International Journal of Current Research and Review
DOI: https://doi.org/10.31782/IJCRR.2025.171002

Research Article

IJCRR
Section: Healthcare

A Clinical Profile of Pancytopenia in Person Who Consumes Alcohol

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ABSTRACT

Introduction: Pancytopenia refers to a reduction in all three major blood cell lines—red blood cells (RBCs), white blood cells (WBCs), and platelets. Chronic alcohol consumption is a potential but often overlooked cause, due to its direct bone marrow toxicity and association with nutritional deficiencies. The aim is to enhance understanding of the clinical profile in this subset of patients, which could aid in earlier recognition and tailored intervention.

Aim/Objectives: To assess the clinical and hematologic profile of pancytopenia among individuals who consume alcohol.

Materials and Methods: A cross-sectional study was conducted involving 100 patients with a history of alcohol intake and diagnosed with pancytopenia. Clinical symptoms, dietary habits, and hematologic parameters were evaluated. Peripheral smear and bone marrow findings were analysed.

Results: Of the 100 patients, 92% were male. The majority were aged 30–40 years. Fatigue and dyspnoea were the most common presenting complaints. Peripheral smear revealed macrocytes, elongated cells, teardrop cells, both microcytes and macrocytes. Bone marrow examination revealed features such as hypocellularity, erythroid hyperplasia, and megaloblastic changes. A statistically significant difference in platelet count was noted across age groups ($p = 0.020$).

Conclusion: Alcohol-induced pancytopenia is a clinically relevant condition, especially in young adult males. Recognition of alcohol consumption as a potential cause is essential for timely diagnosis and management. Macrocytic anaemia and dimorphic marrow findings are characteristic in this population.

Keywords: MCV (mean corpuscular volume), LFT (liver function test), ESR (erythrocyte sedimentation rate), HPE (Histopathological examination), RBC (red blood cell), WBC (white blood cell), HB (haemoglobin).

INTRODUCTION

Pancytopenia is a hematologic condition characterized by the simultaneous reduction of all three major blood cell lines: red blood cells, white blood cells, and platelets. This condition can arise from a wide spectrum of underlying causes, ranging from bone marrow failure and infiltration to nutritional deficiencies and chronic infections.[1] Among these, chronic alcohol consumption has been increasingly recognized as an important contributor to bone marrow suppression and subsequent pancytopenia.

Alcohol particularly when consumed in excessive and prolonged amounts, has a direct toxic effect on the bone marrow, leading to impaired hematopoiesis.[2] In addition, alcohol-induced nutritional deficiencies—such as folate, vitamin B12, and other micronutrient deficiencies—can exacerbate cytopenias.[3] Liver dysfunction and hypersplenism associated with chronic alcoholism may further contribute to the pancytopenia picture.[4] Despite the growing prevalence of alcohol use globally, especially in low- and middle-income countries, its impact on hematologic health is often underdiagnosed and underreported.

This study aims to evaluate the clinical characteristics, underlying mechanisms, and outcomes of pancytopenia in individuals with a history of chronic alcohol consumption. Understanding the hematologic consequences of alcohol use is essential for timely diagnosis, appropriate management, and prevention of complications in this vulnerable population.

MATERIALS AND METHODS

Study design: This was a cross-sectional observational study conducted over a period of six months

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ISSN: 2231-2196 (Print) **ISSN:** 0975-5241 (Online)

Received: 08.04.2025 **Revised:** 05.05.2025 **Accepted:** 15.05.2025 **Published:** 29.05.2025

Sample Size: 100 patients were enrolled.

Inclusion criteria:

- Individuals aged 21 years and above
- Documented history of alcohol consumption

Exclusion criteria:

- Individuals below 21 years of age
- Non-alcoholic individuals
- Patients with known alternative causes of pancytopenia

Mode of Evaluation: Each patient underwent a detailed clinical history and physical examination. Laboratory investigations included complete blood counts, peripheral smear analysis, liver and renal function tests, ESR, MCV measurements, and bone marrow examination. Special focus was placed on identifying hematologic patterns associated with alcohol-related pancytopenia.

Statistical Analysis: The data was analysed using SPSS version 20.0. The Pearson Chi-square test was used to identify statistical significance. Qualitative variables were expressed as frequencies and percentages.

