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## **A prospective study to assess the comparison of hematological manifestations in alcoholics and non-alcoholics at tertiary care centre in north India**

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**Abstract**---Background: Alcoholism is one of the most serious global public health problems. Chronic alcohol abuse results in physical illness, emotional changes and others problems in their lives and relationships. Alcohol problems can often be prevented by early identification and brief intervention. Our study was done to document the hematological changes in chronic alcohol users as early detection and treatment of hematological changes can prevent complications and reduce the morbidity and mortality. Materials & Methods: A prospective study done on 60 patients who sought treatment for alcohol use problems or its complications on an outdoor patient basis (hospital or clinic) for a period of one year (2021 to 2022) and 60 healthy non-alcoholic subjects, who visited the hospital/clinic for non-alcohol related problems and were advised for routine hematological and other relevant investigations. The hematological parameters were compared between alcohol users and non-alcoholic subjects. All data were entered and analyzed using SPSS. 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: Incidence of alcohol consumption is less common below the age of 25 years and above the age of 71 years, which was statistically insignificant ( $P = 1.00$ ). Mean hemoglobin, mean RBC count, mean corpuscular hemoglobin MCH, and MCHC were normal among the non-alcoholic group, and it started decreasing among moderate alcohol intake and more so with severe alcohol intake. 40% of alcohol users are having microcytic, hypochromic blood picture, macrocytosis is seen in 13.33% of patients. Even in non-alcoholics 20% of them are having Microcytic hypochromic blood picture. Dimorphic and pancytopenia blood picture in alcoholics on statistical analysis shows 'p' value of  $> 0.05$ . Conclusion: We concluded that detection of hematological changes in chronic alcoholics is common and increase with amount of alcohol consumed and can by itself cause significant morbidity.

**Keywords**---chronic alcoholics, alcoholism, non-alcoholics, anemia.

## **Introduction**

Alcoholism (Alcohol use disorder) is defined as repeated alcohol related difficulties in at least 2 of 11 life areas that cluster together in the same 12 months period.<sup>1</sup> Lifetime risk for an AUD in most of the western countries is about 10-15% for men and 5-8% for women. Approximately 60% of the risk for AUD is attributed to genes. Recent trends in alcohol consumption changed in India that increased drinking among women due to ready availability, decreased social stigma regarding drinking. Initiation age also decreased with shift from urban to rural areas and pattern of binge drinking.<sup>2</sup>

Alcoholism is one of the most serious global public health problems. Regarding disease Burden Alcohol is the world's third largest risk factor. Alcoholism results in 3.3 million deaths per year globally. AUD decreases the life span by 10 years. Two Billion people consumes alcohol Worldwide, as estimated by WHO (world health organization). Among these 76.3 million people have AUD. Incidence of alcoholism is high especially in lower socio-economic status groups and they prefer low-cost beverages with less quality and more deleterious effects on the organ system.<sup>3</sup>

Recent changing trends like greater social acceptability in alcohol consumption greatly increases the number of consumers especially in youth population to overcome social inhibitions, to produce sense of wellbeing and pleasure. Chronic alcohol abuse results in physical illness, emotional changes and others' problems in their lives and relationships. If alcoholism is not treated, it causes premature deaths through damage to liver, brain, kidney, heart and other organs also. Alcohol dependence is one of the leading contributors to road traffic accidents, suicidal attempts, violence and other events. Untreated alcohol dependence people will lose their jobs, families and other relationships.<sup>4</sup>

The factors increasing risk of liver disease in alcoholics are quantity and duration of intake, Sex (Females susceptibility twice as males), co-infection with Hepatitis C, Genetic factors, Malnutrition, Obesity, Smoking and Iron overload. Hence alcohol consumption causes significant morbidity and mortality. Multiple organs can be involved like Hepatobiliary system, cardiovascular system, Central Nervous system and Haemopoietic system.

Alcohol problems can often be prevented by early identification and brief intervention. The weak links are identifying problems early and the skill and competencies necessary for such an assessment and the experience to confidently move to more specific questions, investigations and suggestion for change. Anemia is a predominant feature among chronic alcohol consumers. A look at the hemogram can alert a physician if the patient is a chronic alcohol user even if the history is withheld, even when there is no anemia.<sup>5</sup> Our study was done to document the hematological changes in chronic alcohol users as early detection and treatment of hematological changes can prevent complications and reduce the morbidity and mortality.

### **Materials & Methods**

A prospective study done on 60 patients who sought treatment for alcohol use problems or its complications on an outdoor patient basis (hospital or clinic) for a period of one year (2021 to 2022) and 60 healthy non-alcoholic subjects who visited the hospital/clinic for non-alcohol related problems and were advised for routine hematological and other relevant investigations.

