

## Haematological Manifestations of Alcoholics in Comparison with Non Alcoholics

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### Abstract

**Background:** Alcoholism is a chronic, progressive, and potentially fatal disease. The major health risk of alcoholism includes liver disease, heart disease, pancreatitis, central nervous system disorders, disorders of hematopoietic system, and certain forms of cancer. The effects on haemopoietic system are both direct and indirect, with anemia being commonly seen in alcoholics. These hematological changes are commonly missed resulting in morbidity and mortality. **Aims and Objectives:** The study was done to compare the hematological parameters in alcoholics to non-alcoholic individuals. **Methods:** Thirty adult patients who were moderate alcoholics, thirty severe alcoholics, and Thirty Non Alcoholic patients were enrolled in the study. Hematological parameters such as hemoglobin, Red Blood Cell (RBC) count, Total Leucocyte 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. **Conclusion:** It was concluded from the study that hematological changes are common in alcoholics and correspond to the quantity of alcohol intake.

**Key words:** Alcoholism, Anemia, CBC, Thrombocytopenia

## INTRODUCTION

Alcoholism has been defined as an individual's dependence on alcohol, alcohol misuse or uncontrolled drinking habit, which adversely affects biological, social and mental well-being.<sup>[1]</sup> It is characterized by tolerance and physical dependence or pathologic organ changes, or both-all of which are the direct or indirect effect of alcohol consumption.<sup>[2]</sup> It is estimated that 3.5% of the global burden of disease is attributable to alcohol, which accounts for as much death and disability as tobacco and hypertension. Alcohol is not only causally related to more than 60 medical conditions,<sup>[3,4,5]</sup> but is also

linked to categories of disease whose relative impact on the global burden is predicted to increase. More than 2 billion people, or about three of ten individuals, are current drinkers globally.<sup>[6]</sup>

There are multiple mechanisms through which alcohol use affects wellbeing: through cumulative intake, which causes damage to organs and tissues; by acute intoxication that may contribute to injuries or poisoning; and by dependent drinking leading to impairments and potentially self-harm or violence. These effects are also influenced by an individual's consumption volume and pattern of drinking.<sup>[7]</sup>

Alcohol has various adverse effects on the blood cells and their functions. Heavy drinking can cause generalized suppression of blood cell formation and also result in the production of structurally abnormal blood cell precursors that cannot develop into functional cells.<sup>[8]</sup>

The impact of alcohol on hematopoietic system can be direct or indirect. Red Blood Cells, White Blood Cells, and Platelet lines are directly affected in the bone marrow. Indirect effects are attributable to metabolic or physiologic changes due to liver disease and dietary abnormalities like folate deficiency.<sup>[9]</sup>

Many a time haematological changes are left undetected and untreated which could progress to serious complications. Early detection and treatment of haematological changes can prevent complications and reduce the mortality.

## MATERIALS AND METHODS

The present prospective study was conducted in the Medicine department of Guru Nanak

Dev Hospital, Amritsar attached to Govt. Medical College, Amritsar. Thirty moderate alcoholics, thirty severe alcoholics, and thirty non alcoholics were enrolled in the study. Moderate alcoholics included were those who consumed less than or equal to two drinks per day for men and one drink per day for women. Severe alcoholics consumed more than fourteen drinks per week for men & seven drinks per week for women. The patients aged less than 18 or those with preexisting hepatic disorder were excluded.

Following hematological parameters of all the subjects under the study were collected: Red blood cell (RBC) count, hemoglobin(HB) content, Total Leucocyte Count(TLC), Mean Corpuscular Volume(MCV), Mean Corpuscular Hemoglobin (MCH), MCH concentration (MCHC), Packed Cell Volume(PCV) and Platelet(Plt) count. These hematological parameters were compared between alcoholic and non-alcoholic subjects. Chi-square test and one- way analysis of variance (ANOVA) tests were performed.

