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Original Article

Psychiatry Section

Thrombocytopaenia in Alcohol Withdrawal: A Retrospective Study on its Prevalence and Role as a Low-cost Predictor of Delirium Tremens

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ABSTRACT

Introduction: Delirium Tremens (DT) is a life-threatening alcohol withdrawal complication, requiring early identification to improve outcomes. Alcohol-induced Thrombocytopaenia (TP) may serve as a cost-effective predictor of DT. Although several biochemical markers have been studied for predicting DT, reliable, simple and cost-effective early predictors remain limited, especially in resource-limited settings. Since platelet count is routinely available and inexpensive, evaluating TP as a potential predictor of DT may provide a practical tool for early risk stratification.

Aim: To study the prevalence of TP in alcohol withdrawal and its predictive role in DT.

Materials and Methods: The present retrospective observational study reviewed case records of adult patients (≥18 years) admitted with an International Classification of Disease-10 (ICD-10) diagnosis of alcohol withdrawal between September 2022 and March 2025 at the Department of Psychiatry, Government Stanley Medical College and Hospital, Chennai, Tamil Nadu, India. Only records with platelet counts available at admission were included, yielding a total sample of 409 patients. Data on demographic characteristics, along with relevant clinical and laboratory findings, were collected. The prevalence of TP and its predictive value for DTs were evaluated using sensitivity, specificity, Positive Predictive Value (PPV) and Negative Predictive Value (NPV). Statistical associations were determined using appropriate tests and multiple logistic regression with a significance level set at $p<0.05$.

Results: The prevalence of TP was 93 patients (22.7%). DT incidence was 12.5% (51 patients). DT occurred in 39.8% of thrombocytopenic patients, showing a strong association ($p<0.001$). Regression analysis identified previous history of DT and TP as strong predictors of DT. TP demonstrated 72.5% sensitivity, 84.4% specificity, moderate PPV (39.8%) and high NPV (95.6%).

Conclusion: The TP is a cost-effective, highly specific predictor of DT in Alcohol Withdrawal Syndrome (AWS), making it useful for risk stratification in resource-limited settings. Further research is needed to evaluate its clinical utility.

Keywords: Alcohol dependence, Alcohol withdrawal syndrome, Demographic characteristics, Risk stratification

INTRODUCTION

The Delirium Tremens (DT) is a serious complication of Alcohol Withdrawal Syndrome (AWS) with a very high mortality rate. In India, where alcohol is a major public health concern, one of the studies reported a 13.4% mortality rate in patients who developed DT and 66.7% of deaths occurred during the initial 48 hours. This highlights the need for early intervention in patients at risk of DT [1].

Over the years, various studies have been conducted to identify early biomarkers of DT. The major biochemical parameters studied were Gamma-Glutamyl Transferase (GGT), Carbohydrate-Deficient Transferrin (CDT), Mean Corpuscular Volume (MCV), Alanine Aminotransferase (ALT), Aspartate Aminotransferase (AST), serum sodium and serum potassium. But the clinical utility of these parameters is limited by their low sensitivity [2]. In recent times, platelet counts are increasingly studied for their association with alcohol withdrawal complications like DT.

Alcohol-induced TP is multifactorial and is thought to be due to the direct toxic effect of alcohol on platelets, bone marrow suppression, splenic sequestration and ethanol-induced platelet dysfunction. Liver impairment commonly seen in alcoholics can also contribute to reduced thrombopoietin synthesis. This leads to transient TP and the platelet count normalises after cessation of alcohol [3].

While the trends of TP in alcohol withdrawal have been studied previously [4], its predictive role in DT remains underexplored. It is essential to identify simple, cost-effective predictors of DT, especially in resource-limited settings, for early risk stratification and improving clinical outcomes. Since platelet count is routinely available and inexpensive, evaluating its role in DT could offer a practical tool for clinicians.

The authors hypothesise that alcohol withdrawal patients with TP are more likely to develop DTs than those patients with normal platelet count. The present study estimates the prevalence of TP (platelet count less than 150,000 per microlitre) in patients hospitalised for alcohol withdrawal and its role as a predictive marker for DT.

MATERIALS AND METHODS

The present retrospective observational study was conducted at the Department of Psychiatry, Government Stanley Medical College and Hospital, Chennai, Tamil Nadu, India. Medical records of patients admitted for alcohol withdrawal management, between 1st September 2022 and 1st March 2025 were reviewed. Ethical approval was obtained from the Institutional Ethics Committee (Ref No: 123/ME/EC/2025-134).

