

STUDY ON ALCOHOL AND ITS NEUROLOGICAL COMPLICATIONS

Akumnaro Jamir¹, A. Ramalingam², G. Vasumathi³, S. M. Sujatha⁴

¹Post Graduate, Department of General Medicine, Stanley Medical College, Chennai.

²Senior Assistant Professor, Department of General Medicine, Stanley Medical College, Chennai.

³Professor, Department of General Medicine, Stanley Medical College, Chennai.

⁴Senior Assistant Professor, Department of General Medicine, Stanley Medical College, Chennai.

ABSTRACT

BACKGROUND

Alcoholism is characterised by alcohol tolerance, signs and symptoms of withdrawal and continued use in spite of insidious physical or psychological consequences. Chronic alcohol abuse causes several distinct diseases affecting many organs; however, the alcohol affecting the brain is the most significant factor for maintaining this alcohol abuse. The neurological complications of alcoholism include both the peripheral and the central nervous system like the alcohol withdrawal syndrome which includes alcohol withdrawal seizures, delirium tremens, alcohol hallucinosis. The other neurological complications are the alcoholic peripheral neuropathy, alcoholic myopathy, Wernicke encephalopathy, combination of Wernicke encephalopathy with Korsakoff's psychosis. Not all alcoholics are alike. The degree of impairment differs from individual to individual and the aetiology of a particular disease has different origins for different people. In the current scenario, it is still a subject of active research as to what characteristic features makes certain group of alcoholics more vulnerable to brain damage.

MATERIALS AND METHODS

The present study was undertaken under the Department of General Medicine, Govt. Stanley Hospital, Chennai. The study consists of 150 patients with history of alcohol intake satisfying the inclusion and exclusion criteria, presenting in medical OPD/wards/ICU, after proper consent were subjected to questionnaires, complete physical examination and relevant laboratory investigations as per proforma. A prospective observational study design was chosen and descriptive statistics was done for all data and suitable statistical tests of comparison for a period of 6 months.

RESULTS

It was found that alcohol withdrawal seizures and acute hallucinosis were the most common neurological sequelae seen. Acute hallucinosis was more prevalent in younger age group, whereas complications like alcohol polyneuropathy, Wernicke's-Korsakoff syndrome were found to be associated with older age group and with longer duration and higher quantity of alcohol intake. The age of onset of consumption of alcohol for majority of the participants was around 26-30 years of age.

CONCLUSION

This study contributes in the daily practice of clinicians, when encountering patients with chronic alcohol abuse to identify and differentiate the neurological complications of chronic alcoholism and at the same time understand its pathophysiology so that this treatment can be tailored to individual patients.

KEYWORDS

Alcoholism, Neurological Complications.

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INTRODUCTION

Alcoholism is characterised by alcohol tolerance, signs and symptoms of withdrawal and continued use in spite of insidious physical or psychological consequences. Recent diagnostic criteria define Alcohol Use Disorder by the presence of at least 2 out of the given conditions for more than a year-tolerance, signs and symptoms of alcohol withdrawal, drinking in excessive amount, a strong desire to use alcohol, unsuccessful efforts to reduce drinking, spending more time in alcohol and alcohol related activity, affecting one's personal

work and social lifestyle due to alcohol, continuous alcohol use despite persistent social, interpersonal problems, alcohol use in spite of persistent recurrent physical and psychological consequences (DSM-5, 2013). Chronic alcohol abuse causes several distinct diseases affecting many organs including the liver, lung, stomach and the brain. However, the alcohol affecting the brain is the most significant factor for maintaining this alcohol abuse. These effects include emotional and behavioural changes as well as defective judgement, learning disability and memory dysfunction. Studies have shown that radio-imaging studies have documented presence of damage in the brain of alcoholics like shrinkage of the brain and atrophy of the nerve cells. At the basic cellular level, alcohol affects the functioning of the brain by affecting the gamma-aminobutyric acid, glutamate and other neurotransmitters.⁽¹⁾ The neurological complications of alcoholism includes both the peripheral and the central nervous system.

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Corresponding Author:

*Dr. Akumnaro Jamir,
Ladies PG Hostel, Room No. 108,
Stanley Medical College,
Chennai-600001.*

E-mail: kumti.jamir@yahoo.com

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They are the alcohol withdrawal syndrome which includes alcohol withdrawal seizures, delirium tremens, alcohol hallucinosis.

