Original Research Article

A comparative study on hematological parameters among the social and problem drinkers admitted in a tertiary care rehabilitation centre

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ABSTRACT

Background: Alcoholism is a broad form for problems with alcohol and is generally used to mean compulsive and uncontrolled consumption of alcoholic beverages, usually to the determinant of drinker's health, personal relationships and social standing. It is medically considered a disease, specifically an addictive illness. Alcohol has numerous adverse effects on the various types of blood cells and their functions. This study aimed to evaluate the hematological changes in alcoholic patients admitted in tertiary care hospital.
Methods: The blood samples were collected from alcoholics admitted in a psychiatric and rehabilitation centre and the samples were processed in hematology laboratory in a tertiary care hospital. The hematological parameters (CBC) except ESR, were performed by using fully automated blood cell counters. The change in alcoholics was studied under two categories-social drinkers and problem drinkers. The results of these parameters were compared with age and sex matched normal population.
Results: Total 200 cases included in which 110 were abstainers and 90 were alcoholics. Among alcoholics 67% were problem drinkers and 33% were social drinkers. The mean values of Hb, RBC and MCV in social drinkers were 11.1 g/dl, 3.1 million cells /μl and 100.5 fl, in problem drinkers were 9.8 g/dl, 2.89 million cells /μl and 105.5 fl, and in control population were 14.8 g/dl, 4.8 million cells / μl and 93 fl respectively.
Conclusions: The study shown that parameters were changed in both social drinkers and problem drinkers. But predominant changes were observed in problem drinkers. The presence of elevated MCV and decreased RBC and Hb are suggestive of megaloblastic changes.

Keywords: Hemoglobin, Mean corpuscular volume, Problem drinkers, Red blood cell, Social drinkers

INTRODUCTION

An alcoholic is a men or women who suffer from alcoholism, they have a distinct physical desire to consume alcohol beyond their capacity to control it regardless of all rules of common sense. The WHO ranks alcohol as the third most important risk factor for the global burden of disease and disability (2009). The American Medical Association considers alcoholism as a disease and supports a dual classification of alcoholism to

include both physical and mental components. According to the National Institute on Alcohol Abuse and Alcoholism (NIAAA) men may be at risk for alcohol related problems if their alcohol consumption exceeds 14 standard drinks per week or 4 drinks per day and women may be at risk if they have more than 7 standard drinks per week or 3 drinks per day.[1] It defines a standard drink as one 12 ounces bottle of beer, one 5 ounces glass of wine, or 1.5 ounces of distilled spirits.[2]

The changes in alcoholic can be studied under two categories- social drinkers and problem drinkers. Social drinkers are who consume alcohol at safe level that is 4 standard drinks per day and problem drinkers are who consume more than standard unit.[3]

Alcoholism is a long term or chronic disease. It primarily effect is the increase in stimulation of GABA receptor, promoting central nervous system depression. With repeated heavy consumption of alcohol these receptors are desensitized and reduced in number, resulting intolerance and physical dependence.[4,5]

People who abuse alcohols are at risk for numerous alcohols related medical complications, including those affecting the blood (blood cells as well as proteins present in the blood plasma) and bone marrow, where the blood cells are produced. Alcohol's advers effects on the blood building or hematopoietic systems are both direct and indirect.[6] The direct consequences of excessive alcohol consumption include toxic effects on the bone marrow, the blood cell precursors, the mature red blood cells (RBC), white blood cells and platelets. Alcohols indirect effects include nutritional deficiencies that impair the production and function of various blood cells. These direct and indirect effects of alcohol can result in serious medical problems for the drinkers. For example, anaemia resulting from diminished RBC production and impaired RBC metabolism and function can cause fatigue, shortness of breath, light headedness, even reduced mental capacity and abnormal heart beats. A decrease in the number and function of WBC's increases the drinker's risk of serious infection, and impaired platelet production and function interfere with blood clotting, leading to symptoms ranging from a simple nose bleed to bleeding in the brain.[7] Finally alcohol induced abnormalities in the plasma proteins that are required for blood clotting can lead to the formation of blood clots.[8]

The aim was to study hematological manifestations among alcoholics based on the quantity and duration of alcohol intake and compare them with non alcoholics.

METHODS

The blood samples were collected from alcoholics admitted in a psychiatric and rehabilitation centre and the samples were processed in hematology laboratory in a tertiary care hospital. Two ml of blood collected in EDTA bottle for the evaluation of main hematological

changes in alcoholism from each patient with age group 21-75. A total of 200 cases were considered randomly for the study. Among these 110 were control group and 90 were alcoholics. The total duration of the study was four months.

To assess the hematological changes in alcoholic patient's blood parameters were analyzed. Which include Red blood cell (RBC) count, White blood cell (WBC) count, Platelet count, Hemoglobin (Hb) Concentration, Packed cell volume (PCV), Mean Corpuscular Volume (MCV), Mean corpuscular hemoglobin (MCH), Mean corpuscular hemoglobin concentration (MCHC), Red cell distribution width (RDW) and Erythrocyte sedimentation rate (ESR). Complete blood cell counts were analyzed by fully automated Beckman Coulter (LH 700 Series System) which is working under the principle of electrical impedance. ESR were analyzed by manual Westergren's method.

