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Original Research Article

Combining Audit Questionnaire and Biochemical Markers to Assess Risk of Alcohol Withdrawal in Alcohol use Disorder: A Prospective Study

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Abstract

Background: For alcohol use disorders (AUDs) to be effectively managed and consequences to be avoided, early detection is crucial. A popular screening tool is the Alcohol Use Disorders Identification Test (AUDIT), and biochemical markers may improve the precision of diagnosis.

Objective: To evaluate the effectiveness of AUDIT alone and in combination with biochemical markers in screening patients with alcohol dependence.

Method: 155 patients with alcohol use disorders who were seen at the NSCB Medical College and Hospital's Department of Psychiatry in Jabalpur were included in this prospective study. The AUDIT, CIWA scale, and biochemical markers (AST, ALT, and MCV) were used to evaluate the participants. Analysis was done on accuracy, sensitivity, specificity, PPV, and NPV.

Results: High sensitivity (93.6%) and specificity (86.7%) were demonstrated with a AUDIT cutoff of 8. Increasing the limit to 15 decreased sensitivity while increasing specificity and PPV. Sensitivity and NPV were increased by combining AUDIT with biochemical indicators; the maximum sensitivity (98.0%) was obtained when AST and MCV were added.

Conclusion: AUDIT is an effective screening tool for AUDs, and its accuracy is enhanced when combined with biochemical markers. This combined approach supports early diagnosis and better clinical management.

Keywords: Alcohol use disorder, AUDIT, biochemical markers, AST, ALT, MCV, screening, CIWA.

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Introduction

Alcohol consumption has always been a part of human society. Alcohol has been seen as a safe, healthful beverage as well as a component of religious ceremonies and rituals because of its antibacterial properties and empty calorie content. Nevertheless, alcohol is a toxin; it is not created by our bodies and becomes lethal in large amounts. [1] Alcohol is a psychotropic drug that can lead to dependence. [2]

Nowadays, alcohol is consumed by almost everyone and has been rising globally for some time. Over 3.3 million deaths worldwide are attributed to alcohol misuse each year (5.9% of all deaths), and alcohol use accounts for 5.1% of the world's disease burden. [2,3] In India, the average annual rate of prevalence of alcohol dependency was 2.1% and AUDs was 2.6% in 2010. [4,5] It was discovered that 5.4% of all caused fatalities in India were related to alcohol and it's usage was responsible for about 62.9% of all liver cirrhosis-related deaths. [4,5] The eastern Mediterranean region, which encompasses Afghanistan, Bahrain, and Egypt, has the lowest incidence of AUDs, whereas Europe has the highest frequency of AUDs (7.5%). [4,6]

For prophylactic, diagnostic, and therapeutic purposes, it is imperative to identify overindulgence in alcohol early on. Self-reported measurements and clinical evaluations are frequently employed to quantify alcohol use. [7] A number of blood tests, including the liver enzymes, γ "glutamyl transferase (GGT), aminotransferases aspartate (AST), alanine (ALT), and mean corpuscular volume (MCV), are frequently

employed as indicators of heavy drinking. [8] Emerging blood biomarkers, such as N-acetyl-β Hexosaminidase (Beta-Hex)," D-dopachrome Tautomerase (DDT), and MIF, may be used to measure alcohol consumption. Our study focuses on application of screening tools alone in alcohol dependence patients and in combination of biological markers in these patients in order to identify how this combination can affect the treatment outcome and whether this combination has any benefit for management of patient.

Aims and Objectives

1. Assessment of patients through AUDIT questionnaire alone and in combination with biochemical markers
2. To determine the effect of combination of biochemical markers and AUDIT over AUDIT alone

Materials and Method

This was a prospective study conducted on inpatient basis in the Department of Psychiatry, NSCB Medical College & Hospital, Jabalpur, and Madhya Pradesh for a period of 18 Months (August 2022 to February 2024).