The other neurological complications are the alcoholic peripheral neuropathy, alcoholic myopathy, Wernicke encephalopathy, combination of Wernicke encephalopathy with Korsakoff's psychosis.⁽¹⁾ Besides these complications less common complications have been identified which includes Marchiafava-Bignami Syndrome, subacute encephalopathy with seizure activity (SESA Syndrome), alcohol cerebellar degeneration which are usually diagnosed by their characteristic MRI and EEG findings.⁽²⁾

Incidences and Prevalence in India

According to the WHO 2014, global status report on alcohol and health, 38.3 % of the total world population consumes alcohol and 30% of the total population in India.⁽³⁾ The prevalence of alcohol dependence is 12.5% and the prevalence of alcohol abuse is 17.8% in a lifetime.⁽³⁾ The per capita consumption of alcohol globally is 6.6 litres, in India it is 2.2 litres. Around 200 different health conditions covered by the ICD-10 is associated with alcohol consumption. Out of which 3.3 million deaths are attributed to alcohol globally.⁽³⁾ These statistical data encourages and contributes towards the importance of further researches in alcoholism and its underlying mechanism.

AIMS AND OBJECTIVES

1. To study the prevalence of various neurological related complications in alcoholism.
2. To study the correlation of duration and quantity of alcohol intake leading to neurological complications.

MATERIALS AND METHODS

The present study was undertaken under the Department of General Medicine, Govt. Stanley Hospital, Chennai. The study consists of 150 patients with history of alcohol intake satisfying the inclusion and exclusion criteria, presenting in medical OPD/wards/ICU, after proper consent were subjected to questionnaires, complete physical examination and relevant laboratory investigations as per proforma. A prospective observational study design was chosen and descriptive statistics was done for all data and suitable statistical tests of comparison for a period of 6 months.

Inclusion Criteria

Patients with history of alcoholism.

Exclusion Criteria

1. Patients with Chronic liver disease/Hepatic Encephalopathy.
2. Patients with known Seizure disorder.
3. Patients with Diabetes Mellitus.
4. Patients with Psychiatric illness.
5. Patients with Congenital disease.
6. Patients with Cerebrovascular accidents.
7. Patients with acute CNS infections.

Study Duration: Jan. 2015 to Sept. 2015

Study Design: Prospective Observational Study.

Sample Size: 150

Data Collection

This study is an observational prospective study, wherein 150 alcoholic patients satisfying inclusion and exclusion criteria were subjected to answer a set of questionnaires, complete physical examination and relevant laboratory investigations as per proforma, exclusively designed for the study. Prior permission from Institutional Ethics Committee was taken, written/informed consent from every subject was taken.

Statistics

Descriptive statistics was done for all data and were reported in terms of whole observed values and percentages. Suitable statistical tests of comparison were done. Categorical variables were analysed with the Chi-Square Test. Statistical significance was taken as $P < 0.05$. The data was analysed using SPSS version 16 and Microsoft Excel 2007.

Alcoholism Definition

National Council on Alcoholism and Drug Dependence and the American Society of Addiction Medicine defines alcoholism as a primary, chronic disease characterized by impaired control over drinking, pre-occupation with the drug alcohol, use of alcohol despite adverse consequences and distortions in thinking. DSM-IV defines alcoholism as maladaptive alcohol use with clinically significant impairment.

RESULTS

Neurological Complications in Alcoholics

In our study patients, alcohol withdrawal seizures (38%) was the most common neurological complication followed by acute hallucinosis (20%). Alcoholic myopathy (2%) and Wernicke-Korsakoff syndrome (8%) were the least common neurological complications seen.

Age Distribution

Study showed that in 26-35 yrs., acute hallucinosis (35%) was more prevalent. In 36-55 yrs., alcohol withdrawal seizures (46%) was more prevalent, whereas in 56-65 yrs. alcohol polyneuropathy (21%) was more prevalent. The study also concluded that the incidence of alcohol hallucinosis was significantly and consistently higher in younger age group patients and the incidence of alcoholic polyneuropathy, Wernicke's encephalopathy, Wernicke's-Korsakoff syndrome were significantly and consistently higher in very older age group patients.

Gender Distribution

The alcohol intake and its associated neurological complications were found to be more prevalent among the males (90%) as compared to females and transgender. There was a contribution of 5% of female alcoholics and 4% of transgender alcoholics in the study group.

Brand of Alcohol

It was observed that brandy (29%) was the most common brand of alcohol used among the study group followed by whiskey (22%). Of the brands, wine (2%) and country liquor were the least commonly used.

Duration of Alcohol Intake

It was found in the study that alcohol withdrawal seizure was the most common neurological complication seen except in the

group with history of alcohol intake for a duration 0-5 years, alcohol hallucinosis was more prevalent.

The study also concluded that incidence of alcohol hallucinosis was significantly and consistently higher in patients with lesser duration of alcohol intake, whereas the incidence of alcoholic polyneuropathy and Wernicke-Korsakoff encephalopathy was significantly and consistently higher in patients with longer duration of alcohol intake.