## RESULTS

**Table 1:** Symptom Analysis

Complaint	Moderate Alcoholics ( n=30)	Severe Alcoholics ( n= 30)	Non Alcoholics(n=30)	P
Jaundice	5 (16%)	10 (33%)	0	<.001
Pedal edema	5 (16%)	12 (40%)	1(3%)	<.001
Haematemesis	3 (10%)	5 (16%)	0	<.001
Malena	5 (16%)	15 (50%)	0	<.001

Abdominal distension	5 (16%)	13 (43%)	0	<.001
Altered Sensorium	1 (3%)	3 (10%)	0	<.001

**Table 2:** General Examination Comparison

Complaint	Moderate Alcoholics (n=30)	Severe Alcoholics (n= 30)	Non Alcoholics(n=30)	P
Pallor	9 (30%)	10 (33%)	3(10%)	<.001
Icterus	5 (16%)	13 (43%)	0	<.001
Ascites	6 (20%)	14 (46%)	0	<.001
Pedal edema	5 (16%)	12 (40%)	0	<.001
Other signs of Liver failure	5(16%)	10(33%)	0	<.001

**Table 3:** Comparison of Complete Blood Count

Blood Parameter	Study Group	Mean	SD	Annova	P
HB	NA	11.76	1.163111167	0.52	p< 0.00001
	Moderate	9.77	1.81		
	Severe	9.17	2.17		
TLC	NA	8136.333333	1004.996083	7.79	p< 0.00001
	Moderate	7790	3360.87		
	Severe	12156.7	7491.41		
RBC	NA	3.878333333	0.325280604	27.85	p< 0.00001
	Moderate	2.8	0.82		
	Severe	2.719	0.75		
MCV	NA	88.83333333	2.245045631	12.86	p<0.00001
	Moderate	93.64	6.69		



	Severe	96.10	6.67		
MCH	NA	30	1.5974117	0.76	0.46
	Moderate	29.58	4.19		
	Severe	28.26	4.28		
MCHC	NA	36.07	1.649691716	53.4	p< 0.00001
	Moderate	29.01	3.34		
	Severe	28.3	4.13		
PCV	NA	38.21333333	1.755333416	56.52	p< 0.00001
	Moderate	28.84	5.45		
	Severe	27.97	4.29		
Platelet	NA	2.531666667	0.169218963	15.48	p< 0.00001
	Moderate	1.96	0.68		
	Severe	1.69	0.75		

**Table 4:** Comparison of Renal Function Tests

Blood Parameter	Study Group	Mean	SD	Annova	P
Urea	NA	27.42333333	2.571016615	455.06	p< 0.00001
	Moderate	63.7	7.2		
	Severe	89.03	11.4		
S. Creatinine	NA	0.876666667	0.209569893	267.02	p< 0.00001
	Moderate	2.04	0.37		
	Severe	3.04	0.46		

**Table 5:** Comparison of Liver Function Tests



Blood Parameter	Study Group	Mean	SD	Annova	P
S. Bilirubin	NA	0.923333333	0.181342376	65.39	p< 0.00001
	Moderate	2.27	0.66		
	Severe	3.25	1.18		
SGOT	NA	20.39	2.4	137.86	p< 0.00001
	Moderate	73.86	18.31		
	Severe	95.36	25.13		
SGPT	NA	26.95333333	3.937506066	105.94	p< 0.00001
	Moderate	47.16	8.82		
	Severe	59.3	11.55		
TSP	NA	7.224	1.210379251	31.19	p< 0.00001
	Moderate	6.67	5.75		
	Severe	5.75	0.2		
DSP	NA	4.417333333	0.222957137	400.1	p< 0.00001
	Moderate	3.44	0.24		
	Severe	2.98	0.1		

In our study maximum number of alcoholics were above 60years of age followed by between 31-50years. Gender wise distribution of the study subjects was not mentioned as all the subjects involved in our study were males.

Table 1 shows that malena and abdominal distension were found to be the most

common presenting complaint among the patients with history of alcoholism, followed by pedal edema and jaundice. These presenting complaints were more common among severe alcoholics than moderate alcoholics.

