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EXECUTIVE FUNCTIONING IN PATIENTS WITH ALCOHOL DEPENDENCE BEFORE AND AFTER MEDITATIVE PRACTICES

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Abstract

There is asignificant need for research regarding the impact of meditative practices on executive functioning. The present study conducted to see the effect of meditative practices on executive functioning. Executive functioning is related to the higher cognitive functioning of the brain which includes attention, problem solving ability, abstract reasoning as well as its ability to organize information to working memory. As we know who have a dependence on alcohol shown impairment in a wide array of executive functioning such as problem solving, verbal fluency, cognitive flexibility, information sequencing and working memory. It tends to affect the quality of life and occupational functioning. In most of the studies found that meditation has a positive effect on the executive functioning such as making planning, attentional capacity and enhance cognitive flexibility. This study assessed the effect of meditation on executive functioning in patients with alcohol dependence. This study comprised20 alcohol patients, in whom 10 patients belonged to an experimental group and 10 patients belonged to treatment as usual group. After the initial screening by the clinical assessment based on their amenability for the interview, a tool for the executive functioning (Wisconsin Card Sorting Test) applied to the patients. Experimental group of patients received one week meditation but treatment as usual group did not receive any therapy. After one week again both group assessed on the tool of executive functioning (Wisconsin Card Sorting Test). This study found that meditation has a positive effect on executive functioning.

Keywords: *Patients with Alcohol dependence, Executive Functioning and Meditation*

I. INTRODUCTION -

Meditation is defined as a way of paying attention to any object either focused the current moment in form of nonjudgmental, nonreactive and compassionate manner (Baer, 2011; Kabat-Zinn, 2003). It can be divided in two categories. First is related to concentrative meditation which practised through limiting attention

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on a specific things (e.g., breath, sound, or an image) and focus of attention imperturbably on a specific object. Second categories is awareness or mindful meditation, the word "mindfulness", is currently used to describe a particular way of paying attention to the present moment without any judgemental attitude (Kabat-Zinn, 1994).

Mindfulness word derived from the Pali word "Sati" which originated from Buddhist text Abhidhamma (Kiyota, 1978) and later in the Vishuddimagga (Buddhaghosa, 1976), this word is frequently used to describe for a particular way of meditative practices in which person are more aware of our bodily sensation, emotion and thought, usually it is open monitoring of present- moment experiences (Lutz et al., 2008). It can be viewed as a progressive heightening of awareness and trained to observe and identify all mental content (Goldstein. 1976). Mindfulness is comprised of five facets : (Baer et al.,2006).

(1) **Observing** refers to noticing or attending to internal and external experiences.

(2) **Describing** refers to labelling internal experiences with words.

(3) **Acting with awareness** which refers to attending to one's activities of the moment;

(4) **Non-judgment** refers to taking a non-evaluative stance toward thoughts and feelings.

(5) **Non-reactivity** refers to the tendency to allow thoughts and feelings to come and go without being attached to them.

Studies showed that meditation has a positive effect on executive functioning. As we know executive functioning is a bunch of cognitive abilities which include planning, problem solving behaviour, organizing the information to direct the daily routine activities. Executive functioning refers as a higher mental process construct involved planning, initiation and regulation of goal directed behaviour (Luria, 1980; Milner, 1995). The cognitive abilities subsumed of executive functioning include attentional capacity, strategic goal planning, problem-solving, abstract reasoning, cognitive flexibility, hypothesis generation, temporal response sequencing, as well as the ability to organize and adaptively utilize the information contained in working memory (Milner & Petrides, 1984; Stuss & Benson, 1984). As it is known that patient with alcohol dependence or any substance such as opiates, and stimulant show impairment on the task which assessing the different aspects of executive functioning including decision making and emotional control (Barry & Petry, 2008; Bechara, 2005; Dolan et al, 2008; Verdejo-Garcia et al,2006). So this kind of deficiency in the executive functioning reduced the sensitivity to future consequences and difficulty in evaluating the consequences as well as suppression of response of substance taking behaviour.(Bechara et al., 2001; Grant et al., 2000;Schoenbaum & Shaham, 2008).