Quantity of Alcohol Intake

The participants taking alcohol of around 840 gm/week had alcohol hallucinosis more common as a neurological complication, whereas the prevalence of alcohol hallucinosis and alcohol withdrawal seizure was equally seen in participants with alcohol intake of around 770 gm/week. For the rest of the group alcohol withdrawal seizure was the most common neurological complication. The study also concluded that the incidence of alcohol hallucinosis, Wernicke's encephalopathy and Wernicke-Korsakoff syndrome was significantly and consistently higher in patients with higher quantity of alcohol intake. The incidence of alcoholic polyneuropathy was significantly and consistently higher in patients with lower quantity of alcohol intake.

Age of Onset of Alcohol Consumption

In our study, it was found that the maximum age of onset of alcohol consumption was between 26-30 years of age.

DISCUSSION

Excessive indulgence of an individual in alcohol causes many problems and chaos at the individual level as well as at the society level. The chronic effects of alcohol abuse include neurological complications through both direct and indirect effects on the central and peripheral nervous system. These complications include alcohol withdrawal syndrome in the form of delirium tremens which is characterized by a state of intense acute withdrawal state in the form of mental confusion, diaphoresis, agitation, fluctuating levels of consciousness, visual and auditory hallucinations associated with tremors and autonomic activity.⁽⁴⁾ Alcohol withdrawal seizures occur within 48 hours of alcohol cessation and occur either as a single generalized tonic-clonic seizure or a brief episode of multiple seizures usually with a normal EEG record.⁽⁵⁾ In alcohol hallucinosis the patients have transient visual, auditory or tactile hallucination, but are otherwise clear. Principally Wernicke's encephalopathy is a nutrition deficiency disorder due to brain damage caused by lack of thiamine, most frequently seen in chronic alcoholic patients characterised by a triad of mental confusion, ataxia and ophthalmoplegia. Wernicke-Korsakoff Syndrome includes symptoms of Wernicke's encephalopathy along with global amnesia, which includes both retrograde and anterograde amnesia and confabulation.⁽⁶⁾ Here, MRI findings may show

hyperintense T2 lesions in mammillary bodies, medial thalami, tectal plate, periaqueductal area. Alcohol polyneuropathy is characterised by axonal degeneration and demyelination. Symptoms include paraesthesias, pain and weakness, reduced pain and temperature sensations confirmed by nerve conduction study. In alcohol myopathy, the main complaints include muscle pain, severe cramps in the muscles, weakness of limbs, mostly the proximal muscles and associated swelling of muscles and tenderness. Chronic alcoholic myopathy is characterized by a gradual long-term involvement of the muscles, which are usually painless and involves the weakness of the proximal muscles with associated muscle atrophy.

CONCLUSION

Not all alcoholics are alike. The degree of impairment differs from individual to individual and the aetiology of a particular disease has different origins for different people. With the known existing harmful nature of alcoholism in the society, its complications have been already recognised clinically for years, hence the current recent advances are emphasizing more in understanding the biochemical targets of ethanol and the pathophysiology of the complications. In current scenario, it is still a subject of active research as to what characteristic features makes certain group of alcoholics more vulnerable to brain damage. This study contributes to daily practice when encountering patients with chronic alcohol abuse to identify and differentiate the neurological complications of chronic alcoholism and at the same time understand its pathophysiology so that these treatments can be tailored to individual patients. Also to encourage further researches on advanced technology, to design newer therapies and medicines for diagnosis and to ameliorate alcoholism and alcohol related neurological disorder.

STATISTICS

Neurological Complications in Alcoholics	Number	Percentage
Alcohol Withdrawal Seizures	57	38.00
Delirium Tremens	28	18.67
Alcohol Hallucinosis	30	20.00
Alcoholic Polyneuropathy	14	9.33
Alcoholic Myopathy	4	2.67
Wernicke Encephalopathy	9	6.00
Wernicke-Korsakoff Encephalopathy	8	5.33
Total	150	100

Table 1: The Percentage of Neurological Complications in Alcoholics

Neurological Complications in Alcoholics-Age Distribution	26-35 years		36-45 years		46-55 years		56-65 years		P value Chi Squared Test
	years	%	years	%	years	%	years	%	
Alcohol Withdrawal Seizures	12	28.57	30	46.88	10	33.33	5	35.71	0.258
Delirium Tremens	11	26.19	14	21.88	3	10.00	0	0.00	0.082
Alcohol Hallucinosi s	15	35.71	13	20.31	0	0.00	2	14.29	0.003
Alcoholic Polyneuropathy	2	4.76	3	4.69	6	20.00	3	21.43	0.028
Alcoholic Myopathy	2	4.76	2	3.13	0	0.00	0	0.00	0.579
Wernicke Encephalopathy	0	0.00	1	1.56	6	20.00	2	14.29	0.001
Wernicke-Korsakoff Encephalopathy	0	0.00	1	1.56	5	16.67	2	14.29	0.003
Total	42	100	64	100	30	100	14	100	