Ethical considerations: The institutional human ethical committee approved the study. No. ECR/892/Inst/TN/2016

Results

In our study, out of 100 cases, males were 92 and females were 8 with males forming majority of patients. Patients were predominantly in the age group 30-40 years (80%). In our study, most common presentation is fatigue (49%). Vegetarian were 16 patients and non-vegetarian were 84 patients. In our study, we found that patients with MCV between 101-110 were more. In our study, peripheral smear revealed macrocytes, elongated cells, teardrop cells, anisopoikilocytes, macro ovalocyte, both microcytes and macrocytes. Bone marrow examination revealed hypocellularity, cellular, erythroid hyperplasia and with megaloblasts, megakaryocytes, giant metamyelocytes and giant bands.

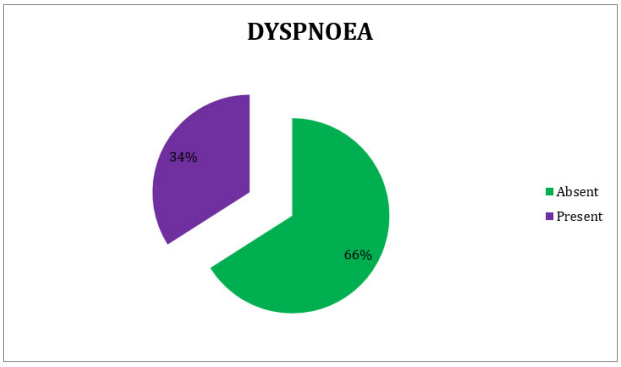

Figure 1: Distribution of study population based on dyspnoea.

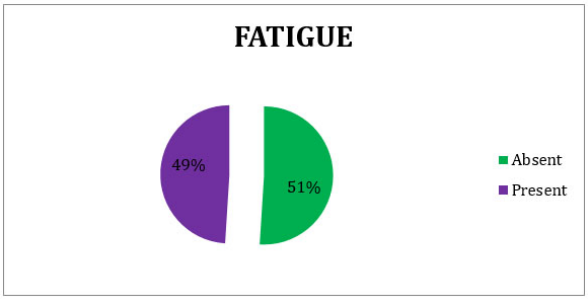

Figure 2: Distribution of patients based on fatigue.

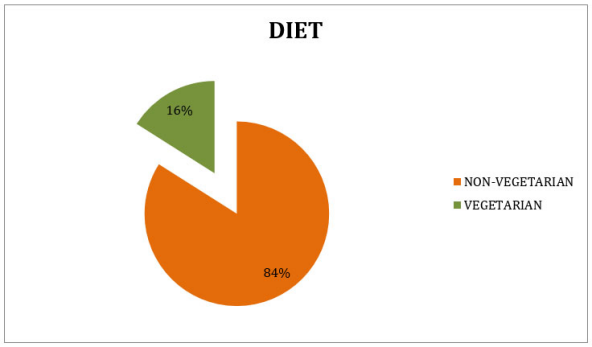

Figure 3: Distribution of patients based on diet.

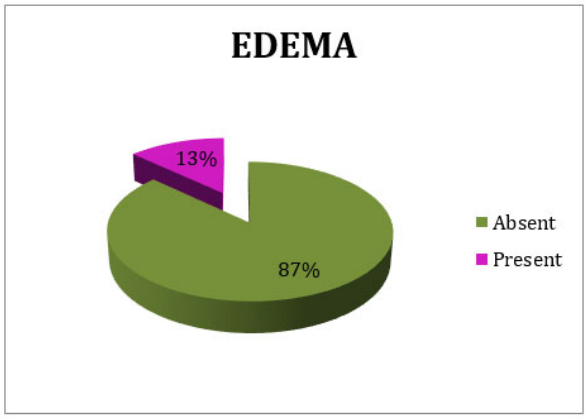

Figure 4: Distribution of patients based on edema.

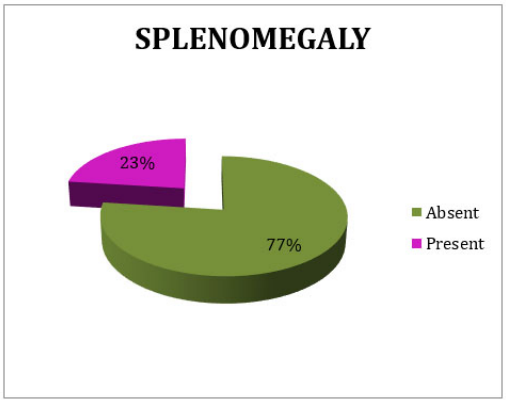

Figure 5: Distribution of patients based on splenomegaly.

