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Original Article

Association and Prevalence of Alcoholism in Epileptic Patients at Tertiary Care Teaching Hospital

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ABSTRACT

Background: The effects of alcohol are complexly interlinked with the pathophysiology of epilepsy. Given that both epilepsy and alcohol have a significant detrimental impact on the brain; it is essential to investigate alcohol's causative involvement as an independent risk factor for epilepsy. Thus, the study aimed to quantify alcohol as an etiologic factor of epilepsy and find its prevalence in the study population. **Materials and Methods:** A prospective cross-sectional study was conducted in the general medicine wards of a tertiary care teaching hospital for six months. A total of 111 epileptic inpatients of both genders, above 18 years of age were included in the study. The Chi-Square Test of Independence was used to carry out a statistical analysis of the data. **Results:** The study comprised 111 epileptic patients. A strong association between alcohol consumption with a new onset of seizures was found (p<0.05, V=*0.54*). The prevalence of alcohol-related seizures was found to be 24.32%. Our statistical analysis also indicated that the new onset of seizure was significantly associated with alcohol consumption in the group of patients with co-morbidities (p<0.05, V=0.28). The study found that alcoholism was strongly associated with the precipitation of seizures and that alcohol-related seizure is prevalent in our study population. **Conclusion:** By considering the new onset of seizures as a serious adverse consequence of alcoholism, we are provided with an opportunity to counsel these patients on alcohol dependence while striving to optimize permanent pharmacological treatment to prevent further seizures. The prevention of more seizures should not take precedence over the treatment of alcohol dependence.

Keywords: Alcohol, Epilepsy, New onset seizure, Prevalence, Alcohol-Related Seizure.

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INTRODUCTION

Although epileptic seizures are very well-known medical and societal concerns, it is unclear how prevalent they are and how frequently they occur. Different definitions and diagnostic standards for epilepsy, data collection methods, and the density of the people in the study areas are a few of the reasons for the lack of clarity. Due to the methodological challenges with the epidemiology of epilepsy, it has been difficult to quantify the prevalence of epilepsy among alcoholics and alcoholism among epileptic patients. Also, the statistics are likely underestimated due to the societal stigma that both epilepsy and alcoholism share.[1] According to one study conducted in the United States on the history of abuse of alcohol in seizure patients, 41% of 472 individuals of lower socioeconomic status admitted for seizures had a history of alcohol addiction.[2] Another study found that around 40% of individuals admitted for seizure diagnosis and/or treatment showed significant simultaneous alcoholism.[3] Alcoholism may be more prevalent among epileptic patients than in the general population. Researchers believe that people with epilepsy may seek solace from their psychological and social problems through alcohol consumption.[4]

Seizures in alcoholics can be explained by abnormalities in neurotransmitters which promote hyper excitability. One of the most significant of these changes is the downregulation of the expression of Gamma-Aminobutyric Acid (GABA) receptors[5,6] and an increased glutamate level in the limbic system and cortical areas, as well as an increase in N-methyl-D-aspartate (NMDA) receptors.[6,7] Alcohol inhibits excitatory glutaminergic synaptic signalling by acting as a glutamate-NMDA receptor (NMDA-R) antagonist.[8,9] Additionally, alcohol blocks calcium flow via the NMDA-R, which is concentration-dependent.[10-14] Alcohol consumption over a prolonged duration causes NMDA-R upregulation.[15] The receptor concentrations shift to preserve normal function; GABA-A receptor (GABA-AR) concentration falls while NMDA-R concentration rises in the brain to maintain

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homeostasis. While NMDA-Rs become more responsive to glutamate, GABA-AR becomes desensitized to GABA. These phenomena cause Central Nervous System (CNS) hyperactivity in the absence of alcohol.[16,17] Even when alcohol is no longer present in this adapted system, the GABA-AR stay less responsive, resulting in an imbalance favouring excitatory neurotransmission as glutamate-mediated CNS excitation is unopposed. The well-known fact that alcohol increases Mg^{2+} excretion may also play a role in the reduction of the convulsive threshold.[18]

Numerous researches have been conducted to investigate the complex association between alcohol intake and epilepsy, with a particular emphasis on alcohol-induced seizures caused by withdrawal.[19] However, less research has been done to investigate the occurrence of epilepsy as a separate condition, as well as the occurrence of spontaneous seizures in alcoholics. Both characteristics may be critical in evaluating alcohol's causative involvement as an independent risk factor for epilepsy.[20] Hence the present study aimed to quantify alcohol as an etiologic factor of epilepsy and find its prevalence in the study population.