Sample size: A total of 155 patients from the inpatient sections of the department of Psychiatry, who reported to the hospital during the study period were selected.

Inclusion Criteria

The patients in the age group of 18–60 years belonging to either sex, who have alcohol use problem, based on International Classification of Diseases 10th Edition Diagnostic Criteria for Research (ICD-10DCR) classification of Mental and Behavioral disorders, were included in the study. Written informed consent was obtained from the patient and/or family members/relative, if the patient lacked the capacity to give valid consent.

Exclusion Criteria

Patients with other co-morbid psychiatric conditions like organic mental conditions, along with those not giving consent were excluded from the study.

Ethical permission and Consent: The study was conducted after taking clearance regarding ethical ground from Institutional Ethical Committee (IEC) (No.IEC/2022/8629-59, Jabalpur dated 05-09-2022).

Assessment Tools

- Clinical profile - semi structured proforma
- Audit Scale [9]
- Biochemical Markers (AST, ALT, MCV) [14]
- CIWA Scale [10]

Procedure: The patient's information was collected with the help of a semi structured proforma to assess socio-demographic variables. These patients were further assessed with help of AUDIT (Alcohol Use Disorders Identification Test), blood markers [alanine aminotransferase (ALT), aspartate aminotransferase (AST), and mean corpuscular volume (MCV)] and CIWA. The effect of adding a combination of traditional biochemical screening test abnormalities to an AUDIT is analysed through sensitivity, specificity, PPV, NPV and accuracy.

Data Analysis: The collected data is analysed by using IBS-SPSS version 23.0. The appropriate statistical methods is used to make tabulation, and also used in different parametric and non-parametric measurements such as Pearson correlation test, independent-measures t-test, Anova tests and the Spearman correlation test.

Results

In our study 149 of patients (96.1%) were male patients and 6 patients (3.9%) were female demarcating clearly a male dominancy in alcoholics.47.1% were between age group of 26 to 35; 29.7% between age of 36 to 45 year; 12.3% were between 18 to 25 year of age; 8.4% were between 46 to 55 year of age and 2.6% were between 56 to 60 years.

Table no. 1 shows various other sociodemographic characteristics of study population.

Table 1: Socio-demographic characteristics of the study group

Variables		N (%)
Age in years	18-25	19 (12.3)
	26-35	73 (47.1)
	36-45	46(29.7)
	46-55	13 (8.4)
	56-60	4 (2.6)
Gender	Male	149 (96.1)
	Female	6 (3.9)
Education	Illiterate	8 (5.2)
	Primary School	34 (21.9)
	Middle School	39 (25.2)

	High School	37 (23.9)
	Intermediate/Diploma	26 (16.8)
	Graduation	8 (5.2)
	Professional Degree	3 (1.9)
Residence	Rural	91 (58.7)
	Sub-urban	54 (34.8)
	Urban	10 (6.5)
Marital status	Single	41 (26.5)
	Married	99 (63.9)
	Remarried	5 (3.2)
	Divorced	1 (0.6)
	Separated	2 (1.3)
	Widowed/Widower	7 (4.5)
Religion	Hindu	133 (85.8)
	Muslim	9 (5.8)
	Sikh	5(3.2)
	Christian	3(1.9)
	Others	5(3.2)

The study participants (N = 155)'s mean, standard deviation, minimum and maximum age, AUDIT, MCV, AST, ALT, and CIWA scores are all summarized in Table 2. Participants ranged in age from 20 to 60 years old, with a mean age of 35 ± 8.1 years. With a range of 5 to 31, the average AUDIT score was 12 ± 5.2. The MCV value ranged from 66 to 134 fL, with an average of 94 ± 9.47 fL. With a mean ALT score of 156 ± 183.5 (range: 12–1034) and an AST score of 169 ± 158.2 (range: 13–987), liver enzyme levels displayed significant variability. With scores ranging from 4 to 34, the average CIWA score was 16 ± 7.49. All things considered, the data show a great deal of variation in biochemical markers, especially AST and ALT levels.