Table 2 shows that ascites was the most common clinical sign present in 46% severe alcoholics and 20% moderate alcoholics. Pallor was found to be present in 33% of severe alcoholics, 30% of moderate alcoholics, and 10% non-alcoholics.

Icterus was present in 43% severe alcoholics and 16% moderate alcoholics. Pedal edema was present in 40% severe alcoholics and 16% of moderate alcoholics.

Table 3 shows there was statistical significant difference in Hemoglobin, RBC count, Total Leucocyte Count, Platelet count, MCV, MCHC, PCV among the alcoholics and non-alcoholics. MCV was increased in

alcoholics in comparison to non-alcoholics, and all the other parameters were decreased.

Table 4 shows that the mean blood urea for non-alcoholics was 27.42, It was 63.7 for moderate alcoholics and 89.03 for severe alcoholics whereas the mean serum creatinine for non-alcoholics was 0.8766, It was 2.04 for moderate alcoholics and 3.04 for severe alcoholics.

Table 5 shows that S. Bilirubin, Serum Glutamic-oxaloacetic Transaminase (SGOT), Serum Glutamic-pyruvic Transaminase (SGPT) were increased in Alcoholics whereas Total serum Proteins and Differential serum proteins were decreased in the alcoholics in comparison to non-alcoholics.

## DISCUSSION

In a study done by T Oduola et al,<sup>[10]</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 a study done by D. Chalmers et al in 1981,<sup>[11]</sup> the mean age group was 59.9 years. In the present study the age of patients ranged from 22 years to 80 years mean age being 48.55 years. The maximum incidence of alcoholics was in the age group above 60- 25% (15/60).

In the present study most of the patient- 96.67% (58/60) belonged to lower socio-economic status. Only about 3.33% (2/60) of alcoholics belonged to middle socio-economic status. In a similar survey done by Wilson et al in 1980 showed a high incidence in low socio-economic group.

In a study done by D. Chalmers et al,<sup>[11]</sup> gastrointestinal symptoms were predominant. About 60% of patients presented with duodenal ulcer and dyspepsia, 20% of patients with haemetemesis, 20% of the patients with jaundice, and 10% of the

patients with altered sensorium. In present study 33.33% (20/60) of patients presented with malena. Next frequent presentation was distension of abdomen 30%(18/60), followed by bilateral pedal edema 28.33%(17/60). In study conducted by T.Oduola et al,<sup>[10]</sup> the haemoglobin was 14.5 +/- 1.2 gm% among moderate alcoholics and 14.8 +/- 1.2 gm% among severe alcoholics. Berad A et al in their study found that mean Hb in moderate alcoholics was 9.01±1.20 and in severe alcoholics was 9.31+/-2.31 while in non-alcoholics it was 11.14+/-2.24. This difference was found to be statistically significant (p <0.001). In the present study the mean haemoglobin was 9.77+/-1.81gms% among moderate alcoholics and 9.17 +/- 2.17 gm% among severe alcoholics.

In the present study, the total count of white blood cells were mean of 7790+/-3360.87 in moderate alcoholics and 12156.7+/-7491.41 in severe alcoholics. In the study of T. Oduola et al,<sup>[10]</sup> TLC (mm<sup>3</sup>) was 4516.7+/-2825.6 among



moderate alcoholics and  $4733.3 \pm 1400.6$  among severe alcoholics. Berad A et al in their study found that mean TLC in moderate alcoholics was  $8274 \pm 2100$  and in severe alcoholics was  $6304 \pm 2002$  while in non-alcoholics it was  $8340 \pm 1826$ . This difference was found to be statistically significant ( $p < 0.001$ ).