The changes in alcoholics were studied under two categories; social drinkers and problem drinkers. The values then compared with normal individuals or abstainers.

Statistical analysis was done for homogencity and normality and datas were following normal distribution curve; thereby using parametric tests. Mean and Standard deviation were used to compare the means between drinkers and abstainers.

RESULTS

The result of hematological parameters were compared with age and sex matched normal individuals (abstainers). In this study total 200 cases were included in which 110 were abstainers and 90 were alcoholics. Out of 90 alcoholics 50 were problem drinkers and 40 were social drinkers.

Table 1: Age distribution in alcoholic group.

Age group	Percentage
21-30	13%
31-40	23%
41-50	36%
51-60	16%
Above 60	12%

Table 2 shows all the mean haematological values of social drinkers, problem drinkers and control population were tabulated.

There is a significant decrease in Hb concentration which is more prominent in problem drinkers than social drinkers. The mean Hb concentration of problem drinkers was 9.8 gm/dl which is very much lower than the normal value (14-16 gm/dl). When compared to abstainers (4.8 million cells/μl) this study shows a significant decrease in

RBC count of both social drinkers (3.1 million cells/μl) and problem drinkers (2.89 million cells/μl) and is markedly decreased in problem drinkers. The ESR of social drinkers was 18 mm/hr, problem drinker was 28 mm/hr and that of abstainers was 12 mm/hr, which shows a significant increase in ESR in problem drinkers. The MCV value shows an increase in problem drinkers than

social drinkers and in abstainers (105.5 fL, 100.5 fL and 93 fL respectively). There is a decrease in PCV value, which is more prominent in problem drinkers (29.4 %) than social drinkers (34.5%).

This study also shows increase in RDW value among problem drinkers (16.8%) than abstainers (14.3%).

Table 2: Mean Hematological Values of Study Population.

Hematological mean	Social drinkers	Problem drinkers	Abstainers	Normal values
Hb	11.5	9.8	14.8	14-16 g/dl
PCV	34.5	29.4	41.6	40-54%
MCV	100.5	105.5	93	76-96 fL
MCH	32	30	32	27-32 pg
MCHC	33	31	34	30-35 pg
RDW	15.15	16.8	14.3	11.5-14.5%
RBC count	3.1	2.89	4.8	4.5-6.0 Million cells/μl
WBC count	6400	6200	7400	5000-11000 cells/μl
Platelet count	1.8	1.6	2.2	1.5-4.5 lacks/μl
Neutrophils	52	54	68	40-80%
Eosinophils	10	12	08	1-6%
Basophils	00	00	00	0-1%
Lymphocytes	36	31	20	20-40%
Monocytes	02	03	04	2-10%
ESR	18	28	12	0-10 mm/hr

DISCUSSION

Alcoholism is a very chronic condition, which cause various physiological and psychiatric problems. Physiological problems include disturbance in almost all system of our body especially liver, kidney etc. which also include changes in hematological parameters.

The study of Sanft HJ, Schulz K, concluded that there is no symptom which would be pathognomonic for alcoholism itself.[9] Macrocytosis and macrovoluminity of erythrocytes, hypersideremia and thrombocytopenia were findings frequently encountered and easily to be identified. Megaloblasts, vacuolization and an increase of sideroblast could be observed in the bone marrow.[10,11] The prompt reversibility of these changes mentioned by simply abstaining from alcohol has a considerable diagnostic utility. The impact of liver damage partly produced by an accompanying spleen enlargement could only be ensured for thrombocyte depression.[12] The reduced platelet count or thrombocytopenia in alcoholics is mainly caused by splenomegaly, liver disease and also direct toxic effect of alcohol on formed elements like RBC, WBC and platelet. In this study, the platelet values were decreased in alcoholic subjects (closer to lower extremities of normal ranges of platelet) from the control subjects.[13,14]

The increase of meth-hemoglobin which is unequivocal but without any clinical importance can also be reversed by alcohol depreviation. From a hematological point of view an alcoholic is endangered by a deficit immunological system. Hemorrhagic diatheses due to thrombocytopenia, thromboembolic complications during rebound-thrombocytosis and severe haemolysis can rarely be found.[15,16]

RDW (Red Cell Distribution Width) will be high in nutritional deficiencies like minerals, vitamins etc. In case of mineral (Iron) deficiency there will be microcytes in peripheral blood and in vitamin (foliate or and Vit B12) deficiencies show macrocytes in peripheral blood. In macrocytes both MCV and RDW shows a high value and if MCV is low and RDW is high is implicated to microcytes. In this study, the MCV and RDW were high in alcoholics that indicate macrocytic anaemia due to vitamin deficiency.

The study of Dr. Bijoykumar Barik concluded that the correlation of alcohol consumption with hematological changes revealed a significant decrease in Hb% and increase in ESR and increase in MCV with the duration of alcohol consumption 5 to 10 years and when it is more than 10 years of duration.

CONCLUSION

In this study, there was marked abnormality in various parameters. The changes are categorized under social and problem drinkers. The parameters were changed in both groups. But predominant changes are observed in problem drinkers. There is a significant decrease in RBC count, Hb concentration and PCV. The MCV is predominantly elevated but other indices have no change. Also, there is increase in RDW and ESR. The presence of elevated MCV, decreased RBC and Hb are suggestive of megaloblastic changes.

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