

A study of speed and sustain attention in persons with alcohol dependence syndrome: a hospital base comparative study

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ABSTRACT

Aim: The aim of the study was to investigate the groups' difference in (persons with Alcohol dependence syndrome (experimental group) and control groups (non experimental group) in speed and attention Test profile and its association with age, education and duration of alcohol intake. **Methodology:** The present study was a cross sectional and comparative It was conducted at Lokopriya Gopinath Bordoloi Regional Institute of Mental Health, Tezpur, Assam. The data collection was done from those who were diagnosed a case of alcohol dependence as per International Classification of Disease -10 Diagnostic criteria for research. For this purpose 150 experimental samples and 150 control group were chosen using variable such as age, education and socio economic status. The study was adopted purpose sampling method and design was co relational and comparative. The experimental group included person diagnosed as a case of alcohol dependence according to Age 18-50 years, male, primary education, comprehend ,right handedness were selected. For control group the same inclusion criteria were consider. Their general health questionnaire 12 score would fall below 2. To assess demographic details self develop socio demographic data was used along with the consent from the both groups. And following tools were used modified Kuppuswamy's Socio economic status scale 2012, finger tapping test and digit symbol substitution test, ICD-10 and GHQ-12 was administered to the respondents. **Result:** - Persons with alcohol dependence group were low performer in finger tapping test, digit symbol substitution test and sustain attention test. It has significant relationship with their Age, Education and socio economic status and associated with the duration of alcohol intake. **Conclusion:** Group difference was found in the domain of attention and speed test profile. However, the group-A were low performer as compare to group B. Group A has significant negative and positive correlation with attention and speed test profile and their age, education, SESS and duration of alcohol intake has significant association with attention and speed test.

Keywords: Alcohol dependence, mental speed, motor speed and sustain attention

Alcohol is one of the most abused substances worldwide; the use of alcohol is increasingly prevalent in our country and remains associated with innumerable social, economic and

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health problems. Being a neurotoxic substance, it is common for the occurrence of brain problems among patients, not only in the first days of withdrawal, but also months after the last use of the substance (Pfefferbaum et al, 1995). Chronic drinking is associated with neurocognitive deficits due to neuropathological changes in the structure, metabolism, and function of the brain. One of the consequences of neuropathological brain abnormalities in the cerebellum of alcoholics has been impairment of motor functioning. A new study using functional magnetic resonance imaging (fMRI) during a finger-tapping exercise has found a weakened relationship between frontal lobe and cerebellar activity in alcoholic individuals. (Boxer P. Rogers et al 2011) These cognitive impairments not only determine everyday management of these patients, but also impact on the efficacy of management and may compromise the abstinence prognosis. It therefore appears essential to clearly define neuropsychological management designed to identify and evaluate the type and severity of alcohol-related cognitive impairments in various manifestations of executive functioning and decision making have been found in several studies related alcohol and drug use disorders (Cantrell et al.). Alcohol dependence is characterized by a neuropsychological profile of extensive impairment in executive functions, visuospatial abilities, socio cognitive, emotional and motivational dysfunctions. Several studies indicated that with prolonged abstinence functional improvement in memory, visuo spatial abilities, and attention occur within 3 to 4 weeks of abstinence accompanied by at least partial reversal of brain shrinkage and some recovery of metabolic functions in the frontal lobes and cerebellum, as well as with increased cortical grey matter volume. (Lilijana Šprah, 2008), Goldman (1983), cognitive deficits in alcoholics is influenced by the patient's age, length of drinking history and lower educational experience. He found that increased age, longer drinking history and lower educational level were associated with greater impairment. Alcohol dependence presents a significant challenge to society and health-care services as alcoholics are not all alike. They experience different subsets of symptoms, and the disease has different origins for different people. Therefore, to understand the effects of alcoholism and it is important to consider the influence of a wide range of variables. Though major research has focused on various aspects of Alcohol dependence syndrome but there has been no conclusive consensus about etiology. It is important to understand the Neuropsychological process, structural and functional aspect of the brain. The present study is aimed to find group difference in motor speed, mental speed and sustain attention of the both groups. An association with various socio demographic profiles of persons with alcoholic dependence syndrome.

Objectives

1. To assess motor speed function test of the persons with alcohol dependence syndrome and control group.
2. To see the difference in the mental speed function test of the persons with alcohol dependence syndrome and control group.
3. To see difference in the sustain attention of the persons with alcohol dependence and control group.
4. To see the relationship of motor speed function, mental speed function and sustain attention and selected socio demographic variables of persons with alcohol dependence syndrome.
5. To see the association between speed function, mental speed function and sustain attention and duration of alcohol intake.