Table 2: Mean and Standard deviation value of age, Audit score, MCV score, AST score, ALT score, CIWA score

Variables	N	Minimum	Maximum	Mean	Std. deviation
Age (in yrs)	155	20	60	35	8.118
Audit Score	155	5	31	12	5.217
MCV value	155	66	134	94	9.4723
AST score	155	13	987	169	158.238
ALT score	155	12	1034	156	183.508
CIWA score	155	4	34	16	7.491

In our study we found that on increasing the AUDIT cutoff score to 15, specificity and PPV also improved to 100% at the expense of sensitivity. On combining AUDIT and MCV, there was some improvement in sensitivity, NPV and accuracy wherein the specificity remained unaffected. Similar results were seen with combination of AST and ALT. Improvement in sensitivity was maximum when AUDIT was combined with AST marker as compare to other 2 markers. When 2 blood markers (MCV and AST) were combined with AUDIT there was maximum improvement in sensitivity and NPV.

Specificity remained unaffected with slight improvement in both PPV and accuracy [table 3].

Table 3: The effect of adding a combination of traditional biochemical screening test abnormalities to an AUDIT score

Test	Sensitivity	Specificity	PPV	NPV	Accuracy
AUDIT(cut off 8)	93.6%	86.7%	59.7%	98.5%	87.9%
AUDIT(cut off 15)	35.2%	100%	100%	88.0%	89.0%
AUDIT+MCV(cut off 8)	94.4%	86.7%	59.9%	98.7%	88.0%
AUDIT+AST(cut off 8)	97.6%	86.7%	60.7%	99.4%	88.6%
AUDIT+ALT(cut off 8)	95.2%	86.7%	60.1%	98.9%	88.2%
AUDIT+ 2Markers	98.0%	86.7%	60.9%	99.6%	88.7%

The impact of including anomalies from conventional biochemical screening tests in the AUDIT score on diagnostic performance metrics is depicted in Figure 1.

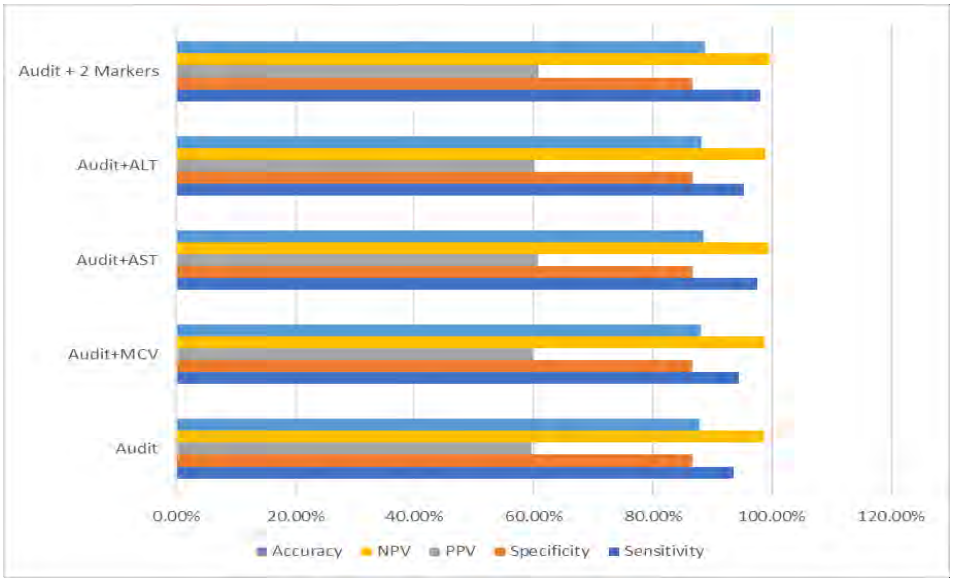

Figure 1: The effect of adding a combination of traditional biochemical screening test abnormalities to an AUDIT score through sensitivity, specificity, PPV, NPV and accuracy.