Table 1: Distribution of patients based on Peripheral smear

Peripheralsmear	Frequency	Percent
Macrocytes	24	24.0%
Macrocytes, Elongated Cells	4	4.0%
Macrocytes, Tear Drop Cells	17	17.0%
Macrocytes,Anisopoiklocytes	6	6.0
Macrocytes,Elongated Cells	6	6.0%
Macrocytesc, Anisopoiklocytes	4	4.0%
Macroovalocytes	6	6.0%
Microcytes,Macrocytes	33	33.0%
Total	100	100.0%

Table 2: Distribution of patients based on bone marrow HPE

Bonemarrow	Frequency	Percent
Bone Marrow Hypocellular,Megaloblasts Seen	20	20.0%
Cellular Marrow, Megakaryocytes Seen	5	5.0%
Cellular, Normal Myeloid Erythroid Ratio, Megakaryocytes Seen	5	5.0%
Erythropoiesis Seen, Megaloblasts Seen	5	5.0%
Giant Metamyelocytes,Giant Band, Megakaryocytes	5	5.0%
M:e= 1.5:3, Erythroid Hyperplasia	5	5.0%
M:e=1:1, Megaloblasts Seen	5	5.0%
M:e=1:2, Erythropoiesis Is Active, Megaloblats Seen	5	5.0%
M:e=1:2.5-3, Erythroid Hyperplasia, Dominant Megaloblasts	5	5.0%
M:e=1.5:1 , Dominant Megaloblasts, Occasional Microcytes	5	5.0%
M:e=1.5:3-4, Erythroid Hyperplasia, Megaloblasts Seen	5	5.0%
M:e=2:1, Megaloblasts Seen	5	5.0%
M:e=2:4, Erythroid Hyperplasia,Megaloblasts Seen	5	5.0%
M:e=3:1.5, Megaloblasts Seen	5	5.0%
M:e=3:2, Megaloblasts Seen	5	5.0%
Megakaryocytes Seen	10	10.0%
Total	100	100.0%

Table 3: Pearson chi-square test of peripheral smear values

Peripheral smear	Pearson chi-square test	p value
Age	26.140	0.565
Sex	12.018	0.100

Table 4: Pearson chi-square test of bone marrow values

Bone marrow	Pearson chi-square test	p value
Age	58.987	0.513
Sex	8.967	0.87

Table 5 : Descriptive Statistics of Study Variables

	N	Minimum	Maximum	Mean	Std. Deviation
AGE	100	26.00	65.00	43.2400	7.76696
HB	100	3.70	9.20	5.9190	1.16582
TOTAL WBC	100	1900.00	4500.00	3105.7000	554.46991
PLATELET	100	35000.00	90000.00	61290.0000	14178.72571
MCV	100	96.00	118.00	103.8900	4.80718
ESR	100	23.00	93.00	60.7500	16.61530