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Hypothesis

1. There will be no difference in the mental speed function test of the persons with alcohol dependence syndrome and control group.
2. There will be no difference in the sustain attention of the persons with alcohol dependence and control group.
3. There will be no significant relationship of motor speed function, mental speed function and sustain attention and selected socio demographic variables of persons with alcohol dependence syndrome.
4. There will be no significant association between speed function, mental speed function and sustain attention and duration of alcohol intake.

METHODOLOGY

The present study was cross sectional hospital base study carried out at Lokopriya Gopinath Bordoloi Regional Institute of Mental Health, Tezpur, Assam. The collection was done from those who were diagnosed a case of alcohol dependence according to International Classification of Disease -10DRC criteria. For this purpose 150 experimental samples and 150 control group were chosen using variable such as age, education and socio economic status. The study was adopted purpose sampling method and design was correlational and comparative in nature. The experimental group included person diagnosed as a case of alcohol dependence according to Age 18-50 years, male, who read and write, comprehend and understand the instruction and Right handedness were selected. For control group the same inclusion criteria were consider. Their general health questionnaire 12 score would fall below 2. The experimental group were excluded from the following criteria; persons with multiple substance and other co morbidities (except nicotine), mentally challenged, family history of mental illness, history of head injury, any other major physical disease. The same criteria were excluded from the control group. To assess demographic details self develop socio demographic data was used along with the consent from the both groups. For studying socio economic status, modified Kuppuswamy's Socio economic status scale 2012, assessment of mental speed digit substitution test, assessment of motor speed finger speed test and sustain attention digit vigilance test, diagnostic guide line for alcohol dependence syndrome under the criteria of ICD-10 and for control group GHQ-12 was administered to the respondents, score of less than 2 was taken. The respondent were assured confidentiality, informed consent was taken from the respondents. The data was used only for research purpose of the study and sample was selected on voluntary basis. An appropriate statistical measure was used for the data analysis with the help of IBM SPSS-20.

Tools for Data collection

1. **Semi structure socio demographic and clinical datasheet:** To obtain the information about Name, Age, Sex, Education, Handedness, Marital Status, Address, Religion, Duration of Alcohol used.
2. **Socio economic status scale:** The scale was developed by Kuppuswami, B. Socioeconomic status (SES) is one of the most important social determinants of health and diseases.,
3. **General health questionnaire -12:** The GHQ-12 is contains 12 questions to know the general health of the normal people here we should like to know if u had any medical complaints, and how your health has been in general, over the past few weeks, this questionnaire was developed by David Gildberg, 1978, Published by GL Assessment Limited, This edition published 1992.

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4. **Finger tapping test:** The finger tapping test (Spreeen & Srauss, 1998) is used to measure motor speed. It measures the speed with which the index finger of each hand can tap.
5. **Digit symbol substitution test:** The digit symbol substitution test (Wechsler, 1981) is a test of visuomotor coordination, motor persistence, sustained attention and response speed. Rapid information is required in order to substitute the symbol accurately and quickly.
6. **Digit vigilance test: The Digit Vigilance Test (Lezak, 1995):** The digit vigilance test consists of number 1 to 9 randomly ordered and placed in rows on a page. There are 30 digits per rows on the sheet. The digits are closely packed on the sheet. The same level of mental effort or attention deployment is required over a period of time. The subject has to focus on the target digits i.e. 6 and 9 amongst other character digits. Inability to sustain and focus attention leads to both increased time to complete the test as well as error.

Ethical issues: The present study was passed from the scientific advisory committee and ethical committee from Lokopriya Gopinath Bordoloi Regional Institute of Mental Health. The respondent were assured of confidentiality, informed consent was taken from the respondents. The participants were clearly explained about the purpose of the study and samples were selected on voluntary basis.

Statistical analysis: The present study was using statistical package for social science version 18 was used for all the analysis. Chi square was applied for the Group comparison in various socio demographic variables; Independent t- test was applied to find out the group difference, spearman correlation was applied to see the relation of finger tapping test, digit symbol substitution test and digit vigilance test with selected socio demographic variables.

RESULT AND DISCUSSION

Table 1:1 socio demographic variables of persons with alcohol dependence syndrome and control group.