Discussion

The optimum AUDIT score to predict the degree of alcohol use disorder or the existence of physiologically manifested dependency, as defined by ICD [10] (World Health Organization, 1992), has not been determined. However, using CIWA-Ar to signify a withdrawal syndrome, Reoux et al. (2002) examined the utility of AUDIT solely as a potential indicator of an alcohol withdrawal syndrome. A cut off of 12 or higher improved specificity in their investigation, albeit at the expense of sensitivity. [11] However, in our study, specificity was increased at the expense of sensitivity when the AUDIT cut off score was raised to 15. This also improved the PPV and accuracy to 100% and 89% respectively.

The risk of alcohol abuse is brought to the clinician's attention by an AUDIT positive result. With high specificity at the expense of sensitivity, higher cut-off scores of 13 or more and 23 or more have been proposed as stronger indicators of alcohol-related social difficulties, liver illness, or gastrointestinal haemorrhage (Conigrave et al. 1995). [12] This is comparable to our study, inwhich sensitivity was lost while specificity was increased by raising the AUDIT cutoff to 15.

In study by Jonathan M et.al, the questionnaire's PPV was raised by including more test abnormalities (2 out of panel of 4 markers used were MCV, AST, ALT, GGT), but sensitivity was decreased in the process. In order to forecast patients who would have withdrawal symptoms, combining two biological markers with a specific AUDIT cut-off offered the best compromise between preserving sensitivity and raising the questionnaire's positive predictive value (PPV). [14] Sensitivity and specificity in the study by Jonathan M. et al. were almost unchanged, but PPV increased to 47% for an AUDIT cut off score of 8 with at least two aberrant markers. While maintaining sensitivity and NPV, increasing the AUDIT cut off score to 13 also increased specificity and PPV to 95.6% and 30.5% respectively.

PPV showed a minor improvement in our study when paired with standard blood indicators. Additionally, our research shown that using AUDIT in conjunction with blood indicators improves sensitivity. The sensitivity increased to 98% when two aberrant markers were employed in conjunction with an AUDIT cut off of 8 for recognition, while maintaining specificity. Raising the cut-off point for the AUDIT score improved the questionnaire's specificity and positive predictive value in identifying individuals who subsequently experienced withdrawal symptoms. With an AUDIT score of less than 8, no patient underwent clinically significant alcohol withdrawal in study [14]. We also found similar outcomes in our investigation.

Conclusion

In order to identify alcohol use disorders and provide possibilities for intervention, aimed at preventing alcohol withdrawal and reducing long term risk, the AUDIT checklist can be utilized in the acute medical context. The screening procedure is strengthened when blood markers and the AUDIT screening tool are combined.

Additionally, it lessens the strain for medical personnel while enhancing patient care

Recommendations

Larger sample sizes and frequent follow-ups are recommended for future study in order to improve the sensitivity and generalizability of the findings. The study necessitates a larger group of patients as well as multicentric participation from other locations in order to fully investigate the potential of these combinations for enhancing the screening process and enhancing patient care. Biochemical markers have not previously been investigated for the purpose of screening. Keeping that in mind, it is necessary to investigate various combinations as new biochemical markers arise, bearing cognizant of the variability of their rise and fall in blood concentration over time.

Limitations

The limited size of our study cohort compromises the validity of the findings. Additionally, the study population is restricted to one centre, even though we ought to have selected several centres.

As a result, it cannot be generalised to the entire population. When gathering information from subjects, there is a chance of observer and subject bias because of a number of variables, including age, gender, education level, motivation, cognitive characteristics, and memory cues. Since a lot of the inpatients arrive for admission following hours of fasting and critical withdrawal, it seemed unethical to keep them drug free. Therefore, the regular administration of benzodiazepine concealed the appearance of withdrawal and its severity.

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