Mindfulness meditation has been shown improvement an executive functioning patient with alcohol dependence Zeidan et al. (2010) found that 4 days of mindfulness meditation training improved the cognition and mood when compared to the control group. After four sessions mindfulness training significantly improved visuospatial processing, working memory, and executive functioning in comparison to the active control group. These findings suggest that 4 days of meditation training can enhance the ability to sustain attention, benefits that have previously been reported with long-term meditation. Wenk-Sormaz (2005) also found that meditators disengaged more quickly from incorrectly cued visual information, more flexibly re-directed attention to new information and improved the attention in the mindfulness group as compared with control group.

II. METHOD

Participant:

Twenty patients who diagnosed with alcohol dependence disorder were taken after detoxification from inpatient services of Central Institute of psychiatry. Amongst these, ten patients were included in the experimental group and whereas in the remainingten were part of the control group or treatment as usual. Nature of sampling was purposive sampling. Mean age of these patients in both group experimental group is 40.7±7.91 and control group is 39.80 ± 4.

INCLUSION CRITERIA (for both experimental and treatment as usual group)

- ✓ Those who fulfilled the ICD-10 DCR (WHO,1992) criteria for alcohol dependence
- ✓ Two weeks after the initiation of successful detoxification program
- ✓ Male patient.
- ✓ Patients aged between 18-50 years
- ✓ Those who gave the informed consent
- ✓ Formal education till least 8 class

EXCLUSION CRITERIA (for both experimental and treatment as usual group)

- ✓ Patient with the serious physical problem and complicated withdrawal (seizure, delirium) physical illness and organic brain disorder.
- ✓ History of harmful use or dependence on any other substance (except nicotine and caffeine)
- ✓ History of any other major psychiatric illness or mental retardation
- ✓ ECT in the last 6 months

RESEARCH DESIGN

In this study cross-sectional design with the pre-post test was selected where patients with alcohol dependence were assigned in the experimental group and treatment as usual group through purposive sampling.

INSTRUMENT

1. **Informed consent form for the patient –** To know about the willingness of theparticipant in the experiment.
2. **Socio-demographic and Clinical Datasheet -** It includes various socio-demographic variables like name, age, gender, educational qualification, occupation, marital status, religion, income, residence and clinical variables like types of substance, age of onset, the pattern of intake, duration of dependence, family history of substance dependence and treatment history.
3. **Wisconsin Card Sorting Test (Grant & Berg, 1948) –**This is a test in which, a set of four cards displaying one red triangle,two green stares, three yellow crosses,four blue circles. This comprises the stimulus. The four stimulus cards reflect three parameters : Color, Form, Number.The

response cards are numbered from 1 to 64 on the lower left corner on the reverse side to ensure standard order of presentation. Inter scorer reliability of the test is .89 to 1

4. **Meditative practice module:** 1 week of meditative practice module, the details of which are as follows.

Sessions	Duration	Technique	References
2	60 min	Breathing Technique	Kubose, 1976; Linden, 1973
3	60 min	Mindfulness based technique (Body Scan Mindful Meditation)	Kabat-Zinn,1994
2	60 min	Urge surfing technique	(Marlatt, 1994)

Procedure:

Patients with the diagnosis of alcohol dependence as per ICD-10(DCR) criteria and fulfilling the inclusion criteria were taken for the study. At first, informed consent was taken from each patient and from the normal control who investigated for the present study. Necessary socio-demographic and clinical information was collected by using the structured socio-demographic sheet. Subsequently, the scales were applied on the patients who were selected for the study. Finally, based on the purposive sampling participants were divided into two groups, in experimental (Meditation + treatment) and treatment as usual group(treatment). The experimental group of patients have received meditation for one week. 7 sessions of meditative practices were taken, initially two sessions they got breathing meditation. After that, they got three sessions of mindfulness based meditation (body scan, emotion, thought). In the last two sessions, they were provided urge surfing meditation and duration of all session was 60 minutes. After completion of 1 week of meditation therapy subsequently, post assessment was again performed for both groups.

STATISTICAL ANALYSIS:

This study was a pre-post study, to see the change over a period of time assessment was done twice the whole course of study, i.e. one at baseline and second assessment at post intervention phase. Non-parametric statistical tests were used. In order to determine whether there was any baseline difference characteristic of patients assigned to the experimental and control group, a series of chi square (for categorical variables) test and paired t test for continues variable. The analysis was done through Statistical Package for Social Sciences (SPSS) 25.