Variable N=300	Numbers participants	Percentage %
<i>Age</i>		
18-28	66	22%
29-39	160	53%
40-50	74	24.7%
<i>Education</i>		
Primary	141	47.6%
Up To 10+2	102	34%
Above 10+2	57	19%
<i>Socio Economic Status</i>		
Upper	61	20.3%
Upper Middle	107	35.7%
Lower Middle	62	20.7%
Upper Lower	57	19.0%
Lower	13	4.0%
<i>Religion</i>		
Hindu	261	87.0%
Muslim	13	4.3%

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Variable N=300	Numbers participants	Percentage %
Christian	19	6.3%
Others	7	2.3%
Types Of Family		
Nuclear	108	36.0%
Joint	191	63.7%
Extended	1	3%
Marital Status		
Married	262	87.3%
Unmarried	38	12.7%

The above table shows the socio demographic variables of persons with alcohol dependence syndrome and control groups. In the socio demographic variables of both groups in terms of age, educational qualification, socio economic status, religion, types of family and marital status. The majority of the participant's age group was from 29-39 years group that is 53%. Nearly by half of them had received education up to primary level (47%), majority of the participants are belonged to upper middle class i.e. 107(35.7%) and 87% participants were followed hind religion and majority of participants are from joint family 63%, 87.3% of the participants were married and 12.7% were unmarried.

The above finding is closely similar to a study done by Ghosh P (2018). In this study majority of the age group was 35-44 years 42%, Hindu religion was the majority 92%, joint family was the majority 62%, marital status, married was the majority 92% and majority of the participants are primary educated 68%. Singh, et al. (2005) also reported that maximum number of subjects (86%) belonged to the 36-45 years age group. Sarkar et al. (2013) studied socio –demographic characteristic of 187 alcohol dependent patient were male (99%) of productive age of (20-49).a large majority of the participants were married (82.95%).Mohan et al. (2000) found in their study that means age of the alcohol dependent participants was 38±13.9.Bhalla, Hiremath, Bhalla, Godke and Choudhury (2014) showed that 59% of persons with alcohol dependent syndrome were age 30- 39 years. As per educational status is concerned, 36% had secondary education followed by 34.6%having primary educated. Sandra Zinn (2004) also reported that mean as was found 58.8 and N=27 and education was found 12. Another similar study done by Neethi Valsan (2016) also reported that the mean was 39.9 years.

Table1: 2 Group comparisons in Various Socio demographic variables of the both groups.

Variables N=300		Group-A (Alcohol dependent) N=150	Group-B (control group) N=150	df	χ²	p
Age	18-28 years	34 (22.66%)	32(21.33%)	2	.115	.944
	29-39 years	80(53.33%)	80(53.33%)			
	40-50 years	36(24%)	38(25.33%)			
Education	Up to primary	71(47.33%)	70(46.6%)	2	.903	.204
	Up to 10+2	52(34.66%)	50(33.33%)			
	Above 10+2	27(18%)	30(20%)			
Marital Status	Married	126(84%)	136(90.66%)	2	.381	.997
	Unmarried	24(16%)	14(9.33%)			
	Separated	0(0%)	0(0%)			

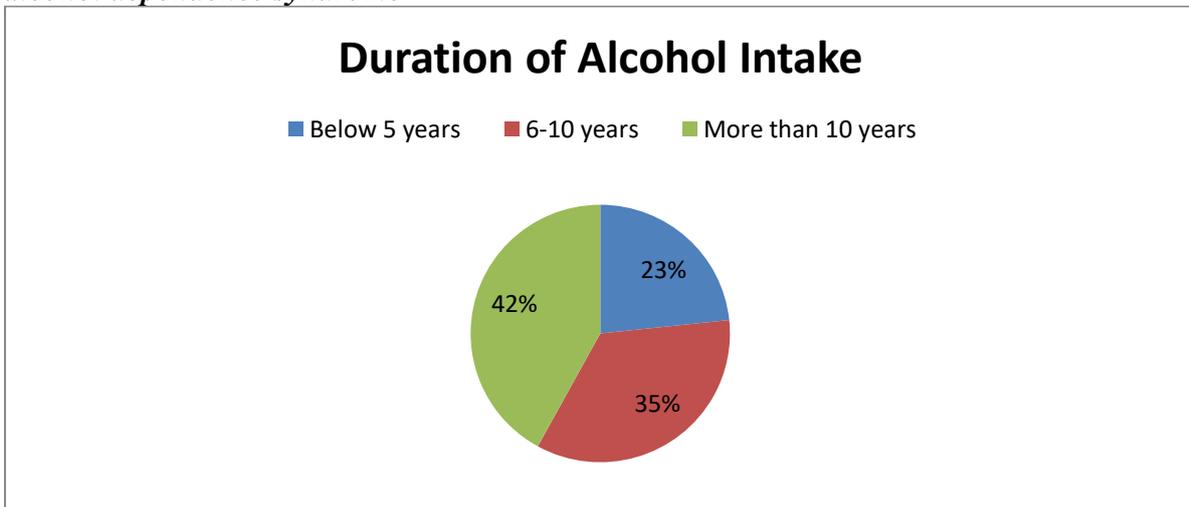
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Variables N=300		Group-A (Alcohol dependent) N=150	Group-B (control group) N=150	df	χ^2	p
Family Type	Nuclear	59(39.33%)	48(32%)	2	.083	.117
	Joint	91(60.66%)	102(68%)			
	Extended	0(0%)	0(0%)			
Religion	Hindu	137(91.33%)	124(82.66%)	3	8.8	.032
	Muslim	5(3.33%)	8(5.33%)			
	Christian	8(5.33%)	11(7.33%)			
	Others	0(0%)	7(4.66%)			
Socio Economic Status	Upper 26-29	30(20%)	31(20.66%)	4	.716	2.10
	Upper middle 16-25	53(35.33%)	54(36%)			
	Lower middle 11-16	31(20.66%)	31(20.66%)			
	Upper Lower 5-10	27(18%)	30(20%)			
	Lower \leq 5	9(6%)	4(2.66%)			

