

Wisconsin Card Sorting Test Profile of Persons with Alcohol Dependence Syndrome and its Association with Socio Economic Status and Clinical Variables

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Abstract

Background: The set shifting ability is the principal target of the study was to investigate the groups difference in (persons with Alcohol dependence syndrome (ADS) -Group-A) and control groups (Male healthy person)- Group-B) in Wisconsin Card Sorting Test profile and association with age, education and duration of alcohol intake.

Methodology: It was a cross sectional study ,we compared 75 person with alcohol dependence syndrome (ADS), with 75 matched control group on variable (Age, Education, SESS) regarding their Socio demographic detail , socio economic status scale(SES), and performance on Wisconsin Card Sorting Test.

Result: - Persons with alcohol dependence group were low performer in Wisconsin Card Sorting Test and its domain score were associated with their Age, Education and socio economic status.

Conclusion: The result suggest that Group difference was found in set shifting ability person with alcohol dependence were poor performing in Wisconsin Card Sorting Test and it has association with age, education, SESS and duration of alcohol intake .

Key words: Alcohol dependence, Set shifting ability, socio economic status.

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Introduction

Alcohol is one of the most abused substances worldwide, excessive alcohol consumption induces cognitive impairments mainly affecting executive functions, episodic memory, and visuospatial capacities related to multiple brain lesions. (Laramee et al.2013, Rehm,2011 ,Whiteford. et al.2013)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. Another study was found that the perspective of

substance use and disorders, an important observation is that the acute effects of many psychoactive substances include changes in cognitive functions (Friswell et al. 2008) 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.2008; Ersche et al.2006; Giancola and Mezzich 2000;Pau et al. 2002& Rapeli et al. 2006).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 Wisconsin card sorting task profile and its association with various socio demographic profiles of persons with alcoholic dependence syndrome as compare to control group (Male healthy person)

Objectives:

- 1) To assess Wisconsin card sorting test (WCST) profile of person with alcohol dependence.
- 2) To see the difference in Wisconsin card sorting test profile of persons with alcohol dependence and control group.
- 3) To see the relationship of Wisconsin card sorting test profile and various related socio demographic variables.
- 4) To see the association between Wisconsin card sorting test profile and duration of alcohol intake.

Methodology

The present study was cross sectional hospital base study carried out on outpatient department and indoor patient department of LGB Regional Institute of Mental Health, Tezpur, Assam. 75 person with ADS who fulfill the following Inclusion Criteria for Group –A (persons with ADS) a case of alcohol dependence according to ICD-10DRC criteria, Age 18-50 years, male, who read and write, comprehend and understand the instruction and Right handedness were selected and 75 control group who fulfill the and Inclusion criteria for Group-B (Control group) Male healthy person, Age 18-50 years, who read and write, GHQ-12 score below 2 and right handedness, sample were selected by using purposive sampling technique. Inform consent was taken from the participants, they were explained about the nature of the study and assurance was given to maintain confidentiality. Semi structure Socio demographic data sheet, Socio economic status scale, GHQ -12 and Wisconsin card sorting test were administered.

Tools for Data collection:

1. **Socio demographic Details:** To obtain the information about name, age, sex, education, handedness, marital status, address, religion, Duration of Alcohol was used.
2. **Socio economic status scale:** The scale was developed Kuppaswami, (2012). 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 Goldberg, 1978, This edition published 1992.

4. Wisconsin Card Sorting Test: Wisconsin card Sorting Test was originally developed to assess abstract reasoning ability and ability to shift cognitive strategies in response to changing environmental contingencies. It was revised and expanded by Robert K Heaton, Gordon J. Chelune, Jack L. Talley and Glenn Curtiss in the years 1993. It consists of 128 cards. Each card is a square of dimensions 8 cms by 8 cms. Stimuli of various forms are printed on the cards. The stimuli vary in terms of three attributes: color, form and number. The stimuli are geometrical figures of different forms (triangle, star, cross, circle), in different colors (red, green, yellow, blue) and different numbers (one, two, three, four), which are presented on each card. The pack of 128 cards consists of two sets of 64 cards each. In addition to these 128 cards, there are 4 stimulus cards. Out of those four stimulus cards, the first card consists of 1 red triangle, the second consists of 2 green stars, the third consists of 3 yellow crosses and the fourth consists of 4 blue circles.