Table 6: Comparison of Hematological Parameters Across Age Groups

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		f VALUE	p VALUE
						Lower Bound	Upper Bound		
HB	20-30 Years	5	5.9000	.88034	.39370	4.8069	6.9931	1.692	0.158
	31-40 Years	37	6.2946	1.13528	.18664	5.9161	6.6731		
	41-50 Years	44	5.6318	1.21114	.18259	5.2636	6.0000		
	51-60 Years	12	5.8333	.92376	.26667	5.2464	6.4203		
	Above 60 Years	2	5.8500	1.90919	1.35000	-11.3034	23.0034		
	Total	100	5.9190	1.16582	.11658	5.6877	6.1503		
TOTAL WBC	20-30 Years	5	2626.0000	332.23486	148.57994	2213.4759	3038.5241	2.003	0.100
	31-40 Years	37	3227.0270	607.24270	99.83008	3024.5622	3429.4918		
	41-50 Years	44	3030.0000	498.13139	75.09613	2878.5542	3181.4458		
	51-60 Years	12	3255.0000	555.50959	160.36181	2902.0460	3607.9540		
	Above 60 Years	2	2830.0000	537.40115	380.00000	-1998.3578	7658.3578		
	Total	100	3105.7000	554.46991	55.44699	2995.6811	3215.7189		
PLATELET	20-30 Years	5	50400.0000	6308.72412	2821.34720	42566.6844	58233.3156	3.061*	0.020
	31-40 Years	37	61324.3243	13587.27766	2233.73469	56794.1004	65854.5482		
	41-50 Years	44	61045.4545	14638.20193	2206.79197	56595.0344	65495.8747		
	51-60 Years	12	69916.6667	12011.04290	3467.28943	62285.2141	77548.1192		
	Above 60 Years	2	41500.0000	4949.74747	3500.00000	-2971.7166	85971.7166		
	Total	100	61290.0000	14178.72571	1417.87257	58476.6332	64103.3668		
MCV	20-30 Years	5	101.4000	2.30217	1.02956	98.5415	104.2585	1.748	0.146
	31-40 Years	37	105.1351	5.86497	.96420	103.1797	107.0906		
	41-50 Years	44	103.7500	4.19925	.63306	102.4733	105.0267		
	51-60 Years	12	102.3333	3.20038	.92387	100.2999	104.3668		
	Above 60 Years	2	99.5000	.70711	.50000	93.1469	105.8531		
	Total	100	103.8900	4.80718	.48072	102.9362	104.8438		
ESR	20-30 Years	5	62.6000	17.75669	7.94103	40.5522	84.6478	1.743	0.147
	31-40 Years	37	57.7297	17.22506	2.83178	51.9866	63.4729		
	41-50 Years	44	62.0682	16.14383	2.43377	57.1600	66.9764		
	51-60 Years	12	60.0000	14.49765	4.18511	50.7886	69.2114		
	Above 60 Years	2	87.5000	.70711	.50000	81.1469	93.8531		
	Total	100	60.7500	16.61530	1.66153	57.4532	64.0468		

DISCUSSION

Pancytopenia can result from a wide spectrum of conditions, including drug-induced bone marrow suppression, megaloblastic anaemia, aplastic anaemia, and hematologic malignancies. In this study, we examined the clinical and hematologic characteristics of pancytopenia among individuals with a history of alcohol consumption. Most participants were within the 30–40-year age group, with a mean age of 43.24 years. The lower number of female alcoholics in the sample likely reflects regional trends in alcohol use. Fatigue emerged as the most frequent symptom, followed by dyspnoea, oedema and splenomegaly.[5] Dietary patterns were also noted, with vegetarians being more susceptible to vitamin B12 deficiency—a potential contributor to megaloblastic anaemia and pancytopenia.[6] Among the study population, 16 were vegetarians and 84 were non-vegetarians. Notably, splenomegaly was more prevalent, which may point toward hypersplenism as a contributing factor. Laboratory analysis revealed significant variations in platelet counts, ESR, and MCV values. Most patients had an MCV in the macrocytic range, suggestive of alcohol-related marrow pathology or nutritional deficiency.[7] Peripheral smears frequently demonstrated macrocytosis, anisopoikilocytosis, and other morphological abnormalities consistent with alcohol-induced bone marrow changes. Bone marrow examination revealed various patterns, including hypocellularity, erythroid hyperplasia, and the presence of megaloblasts, giant metamyelocytes, and abnormal myeloid maturation.[8 9] These findings align with established effects of chronic alcohol consumption on haematopoiesis, both through direct marrow toxicity and nutritional deficiencies.[10 11] This analysis reinforces the need to consider alcohol use as a significant etiological factor when evaluating patients with pancytopenia.

CONCLUSION

The incidence of alcohol-related pancytopenia appears to be rising, potentially reflecting an increase in alcohol consumption, including among females. This study underscores the role of alcohol as an important etiological factor contributing to pancytopenia. The mechanisms likely involve both direct toxic effects of alcohol on bone marrow and associated nutritional deficiencies, particularly of vitamin B12 and folic acid, which contribute to macrocytic anaemia. In our study, fatigue and dyspnoea were the most common clinical presentations; with a dimorphic picture observed on bone marrow, examination. Young adults represented the largest proportion of affected individuals. Given these findings, it is crucial that alcohol consumption history is routinely assessed in patients presenting with pancytopenia. Early identification of alcohol-related haematological abnormalities can help guide appropriate treatment and nutritional support, potentially reversing cytopenia with abstinence and supplementation.

ACKNOWLEDGEMENT

Authors would like to express sincere thanks to the patients for their active participation in the study.

Conflicts of Interest: None declared

Source of Funding: self-funding

Authors Contribution:

1. Assessment of Haemoglobin Content and Sleep Duration In Vegetarians, and Non-Vegetarians
2. Impact of serum albumin on functional status and hospital outcome of geriatric patients in Coimbatore medical college hospital.

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