III. RESULT

This section shows the statistical analysis of the various socio-demographic and clinical variables for the comparison among two groups i.e. the experimental and the control group. For this purpose, the Chi-Square test was computed for the categorical variables (e.g. religion, marital status etc) and for the comparison of the continuous variables paired samples t-test was used.

Table -1: Comparison of age between the experimental and control group

Variables	Experimental Mean & Sd	CONTROL Mean & Sd	t	Df	*p*
Age	40.70±7.913	39.80±4.76	.308	18	.762

p<.05; **p<.01;*p<.001*

This table shows the comparison of age in the experimental and control group. The average mean of experimental group is 40.7±7.91 and control group mean 39.80 ± 4.76 which shows that there is no significant difference between the experimental and control group in terms of age.

Table–2: Comparison of socio-demographic and clinical characteristics of the sample population

Variables		Experimental group N=10	Control group N=10	X^2	*p*
Gender	Male	10 (100%)	10 (100%)	-	-
	Female	0(0%)	0(0%)		
Marital Status	Married	10 (100%)	10 (100%)	-	-
	Unmarried	0(0%)	0(0%)		
Religion	Hindu	3(30.0%)	3(30.0%)	0.431	0.809
	Muslim	1(10.0%)	2(20.0%)		
	Other	6(60.0%)	5(50.0%)		
Education	Intermediate	10(100.0%)	10(100.0%	-	-
Past History Medical	Yes	3(30.0%)	4(40.0%	.220	0.639
	No	7 (70 %)	6(60.0%)		
Past History Psychiatry	Yes	0(0%)	0(0%)	-	-
	No	10(100.0%)	10(100.0%)		
Family History	Yes	2(20.0%)	2 (20.0%)	.00	1.00

Medical	No	8 (80.0%)	8 (80.0%)		
Family History Psychiatry	Yes	8 (80.0%)	5 (50.0%)	1.978	0.35
	No	2(20.0%)	5 (50.0%)		

In this study out of 10 patients, all were male (100%) and married (100%) in both groups. out of 10 patients, 3 (30%) were belong to Hindu religion 1 to Muslim (10%) and 60% belong to other religion in the experimental group while in the control group, 10 out of patients 3(30%) were Hindu, 2(20%) Muslim and 5from (50%) others religion. Education level was intermediate 10(100%) in both groups.

In the experimental group, past history of medical illness was present 3(30%) patients and whereas in control group 4 patients (40%) had past history of medical illness. Past history of psychiatric illness was absent in both groups.Out of 10 patients, 2(20%) patients had a family history of medical illness in the experimental group also in the control group. family history of psychiatric illness found in the 8 (80%) patients of experimental group and 5(50%) patients in the control group.

There is no statistically significant difference in experimental and control group in terms of socio demographic variable.

Table-3 : Comparison of Baseline score between groups on the Wisconsin Card Sorting Test.

Variables	**Exp . group Mean ± SD**	**Control group Mean ± SD**	**t**	***P***
Trials Administered	125.60±5.05	125.80±6.95	0.07	0.95
Total Correct	75.90±9.48	72.40±8.99	0.84	0.78
Total Errors	49.70±10.89	53.40±12.51	0.70	0.74
Preservative Responses	31.30±10.19	37.70±12.11	1.29	0.82
Preservative Errors	27.10±7.48	32.20±9.94	1.29	0.71
Non preservative Errors	22.60±10.20	21.20±7.48	0.35	0.15

*p<.05; **p<.01;***p<.001

Table shows the comparison between both the groups on Wisconsin cord sorting test at baseline. After a data analysis no significant difference was found between both the groups on the most of the dimension

assessed by Wisconsin card sorting test. It was found that both groups were comparable and equivalent to this dimension.

Table–4: Comparison of Pre and Post score of experimental on Wisconsin card sorting test.