MATERIALS AND METHODS

A prospective cross-sectional study was conducted in the general medicine wards of a tertiary care teaching hospital for six months. A total of 111 epileptic patients of both genders, above the age of 18 years and were admitted to the hospital for at least 48 hr were included in the study. The outpatients, obstetrics and gynaecology department, psychiatric patients, paediatric patients, patients aged below 18 years and patients admitted for less than 48 hr were excluded from the study. The Chi-Square Test of Independence was used to analyse the association between two categorical variables. Informed consent was obtained from every patient before conducting the study.

Ethical Clearance

Ethical clearance for this study was obtained from the Institutional Ethical Committee, KLE College of Pharmacy, Hubballi to carry out this research project. IEC Number: KLECOPH/IEC/2022-23/05

RESULTS

A total of 111 epileptic patients were included in the study, of these, 55 patients had no obvious structural or metabolic conditions that could have precipitated seizures. Out of the 55 patients, 33 patients presented with a new onset of seizures. The social history of these patients was obtained. Out of the 33 patients who had developed a new onset of seizures, 27 patients had a history of alcoholism and 6 were non-alcoholic (Table 1).

All 27 patients were males. The demographic details of the patients are given in Table 2. The patient's average age was 37.30 years (the median age was 38 years and the range was 23-62 years). It was observed that all the patients had a history of alcohol consumption of 2 years and above. The mean duration of alcohol use was 12.19 years. The average time interval between alcohol intakes to seizure was 4.44 days. 81.48% of patients had suffered from Generalised Tonic-Clonic Seizures (GTCS), 7.4% suffered from focal seizures and 11.11% had an unknown seizure type diagnosis.

Association Between Alcoholism and New Onset Seizures

The association between alcohol intake and new onset of seizure was analysed in the patients. A Chi-Square Test of Independence was run for this purpose (2x2 contingency table shown in Table 1). A significant association was found between alcohol consumption and new onset of seizure, χ^2 (1, N=55) = 16.36, p=.000 (Table 1). Our study population was divided into two groups based on the presence or absence of co-morbidities. Out of 111 patients, 56 were co-morbid. Out of these, 22 had a history of alcohol consumption and had developed a new onset of seizures (Table 3). Therefore, we evaluated the association between alcohol consumption and new onset of seizure in patients with co-morbidities. New-onset seizure was significantly associated with alcohol consumption in the group of patients with co-morbidities, χ^2(1, N=56) = 4.43, p =0.035 (Table 3).

Effect Size

While statistical significance shows that an association between two variables exists in a study, practical significance tells us that the association is large enough to be relevant in the real world. Thus, Cramer's V was computed to analyse the strength of association between the alcohol intake and the new onset of seizures. For the group of patients with co-morbidities, Cramer's V=0.28 and for the group of patients without co-morbidities, Cramer's V=0.54. This suggests that there was a strong association between alcohol and new-onset seizures in patients without co-morbidities.

Prevalence of Alcohol-Related Seizures (ARS)

In twenty-seven out of 111 patients, the seizures had occurred in the presence of persistent alcohol abuse with abrupt cessation of alcohol intake and without obvious structural or other metabolic reasons. This suggests that alcohol was the only evident reason that led to the development of seizures. Thus, we referred to them as ARS. With 27 out of 111 epileptic patients suffering from ARS, the prevalence of ARS was found to be 24.32%.

DISCUSSION

In this study, we aimed to analyse the association between alcohol consumption and the occurrence of seizures and the prevalence of ARS in 111 epilepsy patients. We found a strong association between alcohol consumption with new onset of seizure in 27 out of 111 patients. Similar observations were made by Victor *et al.*, 1967.[21] The 24.3% (N=27) of our study population suffered from ARS. Our results are similar to the study findings made

Table 1: 2x2 contingency table of alcohol consumption and onset of seizure of patients without co-morbidities.

2x2 contingency table of alcohol consumption and onset of seizure		Onset of Seizure		Total
		New Onset	History of Seizures	
Alcohol Consumption	Alcoholic	27	6	27
	Non-Alcoholic	6	16	29
Total		33	22	55

Table 2: Demographics of patients who had a history of alcohol and developed a new onset of seizure (*N*=27).