The above table shows group comparisons in various socio demographic variables, Age variable of the subjects majority of the alcohol dependent (Group –A) and control group (Group –B). Age, education and socio economic status of the person these variables have been matched with the control group so the group difference was not likely to occur from the above mention three variables. Whereas, when we talk about the variables like marital status, types of family and religion these variables are not matched with the control groups.

In the marital status of the participants, majority of the participants was married 87.33% followed by unmarried participants 12.66 %, when we talk about the two groups, the group difference was not found in a significant level in this variable. When we discussed about the type of family the majority of the participants family types were belonging to Joint family 63.6% and followed by Nuclear family were 36%, extended family 0.33% and both the groups didn't shows any significant difference in statistics .Where as in religion the majority of the respondents were followed Hindu religion, 87%, followed by Christian religion 6.33% and Muslim 4.33%and others were 2.33%, in this variable group difference was found in significant level ($\chi=8.8.p=.032$).

Figure 1.1: Shows the Pie chart of duration of alcohol Intake among the persons with alcohol dependence syndrome



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The above figure shows that the durations of alcohol intake of the experimental group's. And within the variables are divided in three groups below 5 years, 6-10 years and more than 10 years duration of alcohol intake. The majority of the alcohol dependent (group -A), their duration of alcohol intake were fallen in the category of more than 10 years i.e. 42%. And it has been followed by 6-10 years i.e. 34.66% and Below 5 years 23.33%. The findings of present study corroborated with the findings of previous study s of D.R. Siri Gowri etal.2008. In her study mean duration of drinking was found 14.07 years. In the studies of Sandra Zinn (2004) & Manisha Jha (2015). The mean years of dependency was found 29.9 and 9.43+5.98 years.

Table (3) Group difference in speed test among the two groups.

Group Difference In The Domain Of Speed Functions							
N=300 Variable/Domain(speed)	Alcohol Dependence Syndrome (N=150)		Control Group(N=150)		df	t	p
	Mean	Std.	Mean	Std.			
Finger tapping test (motor speed) Right hand motor speed	38.12	7.84	46.47	5.47	298	-10.6	.000
Finger tapping test (motor speed) Left hand motor speed	35.21	7.10	42.21	5.28		-9.67	.000
Digit symbol substitution test(mental speed)	295	113	194	54		9.84	.000

*p≤.01, *p≤.05

The above table shows the group difference in Neuropsychological domains of speed functions test. And it has been divided into two; motor speed and mental speed. Motor speed was assessed through finger tapping test and mental speed was assessed through digit symbol substitution test. We analyzed the neuropsychological domain of speed function test the findings indicates that group difference was found between the experimental and control group in the speed functions test. In the finger tapping test mean difference was found between the two groups, experimental groups mean was 38.12 where as in control group mean was 46.47. The finding shows the mean differences are found statistically significant, experimental group mean was 295 and control group mean 194. The score suggest that higher the score worsen the mental speed functions in this test. So in this speed test the control groups were performed in the speed functions test than the experimental groups. A similar study on alcohol reveals that finger tapping exercise has weakened relationship between frontal; lobe and cerebellar activity in alcoholic individual Boxter P. Roger. (2012). Motor function adversely affected by alcohol dependence (Oscar-barman, 2000; Rourke and Grant, 1999).The finding from this study also consistent with earlier work (Timoth C.Durazzo et.al 2010) demonstrating that processing speed was poorer performance on alcohol dependence. Impaired performance on the digit symbol task of the WAIS-R has been previously reported and was chosen because of this (Moselhy et al., 2001). Simon J.C.Davies finding also supported on this current findings. In his studies control mean & SD 10.9±2.5 and ADS Mean &SD 9.3±2.7, p=0.002*.