Sample size calculation: Using a prevalence rate of 18.8% for TP (from a reference study by Vijayakumar S et al., [5]) and applying the formula $n=Z^2pq/d^2$ ($Z=1.96$, $p=18.8$, $d=4$), the minimum required sample size was calculated as 366. After accounting for a 10% potential exclusion rate, the final sample size was 402.

Inclusion criteria: Case records of patients aged ≥ 18 years with an International Classification of Disease-10 (ICD-10) [6] diagnosis of AWS and a platelet count documented at admission were included.

Exclusion criteria:

- Case records of patients taking medication or having conditions that affect platelet count (chronic liver disease, bleeding diathesis, tropical fever, malignancy, etc.);
- Case records of patients presenting with DT;
- Case records with missing data.

Study Procedure

Case records meeting eligibility criteria were identified from hospital records. The records were reviewed for history of alcohol pattern, past psychiatric, medical and medication-related history and investigation reports were reviewed. The following parameters were extracted for analysis- Sociodemographic data (age, gender), clinical history (previous DT, seizures) and laboratory parameters {platelet count at admission, Serum Glutamic Oxaloacetic Transaminase (SGOT), Serum Glutamic Pyruvate Transaminase (SGPT), serum sodium, serum potassium}.

Patients were grouped based on the development of DTs during current hospitalisation. The prevalence of TP (platelet count <150,000/μL) was calculated. Its association with DTs was analysed and predictive performance was assessed.

STATISTICAL ANALYSIS

Data Analysis was done using Statistical Package for Social Sciences (SPSS) software version 23.0. Descriptive statistics summarised demographic and clinical variables. The t-tests or Mann-Whitney U tests were used for group comparisons of continuous variables and Chi-square or Fisher's-exact tests for comparisons of categorical variables. Multiple logistic regression analysis was done. The predictive value of TP was determined using sensitivity, specificity, PPV and NPV. A p-value of <0.05 was taken as statistically significant.

RESULTS

The present study analysed case records of 432 patients with an ICD-10 diagnosis of AWS, out of which 409 patient records met the inclusion criteria. The majority were males 402 (98.3%), with only 7 females (1.7%), indicating a skewed gender distribution. The mean age was found to be 38.03±8.27 years, predominantly ranging between 30 and 46 years [Table/Fig-1]. The prevalence of TP was 93 out of 409 patients (22.7%), affecting nearly one in five patients with alcohol withdrawal. A total of 51 patients developed DT during the hospitalisation period, with an incidence of 12.5%.

Demographic parameters: Those with DT were significantly older, with a mean difference of 2.45 years {Confidence Interval (CI): 0.02-4.87} compared to those without DT (p=0.04), suggesting age as a potential risk factor. More females (28.6%) experienced DT than males (12.2%), but the difference was not statistically significant, likely due to the small female sample (n=7).

Clinical and laboratory parameters: A strong association was found between past DT episodes and DT recurrence during treatment (p<0.001). Out of 13 individuals with a previous history of DT, 9 (69.2%) experienced recurrence, with an Odds Ratio (OR) of 18.96 (95% CI: 5.59-64.27), indicating a nearly 19-times increased risk. There was no statistically significant association between previous history of seizure and DT incidence. SGOT, levels were significantly higher in patients with DT {median (IQR): 33 (68)} than in individuals without DT {26 (16)} (p<0.001) and SGPT levels also showed significant elevation (p=0.003), indicating hepatic involvement. Serum electrolytes (sodium, potassium) showed no significant differences.