Mean age (SD).	37.30 years (10.11).
Median age (SD).	38 years (Range: 23-62).
Mean time interval since the last intake of alcohol (SD).	4.44 days (3.97).
Mean duration of alcoholism (SD).	12.19 years (7.50).
Mean number of seizures per patient.	2.30

Table 3: 2x2 contingency table of alcohol consumption and onset of seizure of patients with co-morbidities.

2x2 contingency table of alcohol consumption and onset of seizure		Onset Of Seizure		Total
		New Onset	History of Seizures	
Alcohol Consumption	Alcoholic	22	5	27
	Non-Alcoholic	16	13	29
Total		38	18	56

by Hamerle *et al.*, 2018[22] who reported that 18.1% of their study population experienced ARS, while Tudor 1975[23] reported that ARS accounted for 30% of seizure cases in the population. Of the twenty-seven patients, 48.1%, (N=13) reported the occurrence of seizure within 48 hr of cessation of alcohol, which is per the study conducted by M. E Hillbom.[24] The mean number of seizures per patient was found to be 2.30 in our study population, which is similar to the study conducted by Sandeep *et al.*, 2013.[25] The mean duration of alcohol intake in our study population was at 13.37±8.62 years, while a study conducted by Sandeep *et al.*, 2013[25] observed 17±9.13 years. Rathlev *et al.*, 1994[26] observed that between 20 to 40% of patients with seizures who go to the emergency department have seizures linked to alcohol abuse. In our study, we observed 54% (N=60) of our epileptic study population presenting to the hospital with a history of alcohol consumption. Our findings are also in line with another study conducted by Chu *et al.*, 1976 who reported that 40% of their epileptic population had simultaneous alcoholism. All 60 of these patients were males and none of the females in our study population consumed alcohol. Sandeep *et al.*, 2013[25,26] also observed that 88% of their study population suffered from GTCS and 12% from partial seizures. In our present study, out of the twenty-seven ARS patients, 81.4% were GTCS patients, 7.4% had focal seizures and 11.1% patients had been diagnosed as unknown seizure type.

CONCLUSION

Alcohol usage has been identified as a substantial seizure risk factor. The finding that patients with alcoholism had a higher occurrence of seizures and that alcoholism is more common among people with epilepsy than it is among the general population, lends credence to this theory. Therefore, to quantify alcohol as an etiologic factor of epilepsy and gauge the prevalence of ARS, we studied new-onset seizures with a history of alcohol intake in our study population. In light of our results, we conclude that alcoholism was strongly associated with the precipitation of seizures ($p<0.05$, $V=0.54$). The prevalence of alcohol-related seizures in our study population was found to be 24.32%. Our statistical analysis also indicated that the new onset of seizure was significantly associated with alcohol consumption in the group of patients with co-morbidities ($p<0.05$, $V=0.28$). By considering new-onset seizures as a serious adverse consequence of alcoholism, we are provided with an opportunity to counsel these patients on alcohol dependence while striving to optimize permanent pharmacological treatment to prevent further seizures. The prevention of more seizures should not take precedence over the treatment of alcohol dependence.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHORS' CONTRIBUTION

All authors contributed equally to conceptualizing the study, data collection, statistical analysis of the results, writing, and revising the manuscript. All the authors have read and approved the final version of the manuscript and have agreed to be accountable for all aspects of the work.

ABBREVIATIONS

ARS: Alcohol-related Seizures; **CNS:** Central Nervous System; **GABA:** Gamma-aminobutyric acid; **GTCS:** Generalised Tonic-Clonic Seizure; **NMDA:** N-methyl-D-aspartate.

SUMMARY

Alcohol intake significantly increases seizure risk, with a higher incidence among those with alcoholism. Our research found a 24.32% prevalence of alcohol-related seizures in new-onset cases. Statistical analysis demonstrated a strong association between alcoholism and seizures ($p<0.05$, $V=0.54$). This underlines the necessity of addressing alcohol dependence to prevent further seizures. Emphasizing the need to counsel patients on alcohol dependence, our study highlights the importance of balancing seizure prevention with comprehensive alcoholism treatment without neglecting the latter's significance.

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