### **Inclusion Criteria**

- All adult patients who regularly consume alcohol, moderate use was defined as less than or equal to two drinks per day for men and less than or equal to one drink per day for women.
- All adult patients who are severe alcohol user, defined as more than 7 drinks a week in women and more than 14 drinks in a week in men.
- Mild use of alcohol was considered in less than moderate users.
- 60 adult patients who are non-alcoholic without significant other co morbidities were taken as controls.
- Both sexes were included.

### **Exclusion Criteria**

- Patients with age less than 18 years.
- Pregnancy
- Previous history of Haematological disorders or Malignancies.
- Patients with other hepatic diseases.
- Chronic illness such as Tuberculosis (or) Diabetes mellitus etc.
- Patients receiving any hepatotoxic or Haemotoxic drugs.
- Overt gastrointestinal bleed or transfusion in last 3 months

## Methods

A detailed 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. Red blood cell (RBC) count, hemoglobin content, packed cell volume, mean corpuscular hemoglobin (MCH), Mean corpuscular volume (MCV), MCH concentration (MCHC), and PLT count. These hematological parameters were compared between alcohol users 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

In our study, maximum number 38 (63.3%) of alcohol consuming patients are in the age group (31-50), minimum numbers (8.33%) of alcoholics are in the age group (21-30). Incidence of alcohol consumption is less common below the age of 25 years and above the age of 71 years, which was statistically insignificant ( $P = 1.00$ ). Out of 60 alcohol users recruited, 56 are males (93.33%) and remaining 4 are female (6.6%). This shows that alcohol consumption is less common in females. The higher number of alcohol users are in low socioeconomic status 40 (66.6%), 25% are in middle socioeconomic status. p-value in this statistical analysis is  $< 0.05^*$ , which is significant (table 1).

In present study, 41.6% of patients in study group are consuming alcohol for a period of 11-20 years, 36.6% are using for a period of more than 20 years and the remaining 21.6% of them were taking alcohol for 10 years and below (table 2). Mean hemoglobin, mean RBC count, mean corpuscular hemoglobin MCH, and MCHC were normal among the non-alcoholic group, and it started decreasing among moderate alcohol intake and more so with severe alcohol intake and a similar type of result was also seen with total count and PLT count, and the difference was found to be statistically significant. MCV was significantly higher in moderate to heavy ethanol users. This shows that a significant percentage of alcohol using subjects were suffering from anemia (table 3).

In our study, 40% of alcohol users are having microcytic, hypochromic blood picture, macrocytosis is seen in 13.33% of patients. Pancytopenia and Dimorphic blood picture is seen in only 1.66% of alcoholics. 38.33% of alcoholics are having Neutrophilia due to infection, thrombocytopenia is seen in 25% of alcoholics. Even in non-alcoholics 20% of them are having Microcytic hypochromic blood picture. Dimorphic and pancytopenia blood picture in alcoholics on statistical analysis shows 'p' value of  $> 0.05$  (table 4).

## Discussion

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 due to thrombocytopenia or deranged prothrombin time, which may initiate or exacerbate bleeding.

In our present study 60 alcoholic patients and their age group ranged from 20 years to 60 years, mean age being 48.67 years. In a similar study done by T. Oduola et al.<sup>6</sup> in Nigeria out of 200 patients age of patients ranged from 20 years to 57 years mean age being 36.04±11.28 years. In our study, maximum number (63.33%) of alcoholics are in the age group (31-50), least number (8.33%) of alcoholics are in the age group (21-30). Incidence of alcohol consumption is less common below the age of 25 years and above the age of 71 years, which was statistically insignificant (P=1.00). This could be probably because middle age group people belonging to lower socioeconomic status start consuming alcohol after gaining financial independence and alcohol purchasing capacity.

Our results show similarity with D. Chalmers et al.<sup>7</sup> who in 1981 from Harrow published a study of 219 subjects out of which 146 (66.66%) were men 73 (33.33) were females. In a similar study done by T. Oduola et al.<sup>6</sup> in Ile at Nigeria out of 200 chronic ethanol users (100%) I.e. all were men. Our study showed that there is chronic significant ethanol use in lower socioeconomic group (labor class) who are visiting our hospitals. Being poor they tend to consume low quality drink like arrack, toddy and other locally and somewhat illicitly brewed beverages. In a similar survey done by Sammaiah P et al.<sup>8</sup> in 2018 showed a high incidence of chronic alcohol consumption in low socio-economic group.

