute or relative thrombocytopenia. Limited sample size and non-inclusion of clinical parameters are some of the limitations of the study.

Table 1: The hematological profiling index among alcohol dependent subjects and controls

Parameters	AD subjects (N=200) Mean ± SD.	Abnormal range# (%) in AD subjects.	Controls (N= 77) Mean ± SD.	T test (2 tailed)
Age	36.31[9.2]		38.39[11.9]	0.125
Hb (gm/dl)	14.07[1.8]	8.5 % ↓	14.43[1.4]	0.128
MCV (fl.)	101.39[8.6]	78.5 %↑	91.46[6.3]	0.000*
MCH (pg/cell)	32.00[5.4]	75.0 % ↑	28.89[2.9]	0.000*
MCHC gms/dl	31.37[4.3]	19.5 %↑	31.18[1.1]	0.708
RBC (10^9/L)	4.56[0.7]	8.4 % ↓	5.04[0.6]	0.000*
TLC (/Cu mm)	7219.8[2165.4]	22 % ↓, 9.5%↑	8120.78[2272.5]	0.005*
PLT (/Cu mm)	195.70[78.1]	13.5 % ↓	218.87[60.0]	0.020*

Table 2: Relationship of hematological profiling with amount of alcohol consumption

Variables	Group A Control (n= 77)	Self-reported alcohol consumption (last 30 days) Group B ≤ 0.5 bottle (n=101)	Group C > 0.5 bottle (n= 99)	Kraus-Wallis test by mean rank	Post hoc Mann-Whitney
Age	38.39[11.9]	37.23[9.7]	35.36[8.6]	.140	A Vs B: .436 A Vs C: .068 B Vs C: .158
GGT	30.58[17.2]	79.53[42.2]	621.98[743.4]	.000*	A Vs B: .000* A Vs C: .000* B Vs C: .000*
Hb	14.78[3.3]	14.07[1.8]	14.07[1.7]	.567	A Vs B: .374 A Vs C: .323 B Vs C: .949
MCV	91.46[6.3]	98.81[9.9]	104.02[6.0]	.000*	A Vs B: .000* A Vs C: .000* B Vs C: .000*
MCH	28.89[2.9]	31.91[6.9]	32.09[3.3]	.000*	A Vs B: .000* A Vs C: .000* B Vs C: .038*
MCHC	31.18[1.1]	31.11[2.2]	31.65[5.8]	.083	A Vs B: .535 A Vs C: .039* B Vs C: .100
RBC	5.04[0.6]	4.63[0.7]	4.48[0.6]	.000*	A Vs B: .000* A Vs C: .000* B Vs C; .094
TLC	8120.8[2272.5]	7401.0[2179.1]	7034.9[2146.6]	.006*	A Vs B: .054 A Vs C: .002* B Vs C: .154
PLT	218.87[60.0]	210.14[83.5]	180.98[69.6]	.000*	A Vs B: .335 A Vs C: .000* B Vs C: .003*

4. CONCLUSION

The current findings suggest that alcohol dependence results in diverse patterns of hematological effects. In light of the high prevalence of ethanol-related hematological findings in a general hospital setting, a comprehensive assessment of alcohol consumption should be included as part of the clinical management of patients with obscure hematologic abnormalities or routine assessment hematological profiling in patient with alcohol dependence.

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