Ethical issues: The present study was passed from the scientific advisory committee

and ethical committee from LGBRIMH. 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 WCST profile with selected socio demographic variables.

Results:

In the present study majority of the age group were 29-39 years 59.34% followed by 40-50 years 22.66% and 18-28 years 18%, no significant difference was found in education, marital status, religion, type of family in both the group.

Table 1: Duration of Alcohol intake

Variable N=75		Group -A (Alcohol dependent) N=75
Duration of Alcohol intake	Below 5 years	11(14.66%)
	6- 10 years	24(32%)
	More than 10 years	40(53.3%)

The above table shows the majority of the alcohol dependent (group –A) their duration of alcohol intake were fall in the category of

more than 10 years i.e. 40(53.3%) followed by 6-10 years 24(32%) and least duration was below 5 years 14.66%.

Table 2: Group difference in Wisconsin Card Sorting Test profile

Group Difference in Set Shifting ability							
Variable	ADS (N=75)		CG(N=75)		df	t	p
	Mean	Std.	Mean	Std.			
WCST Number of trial	121	13.01	106	16.99	148	6.25	.00
WCST Correct response	65.25	15.46	78.05	11.13		5.81	.001
WCST error response	56.27	22.58	27.79	7.28		9.59	.000
WCST preservative response	36.67	28.66	17.79	7.28		5.52	.000
WCST preservative error	30.63	20.48	13.92	6.8		6.69	.000
WCST non preservative error	24.89	15.85	14.55	9.17		4.89	.000
WCST conceptual level response	45.04	22.84	67.48	6.7		8.16	.000
WCST trial to complete first category	16.91	14.90	15.71	4.49		.668	.000
WCST number category completed	2.99	2.07	5.63	.73		10.3	.000
WCST failure to maintain set	1.41	1.58	.73	.704		3.39	.000

**p≤.01, *p≤.05

Independent t- test was applied to find out the group difference Wisconsin card sorting test measure for set shifting ability. The above table shows that there exists significance difference in the performance of Wisconsin Card Sorting Test

domains in groups in person with alcohol dependence and control group. Result shows that p value in different domain of WCST was less than 0.01 in all domains.

Table 3: Spearman correlation of Wisconsin Card Sorting Test profile with selected socio demographic variables

Variables	Age	Education	Socio economic status	Duration of alcohol intake
WCST NUMBER OF TRIAL	.166	-.432**	.358**	.222
WCST CORRECT RESPONSE	.314**	-.509**	.315**	-.002
WCST ERROR RESPONSE	.001	-.284*	.250*	.250
WCST PERSEVERATIVE RESPONSE	.058	-.343*	.294	.181
WCST PERSEVERATIVE ERROR	-.079	-.314**	.178	.166
WCST NON PERSEVERATIVE RESPONSE	-.052	-.155	.179	.043
WCST CONCEPTUAL LEVEL RESPONSE	-.146	.297**	.026	-.111
WCST TRIAL TO COMPLETE FIRST CATEGORY	.091	-.239*	-.159	.190
WCST NUMBER OF CATEGORY COMPLETED	.078	.491**	-.353	-.352
WCST FAILURE TO MAINTAIN SET	.297**	-.348**	.202	.361**

**p≤0.01, *p≤0.05

In WCST total number of trial was positively correlated with Age (r=.166), Socio Economic status (r=.358**) and Duration of alcohol intake (r=.222) and it was also negatively correlated with Education (r=-.432**). WCST correct response was positively correlated with Age (r=.344**), Marital status (r=.284*) and Socio economic status (r=.315**) and it was negatively correlated with Education (r=-.509**) and Duration of alcohol intake (r=-.002).

WCST error response was positively correlated with Age (r=.001), socio economic status (r=.250*) and Duration (r=.250) and it was negatively correlated with education (r=-.284*).

WCST preservative response was positively correlated with Age (r=.058), socio economic status (r=.294) and duration (r=.181).