Table 2: Age Wise Distribution of the Various Neurological Complications in Alcoholics

Neurological Complications in Alcoholics-Gender Distribution	Male		Female		Transgender		P value Chi Squared Test
	Male	%	Female	%	Transgender	%	
Alcohol Withdrawal Seizures	53	38.97	3	37.50	1	16.67	0.545
Delirium Tremens	28	20.59	0	0.00	0	0.00	0.17
Alcohol Hallucinosi s	27	19.85	0	0.00	3	50.00	0.068
Alcoholic Polyneuropathy	12	8.82	1	12.50	1	16.67	0.772
Alcoholic Myopathy	4	2.94	0	0.00	0	0.00	0.804
Wernicke Encephalopathy	6	4.41	2	25.00	1	16.67	0.033
Wernicke-Korsakoff Encephalopathy	6	4.41	2	25.00	0	0.00	0.037
Total	136	100	8	100	6	100	

Table 3: The Distribution and the Percentage of Neurological Complications in Alcoholics-Gender Wise

Brand of Alcohol Used	Number	Percentage
Beer	28	18.67
Wine	3	2.00
Whiskey	34	22.67
Brandy	44	29.33
Rum	25	16.67
Vodka	9	6.00
Country Liquor	7	0.00
Total	150	95

Table 4: The Percentage of Brand of Alcohol Used in Alcoholics

Neurological Complications in Alcoholics Vs Duration of Intake	0-5 years		6-10 years		11-15 years		16-20 years		21-25 years		P value Chi Squared Test
	years	%	years	%	years	%	years	%	years	%	
Alcohol Withdrawal Seizures	13	33.33	15	30.61	19	52.78	6	30.00	4	66.67	0.103
Delirium Tremens	8	20.51	13	26.53	7	19.44	0	0.00	0	0.00	0.087
Alcohol Hallucinosi s	15	38.46	11	22.45	1	2.78	3	15.00	0	0.00	0.003
Alcoholic Polyneuropathy	0	0.00	4	8.16	4	11.11	5	25.00	1	16.67	0.034
Alcoholic Myopathy	1	2.56	3	6.12	0	0.00	0	0.00	0	0.00	0.412
Wernicke Encephalopathy	2	5.13	1	2.04	4	11.11	2	10.00	0	0.00	0.402
Wernicke-Korsakoff Encephalopathy	0	0.00	2	4.08	1	2.78	4	20.00	1	16.67	0.012
Total	39	100	49	100	36	100	20	100	6	100	

Table 5: The Relation between the Duration of Intake of Alcohol and the Development of Neurological Complications

Neurological Complications in Alcoholics Vs Quantity of Intake	490 g/week		560 g/week		630 g/week		700 g/week	
	g/week	%	g/week	%	g/week	%	g/week	%
Alcohol Withdrawal Seizures	7	43.75	8	33.33	16	39.02	15	44.12
Delirium Tremens	2	12.50	2	8.33	7	17.07	10	29.41
Alcohol Hallucinosi s	4	25.00	3	12.50	5	12.20	5	14.71
Alcoholic Polyneuropathy	0	0.00	5	20.83	4	9.76	3	8.82
Alcoholic Myopathy	1	6.25	0	0.00	2	4.88	1	2.94
Wernicke Encephalopathy	1	6.25	4	16.67	4	9.76	0	0.00
Wernicke-Korsakoff Encephalopathy	1	6.25	2	8.33	3	7.32	0	0.00
Total	16	100	24	100	41	100	34	100

Table 6: The Relation of the Quantity of Alcohol Intake with the Neurological Complications

Neurological Complications in Alcoholics Vs Quantity of Intake	770 g/week	%	840 g/week	%	910 g/week	%	P value Chi Squared Test
Alcohol Withdrawal Seizures	6	33.33	5	29.41	4	44.44	0.302
Delirium Tremens	5	27.78	2	11.76	0	0.00	0.113
Alcohol Hallucinosi s	6	33.33	7	41.18	3	33.33	0.025
Alcoholic Polyneuropathy	1	5.56	1	5.88	0	0.00	0.017
Alcoholic Myopathy	0	0.00	0	0.00	1	11.11	0.598
Wernicke Encephalopathy	0	0.00	0	0.00	1	11.11	0.045
Wernicke-Korsakoff Encephalopathy	0	0.00	2	11.76	0	0.00	0.017
Total	18	100	17	100	9	100	

Table 7: The Relation of the Quantity of Alcohol Intake with the Neurological Complications

Age of Onset of Alcohol Consumption	No.	%
≤ 20 years	1	0.67
21-25 years	46	30.67
26-30 years	83	55.33
31-40 years	19	12.67
41-50 years	1	0.67
Total	150	100

Table 8: Distribution of the Age of Onset of Alcohol Consumption

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