Variables		Delirium Tremens (DT)		Test statistics	p-value
		Yes (n=51)	No (n=358)		
Age (in years) Mean±SD		40.18 ± 7.92	37.73 ± 8.28	1.985 (t-value)	0.04‡
Gender					
Male (n= 402) Frequency (%)		49 (12.2%)	353 (87.8%)		0.21*
Female (n=7) Frequency (%)		2 (28.6%)	5 (71.4%)		
Previous history of DT (n=13) Frequency (%)		9 (69.2%)	4 (30.8%)		<0.001*
Previous history of Seizure (n=53)		5 (9.4%)	48 (90.6%)		0.473
SGOT (U/L)	Median (IQR)	33 (68)	26 (16)	6100 (U-value)	<0.001†
	<40 (U/L) n (%)	27 (52.9)	294 (82.1)		
	≥40 (U/L) n (%)	24 (47.1)	64 (17.9)		
SGPT (U/L)	Median (IQR)	31 (76)	24 (19)	6789 (U-value)	0.003†
	<56 (U/L) n (%)	31 (60.8)	316 (88.3)		
	≥56 (U/L) n (%)	20 (39.2)	42 (11.7)		
$S.Na^+$ (mEq/L)	Mean ± SD	137.78 ± 3.87	138.04 ± 2.32	-1.489 (t-value)	0.14‡
	<135 (mEq/L) n (%)	24 (47.1)	36 (10.1)		
	135–145 (mEq/L) n (%)	27 (52.9)	322 (89.9)		
$S.k^+$ (mEq/L)	Mean ± SD	3.42±0.32	3.81±1.47	-1.836 (t value)	0.07‡
	<3.5 (mEq/L) n (%)	30 (58.8)	98 (27.4)		
	3.5-5.5 (mEq/L) n (%)	21 (41.2)	259 (72.3)		
	>5.5 (mEq/L) n (%)	0 (0.0)	1 (0.3)		
Platelet at admission ($*10^5$/μL) Mean±SD		1.17±0.6	2.11±0.6	-10.352 (t-value)	<0.001‡

[Table/Fig-1]: Distribution and association of the sociodemographic and clinical variables during treatment period among participants with and without Delirium Tremens (DT).
*Fisher-exact test; † Mann-Whitney U test; ‡ Independent t-test
DT: Delirium tremens; SGOT: Serum glutamic oxaloacetic transaminase; SGPT: Serum glutamic pyruvate transaminase; $S.Na^+$: Serum sodium; $S.k^+$: Serum potassium; IQR:Interquartile range

Thrombocytopaenia (TP) and Delirium Tremens (DT): Among 93 thrombocytopenic patients, 37 (39.8%) developed DT, compared to 14 cases among 316 with normal platelets. This strong association (p<0.001) suggests TP as a risk factor for DT.

In multiple logistic regression [Table/Fig-2], previous episodes of DT were strongly associated with a 5.85 times increased risk of recurrence (p=0.031). TP emerged as a strong predictor with a 9.7 times increased risk of DT (p<0.001), underscoring its potential as a critical marker.

Predictive role of Thrombocytopaenia (TP):

Sensitivity: 72.5%

Specificity: 84.4%

Positive Predictive Value (PPV): 39.8%

Negative Predictive Value (NPV): 95.6%

The TP has a moderate PPV (39.8%), meaning many affected individuals did not develop DT, but its high NPV (95.6%) strongly indicates a lower DT risk when TP is absent [Table/Fig-3].

Variables	Regression coefficient (B)	AOR (95% CI)	p-value
Age	0.030	1.03 (0.984-1.079)	0.206
Previous history of DT present	1.766	5.847 (1.171-29.201)	0.031
Previous history of DT absent (reference)	1		
SGOT	0.006	1.01 (0.996-1.017)	0.255
SGPT	-0.012	0.99 (0.971-1.006)	0.185
Thrombocytopaenia (TP) present	2.272	9.696 (4.230-22.224)	<0.001
Thrombocytopaenia (TP) absent (reference)	1		

[Table/Fig-2]: Multiple logistic regression showing independent predictors of Delirium Tremens (DT).
SGOT: Serum glutamic oxaloacetic transaminase; SGPT: Serum glutamic pyruvate transaminase; AOR: Adjusted odds ratio; CI: Confidence interval; DT: Delirium tremens.

Thrombocytopaenia (TP)	Delirium Tremens (DT)		Total
	Yes n (%)	No n (%)	
Yes	37 (39.8%)	56 (60.2%)	93
No	14 (4.4%)	302 (95.6%)	316

Note: Percentages represent row percentages.

Thrombocytopaenia (TP)	Delirium Tremens (DT)	
	Yes n (%)	No n (%)
Yes	37 (72.5%)	56 (15.6%)
No	14 (27.5%)	302 (84.4%)
Total	51	358

[Table/Fig-3]: Predictive role of Thrombocytopaenia (TP).
Note: Percentages represent column percentages.