WCST Trial to complete first category task was positively correlated with Age (r=.091) and Duration (r=.190) and it was negatively correlated with education (r=-.239*), Marital status (r=-.228*), family type (r=-.067) and Socio economic (r=-.159).

WCST No category completed task was positively correlated with Age (r=.078) and Education (.491**) and it was negatively correlated with Marital status (r=-.479**), Family type (r=-.171), Socio economic status (r=-.353) and Duration (r=.352**).

WCST conceptual level response was positively correlated with Education ($r=.297^{**}$) and Duration ($r=.026$) and it was negatively correlated with Age ($r=-.146$), Marital status ($r=-.137$), family type ($r=-.048$) and Socio economic status ($r=-.111$).

WCST failure to maintain set was positively correlated with Age ($r=.297^{**}$), Marital status ($r=.416^{**}$), Socio economic status ($r=.202$) and duration ($r=.361^{**}$) and it was negatively correlated with Education ($r=-.348^{**}$) and Family type ($r=-.040$).

Discussion

In the present study group difference was found person with alcohol dependence were poor perform in the profile of Wisconsin Card Sorting Test. This finding also supported by a study done by Noel et al, (2001) & Ratti et al (2002) they found that most of the alcohol dependence shows poor performance in executive function task impaired. Group difference (ADS group and Control Group) was found in the domain of number of category completed in WCST profile. Similar finding was reported by Sandra Chanraud et al (2007). They also found the mean difference in ADS group (mean = 5.19) and Control Group (mean = 5.9) and ($P = 0.16$). on preservative error ADS mean is 30.63 and CG mean is 17.79 and ($t=6.69, p=.000$). They also found the mean difference this two domain ADS (mean = 18.1, $SD=18$) and CG (mean = 9.83, $SD=8$) and ($p = 0.042$).

A similar study done by D.R. Siri Gowri et al (2008) in their study conceptual level response was found deficit 50 percentile and failure to maintain set was found deficit in 26 percentile so cognitive impairment found in persons with alcohol dependence this finding also supported in the present findings So the findings indicates persons with

alcohol dependence have cognitive deficits or impairment .

A study done by Katarzyna Nowakowska (2008) they found that when they compared with healthy subjects, person with alcohol addiction shows significant disorder of various aspect of working memory and executive functioning. Acker et al (1984) and Casbon et al (2003) they found set shifting ability were deficits in alcoholic patients. Waugh M. et al they also found that alcohol dependent patients shown the deterioration of cognitive function ranging from amnesic disorder to mild cognitive impairment.

However, WCST profile of number of trial has significant positive correlation with socio economic status ($r=.358, p=0.01$) number of correct response has a positive correlation with Age ($t=3.14, p=0.01$), conceptual level response has a positive correlation with education ($t=2.97, p=0.01$) failure to maintain set has a positive correlation with age ($t=2.97, p=0.01$) and number of trail has a significant negative correlation with education ($t=4.32, p=0.01$) correct response with education ($t=5.09, p=0.01$) error response with education ($t=2.84, p=0.01$) preservative response with education ($t=-3.43, p=0.01$), preservative error with ($t=3.14, p=0.01$) trial to complete first category with education ($t=-2.39, p=0.05$) failure to maintain set with education ($t=3.48, p=0.01$) This findings are also supported by Beatty et al (2000) and Parsons and Nixon (1998), they suggested that cognitive performance worsens in direct proportion to the severity and duration of alcoholism .

Another similar study, D.r. Siri Gowri et al. (2008) found that Conceptual level response was negatively correlated with Age ($r=0.30$), and duration of drinking ($r=0.29$) and it also positively correlated with Education ($r=0.22$) this finding also supported in the present studies finding. And another domain of WCST failure to maintain set also negatively correlated with education ($r=0.25$) and positively correlated with Age ($r=0.13$) and Duration of drinking ($r=0.31$) this finding also supported in the present studies finding.

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 quantitative study.

Conclusion

Group difference was found in the domain of WCST performance. However, the persons with alcohol dependence were low performer as compare to control group. 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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