In the study by T.Oduola et al,<sup>[10]</sup> the MCV was  $84.9 \pm 9.1$  in moderate alcoholics and  $89.7 \pm 9.7$  among severe alcoholics. Berad A et al,<sup>[12]</sup> in their study found that Mean MCV in moderate alcoholics was  $85.40 \pm 8.26$  and in severe alcoholics was  $93.42 \pm 11.62$  while in non-alcoholics it was  $88.24 \pm 2.46$ . This difference was statistically significant ( $p < 0.001$ ). A study done by D, Chalmers et al,<sup>[11]</sup> found mean corpuscular volume (MCV) of 94 women was 101.3 fl compared with 96.7 fl in their male counterparts. In the present study, MCV in moderate alcoholics was  $93.31 \pm 7.19$ , and in severe alcoholics it was  $93.51 \pm 10.13$ .

It is suggested that MCV is a better indicator of excessive alcohol consumption in women than in men, and that women are more susceptible to the haematological toxicity of alcohol.

In a study done by H. Koivisto, J. Hietala, P. Anttila,<sup>[13]</sup> 105 severe alcoholics, 62 moderate drinkers, and 24 abstainers, the highest MCV ( $P < 0.001$ ) and mean cell hemoglobin (MCH) ( $P < 0.01$ ) occurred in the alcoholics. The values in the moderate drinkers was in the upper normal limit for MCV 98 fl, as compared with 96 fl from abstainers.

In the study by T.Oduola et al,<sup>[10]</sup> MCH among moderate alcoholics was  $28.4 \pm 4.1$ , and among severe alcoholics it was

$28.9 \pm 4.3$ . Berad A et al,<sup>[12]</sup> in their study found that mean MCH in moderate alcoholics was  $26.42 \pm 1.82$  and in severe alcoholics was  $24.86 \pm 1.64$  while in non-alcoholics it was  $30.42 \pm 2.46$ . This difference was found to be statistically significant ( $p < 0.001$ ). In our study the MCH showed  $29.58 \pm 4.19$  among moderate alcoholics and  $28.26 \pm 4.28$  among severe alcoholics.

In the study of T. Oduola et al,<sup>[10]</sup> MCHC was  $32.3 \pm 1.8$  among moderate alcoholics and  $32.7 \pm 0.9$  among severe alcoholics. Berad A et al,<sup>[12]</sup> in their study found that Mean MCHC in moderate alcoholics was  $32.88 \pm 2.02$  and in severe alcoholics was  $30.26 \pm 1.46$  while in non-alcoholics it was  $36.26 \pm 1.14$ . This difference was found to be statistically significant ( $p < 0.001$ ). In present study the MCHC was  $29.01 \pm 3.34$  among moderate alcoholics and  $28.3 \pm 4.13$  among severe alcoholics.

In the study conducted by T.Oduola et al,<sup>[10]</sup> PCV was  $44.2 \pm 3.7$  among moderate alcoholics and  $45.3 \pm 3.8$  among severe alcoholics. Berad A et al,<sup>[12]</sup> in their study found that mean PCV in moderate alcoholics was  $33.52 \pm 4.21$  and in severe alcoholics was  $28.16 \pm 6.02$  while in non-alcoholics it was  $39.24 \pm 2.68$ . This difference was found to be statistically significant ( $p < 0.001$ ). In the present study, PCV among moderate alcoholics was  $28.84 \pm 5.45$  and among severe alcoholics it was  $27.97 \pm 4.29$ .

In the study by T. Oduola et al,<sup>[10]</sup> the platelet count was  $2.12 \pm 0.49$  among moderate alcoholics and  $2.18 \pm 0.42$  among severe alcoholics. In the present study Platelet count showed a mean of  $1.96 \pm 0.68$  in moderate alcoholics, In severe alcoholics the platelet count was a mean of  $1.69 \pm 0.75$ .

Akanni EO et al<sup>14</sup> in their study on 130 subjects, consisting of 84 alcoholics and, 46 Non alcoholics that served as control. The Hb, PCV were found to be significantly lower in Alcoholics as compared to the control group (p- <0.05). This was comparable to our study results.

## CONCLUSION

From the results of our study we conclude that hematological changes are significantly common in alcoholics and correspond to the quantity of alcohol intake. Early detection of these changes and treating them can prevent further complications and may reduce mortality in these patients.

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