In present study, 41.66% of patients in study group are alcoholic for a period of 11-20 years, 36.66% are alcoholic for a period of more than 20 years and the remaining 21.66% of them were alcoholic for 10 years and below. In the similar study conducted by D. Chalmers et al.<sup>7</sup> 219/373(58.8 %) were severe alcoholics for more than 10 years. Another similar study conducted by T. Oduola et al<sup>6</sup>, 200 patients were studied among which 50% moderate alcoholics who were consuming alcohol for less than 10 years. 50% were severe alcoholic who consumed for more than 10 years.

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 mild alcoholics. MCV tend to be significantly elevated in moderate and severe users either due to folate deficiency or alcohol per se. 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 (platelet) count. 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.<sup>9-12</sup> Alcohol as well as alcohol-induced cirrhosis led 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.<sup>13</sup> Hypersplenism, blood loss, liver disease, folic acid deficiency, and reduced RBC production are causes of low hemoglobin levels in alcoholics.<sup>14</sup> Alcoholism has effect on PLT count, blood indices, and total leukocyte count also.<sup>15</sup> 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.<sup>16-18</sup> 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.<sup>19</sup> Another study done in India had shown a significant reduction of hemoglobin, RBC, WBC, hematocrit, and PLT, while MCV and MCH were significantly elevated.<sup>20</sup> In our study, 40% of alcoholics are having microcytic, hypochromic blood picture. The similar study done by T. Oduola et al.<sup>6</sup> in severe drinkers they showed predominantly a macrocytic blood picture in peripheral blood smear. In other similar study by Latvala Jaana and Parkkila<sup>21</sup> thrombocytopenia was found in 41% of alcoholics.

## Conclusion

We concluded that detection of hematological changes in chronic alcoholics is common and increase with amount of alcohol consumed and can by itself cause significant morbidity. Psychiatric counseling directed therapies (folate and iron supplementation etc), treatment for alcohol dependence with drinking cessation will decrease the future complications such as cirrhosis of liver, cardiac and renal disease, Haemopoietic diseases, cerebellar degeneration, neuropathy, and myriad of other alcohol related diseases and reduce the morbidity and mortality in alcoholics.

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Table 1: Demographic profile of alcoholic and non-alcoholic patients

Demographic profile	Alcoholic (60)	Non-Alcoholic (60)	Total (120)	Chi square	p
Age (years)					
21 - 30	5	5	10	0.34	1.00
31 - 40	17	17	34		
41 - 50	21	20	41		
51 - 60	12	13	25		
Above 60	6	4	10		
Gender					
Male	56	54	110	0.16	>0.05
Female	4	6	10		
Socioeconomic status					
Lower	40	30	70	11.78	<0.05*
Middle	15	15	30		
Upper	5	15	20		

Table 2: Duration Of Alcohol Intake

Duration of alcohol	Frequency	Percent
1 - 10	13	21.66%
11- 20	25	41.66%
> 20	22	36.66%
Total	60	100%

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

Complete blood count	Moderate alcoholic subjects (n=30)	Severe alcoholic subjects (n=30)	Non-alcoholic subjects (n=60)	Significance P value
Hemoglobin (gm%)	9.12±1.18	9.35±2.33	11.16±2.28	<0.001
WBC count (cells/mm <sup>3</sup> )	8268±2100	6317±2042	8348±1835	<0.001
RBC count (cells/mm <sup>3</sup> )	3.23±0.82	3.13±0.66	4.13±0.57	<0.001
MCV (fl)	85.38±8.11	93.57±11.49	87.34±2.36	<0.001
MCH (pg)	26.27±1.72	24.76±1.54	31.22±2.24	<0.001
MCHC (%)	33.08±2.01	31.15±1.36	36.46±1.24	<0.001
PCV (%)	33.22±4.11	28.26±6.12	39.44±2.58	<0.001
Platelet count (10 <sup>6</sup> cells/mm <sup>3</sup> )	1.78±0.30	1.45±0.56	2.82±0.72	<0.001

Table 4: Peripheral Blood Smear in between alcoholic (moderate &amp; severe alcoholic) and non-alcoholic

Peripheral blood picture	Alcoholic	Total	p
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		NA (N=60)	Moderate (N=30)	Severe (N=30)		
Normocytic Normochromic	No	12	12	25	49	<0.05*
	Yes	48	18	5	71	
Microcytic Hypochromic	No	48	23	13	84	<0.05*
	Yes	12	7	17	36	
Macrocytic	No	60	29	23	112	<0.05*
	Yes	0	1	7	8	
Pancytopenia	No	60	30	29	119	>0.05
	Yes	0	0	1	1	
Neutrophilia	No	60	23	14	97	<0.05*
	Yes	0	7	16	23	
Dimorphic	No	60	29	30	119	>0.05
	Yes	0	1	0	1	
Thrombocytopenia	No	60	22	23	105	<0.05*
	Yes	0	8	7	15	