DISCUSSION

The present retrospective record-based observational study demonstrated a significant association between TP and the development of DT among patients admitted with Alcohol Withdrawal Syndrome (AWS). The TP was present in 22.7% of patients and DT occurred in 12.5% during hospitalisation. A significantly higher proportion of patients with TP developed DT compared with those with normal platelet counts (39.8% vs 4.4%) and TP was associated with a 9.7-fold increased risk of DT, thus accepting the study hypothesis. Although patients who developed DT were significantly older, age did not have significant independent association.

These results are in line with the previous literature. Berggren U et al., found a greater prevalence of TP in patients who suffered from DT and alcohol withdrawal seizures [7]. They also found a low PPV but a very high NPV for TP in predicting DT. Similarly, in the present study, although the PPV is low, the NPV of TP was found to be high (95.6%), along with good sensitivity (72.5%) and high specificity (84.4%), which makes it a potential useful marker for the identification of patients at lower risk of DTs.

Silczuk A et al., similarly demonstrated TP in almost half of the patients with complicated AWS. The study showed that lower platelet counts were associated with complicated withdrawal [8]. Eyer F et al., showed that lower platelet counts on admission were an independent predictor of DT [9]. The systematic review and meta-analysis by Goodson CM et al., also proved that lower platelet counts are consistently associated with complicated AWS [10].

A strong association between previous history of DT and recurrence was also evident in the present study, consistent with findings by Sarkar S et al., who identified past history of delirium as a major predictor of DT [11].

Serum sodium and potassium levels did not show a significant association with DT in the present study. Although hypokalaemia has been reported as a predictor of severe withdrawal in some earlier studies [9,10], subsequent findings have been inconsistent. Like the present study, Patel BB et al. and Nagda P et al., did not demonstrate a reliable relationship between electrolyte disturbances and DT severity [12,13].

Patients who developed DT showed significantly higher levels of liver transaminases, indicating higher physiological stress during withdrawal. However, the available evidence suggests that alcohol-related TP is a common occurrence that often occurs independently of chronic liver disease. Latvala J et al., have shown direct alcohol-induced suppression of bone marrow activity, including abnormalities of megakaryocytes, which are involved in platelet production [14]. In agreement with this, Lindenbaum J and Hargrove RL have shown rapid normalisation of platelet counts after stopping alcohol in patients who did not have cirrhosis or nutritional deficiency [15]. This rapid reversibility suggests a reversible suppression of platelet production as the primary mechanism rather than irreversible bone marrow injury or predominant splenic sequestration.

Longitudinal studies also confirm this reversibility. Harshe DG et al., found lower platelet counts in patients who developed DT, followed by a gradual increase in platelet counts during abstinence [4]. Similar patterns of recovery were observed in patients by Vijayakumar S et al. and Patel BB et al., who found baseline TP in about one-fifth of patients, which improved during withdrawal [5,12]. Mahat P et al., also found that all patients who developed DT in an emergency setting had TP [16]. These observations clearly establish a link between low platelet counts and severe alcohol withdrawal.

Other laboratory markers seem to have only limited predictive value. Wetterling T et al., observed that CDT and MCV had low sensitivity for the prediction of severe AWS, thus limiting their role as screening tests compared to platelet count [2].

Clinical implications: Platelet count is a readily available and inexpensive test that may help in the early screening of patients at risk of DTs. While TP is not to be used as the sole marker in clinical decision-making, its high NPV makes it a valuable tool when considered alongside history and examination, especially a history of previous episodes of DT.

Limitation(s)

These findings cannot be generalised, as this is a single-centre study. The male predominance restricts assessment of gender-based differences. Platelet counts were measured only at admission, without monitoring the trend, limiting its correlation with alcohol withdrawal progression. Prospective multicentre studies are needed to confirm TP's predictive role in DTs across diverse populations.

CONCLUSION(S)

The TP can be used as a marker for DTs risk stratification in AWS. While its modest PPV limits standalone use, high specificity and NPV make it a cost-effective early predictor, especially for identifying low-risk patients in resource-limited settings. Future research should refine predictive thresholds and assess interactions with other biomarkers to enhance early prediction of complications, including DT in AWS.

Author declaration: The author(s) attest that there was no use of generative Artificial Intelligence (AI) technology in the generation of text, figures, or other informational content of the present manuscript.

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