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Table (4) Group difference in attention test ability between the groups.

Group Difference In The Domain Of Attention Functions							
N=300 Variable/Domain(sustain attention)	Alcohol Dependence Syndrome (N=150)		Control Group (N=150)		df	t	p
	Mean	SD	Mean	SD			
digit vigilance test	589	194	315	91.68	298	15.6	.000

The above tables shows the group difference in sustain attention task of the experimental and control groups. Independent t-test applied to see the group difference. For assessing sustain attention digit vigilance test was applied. The finding shows that the mean difference was found between the groups, in the performance of sustained attention assessing task. In sustain attention task the experimental groups mean was found to be 589, and control group mean was found to be 315. The finding of the score indicates that lower the score higher the sustained attention. So the findings indicates that the person with alcohol dependence syndrome have problems in sustain attention as compare to control group. They were not able to give proper attention to any kind of attention requisite task. The present finding also comparable with the findings L. Roshan singh (2009) in their findings out of 30 sample 4 people were found impairment in attention whereas in control group no impairment was found. Ghosh p, Sharma S and Victor R, 2018. They also found that impairment in attention on alcoholic dependent persons.

Table (5) shows correlation between speed test performance with the variables Age, Education, Socio economic status and Duration of alcohol intake.

N=150 Variables/domain (speed)	Age	Education	Socio Economic Status	Duration of Alcohol Intake
Finger tapping right hand	.095	.162*	-.138	-.277**
Finger tapping left hand	-.055	.141	-.171	-.187
Digit symbol substitution test	-.319*	.553*	-.288*	-.301*

**p<0.01, *p<0.05

The above table reflects correlation between neuropsychological domains of speed function with the variables of age, education, socio economic status and duration of alcohol intake. Age has a significant negative correlation with mental speed test (r=-.319**, p=0.05), Education has a positive relationship with motor speed test (finger tapping right hand, r=.162*, P=0.05) and mental speed test also (r=.553*, p=0.05). Socio economic status has a significant negative correlation ship with the mental speed task (r=-.288*, p=0.05). Duration of alcohol intake has significant negative correlation with motor speed and mental speed (r=-.277*, p=0.05 and r=-.301*, p=0.05). Findings of the study are also consistent with findings of Siranjana Adhikari 2016, Sandra Zinn 2004.

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Table (6) spearman correlation between the visual memory ability with the variables of age, education, socio economic status and duration of alcohol intake.

Variables/Domain(attention)	Age	Education	Socio Economic Status	Duration of Alcohol Intake
Digit vigilance test	.284**	-.595**	.193**	214**

**p≤0.01,*p≤0.05

The above table shows that the experimental groups sustain attention and its correlation with various socio demographic Variables. The findings shown that sustain attention has positive correlation with age (r=.284**, p=0.01) level, Socio economic status (r=.193**, p=0.01) level and Duration of alcohol intake(r=214**,p=0.01). Whereas sustain attention has a negative correlation with Education (r=-.595**, p=0.01) level. The result shows that attention has closely related with increase of human age. In alcoholic persons with alcohol dependence syndrome with the age their performance on attention related activities will take more time. In education, the lower the educational level may lead to take longer time duration on performance of attention related task in the experimental group.

Implication

Positive cases identified during the study can refer for treatment and intervention for cognitive retraining and Motivational enhancement therapy for the better cognitive functioning and leading productive life both professionally and socially.

Limitation

Findings of the present study cannot be generalized to a large population of persons with alcohol dependence syndrome because of following reasons Purposive sampling technique, study is limited to one setting, cross sectional study; no follow up was done and it was purely quantities study.

CONCLUSION

Group difference was found in the domain of speed test and sustain attention between the experimental and control groups. The experimental groups are worse performance on speed test and sustain attention. And persons with alcohol dependence have significant negative and positive correlation with age, education, socio economic status and duration of alcohol intake.

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Conflict of Interest

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