Variables	Baseline Mean ± SD	Post Mean ± SD	t	*p*
Trials Administered	125.80±6.95	99.40±21.44	4.08	0.00**
Total Correct	72.40±8.99	73.70±7.68	0.74	0.47
Total Errors	53.40±12.51	25.70±14.04	3.96	0.00**
Perseverative Responses	37.70±12.11	16.80±8.25	3.31	0.00**
Perseverative Errors	32.20±9.94	15.30±8.02	3.35	0.00**
Non-perseverative Errors	21.20±7.48	10.40±7.19	2.83	0.01*

*p<.05; **p<.01;***p<.001

This table shows the comparison of the score of the Wisconsin card sorting test within the experimental group at pre and post assessment. The table shows a significant difference on WCST domain of trial administered, total errors, perseverative response, perseverative errors and non perseverative errors between the pre and post a score at the 0.01 and o.5 level but not in WCST total correct score.

Table–5: Pre and Post score of thecontrol group on Wisconsin Card Sorting Test.

Variables	Baseline Mean ± SD	Post Mean ± SD	t	*P*
Trials Administered	125.60±5.05	118.10	1.89	0.09
Total Correct	75.90±9.48	76.00	1.19	0.26
Total Errors	49.70±10.89	42.10	2.89	0.01*
Perseverative Responses	31.30±10.19	28.50	1.79	0.10
Perseverative Errors	27.10±7.48	23.90	2.11	0.06

Nonperseverative Errors	22.60±10.20	18.20	1.44	0.18

p<.05; **p<.01;*p<.001*

The table shows the comparison of the score within the control group pre and post assessment. It shows a significant difference between the pre and post score of total errors at $p<0.01$.

IV. DISCUSSION

Socio-demographic characteristics

Twenty male patients with the diagnosis of alcohol dependence were included in the study and were randomly assigned to either the experimental or control group. In the present study, the mean age of patients with alcohol dependence was 39.80±4.76 years (Table- 1). This finding is comparable with the previous studies (Flannery et al., 2001). According to research finding it showed that in this age group increased sensitivity and decreased tolerance to alcohol leads to consumption of alcohol (Rosin and Glatt, 1971).Another study showed some factors responsible for excessive drinking among young adults include; the fact that alcohol had an important cultural role in offering one of the few occasions in their lives for fun making, maintaining friendships and group bonding and young adults did not worry about the health risks of alcohol (Seaman and Ikegwuonu.,2010). Another study also showed that the prevalence of problematic alcohol use continues to escalate into a late adolescent and young-adult age range of 18 to 20 years. Because the use of alcohol at an early age is associated with future alcohol related problems (Grant et al., 2004). Grant & Dawson (1997) found that individuals with earlier ages at onset of alcohol use (alcohol initiation at 14 years or younger) were more likely than those with later ages of onset (20 years or older) to develop alcohol dependence at some point in their lives (more than 40% versus approximately 10%).

The present study had all male patients (100%) table (2). In our institute there is a higher rate of alcohol consumption and dependence among men compared to women amongst patient. Research in the United States has shown consistently that men have higher rates of alcohol consumption problems than women (Myers et al., 1984; Atkinson, 1990; Bucholz et al., 1995)

The present study had all patients were married (100%) table (2). According to Singh et al. (2000) 81.7% of regular alcohol users were married whereas only 10.8% of regular alcohol users were unmarried. The high incidence of regular alcohol users among married person may be that alcohol use serves as a measure for ventilation of tensions, anxiety and increased responsibility that married persons faced in their day to day married life (Prajapati, Girdharbhai & Rathod, 2013).

The present study all patient have intermediate level of education qualification (100%) (Table 2). Research indicates that education may be positively associated with how frequently individuals drink but negatively with heavy drinking (Bloomfield et al., 2005; Casswell et al., 2003; Caldwell et al., 2008). A study showed that who studied the intermediate level and failed to get degree were three times more likely to develop alcohol dependence because lack of educational achievement is a continuing stressful effect and due to this stressful condition, alcohol abuse is more likely to be chosen as a coping mechanism at as earlier rather than

later ages, reflecting generational differences in the acceptability of alcohol as a means of coping (Crum et., al 1992).The National Family Health Survey (INFHS) 1998-99 observed a strong gradient between education and alcohol consumption with illiterate men having twice the likelihood of alcohol consumption compared to men with post-graduate education.

This study shows that most of the patients belonged to the Christian religion (80%) (Table 2). This finding is consistent with other researches Subramanian and colleagues (2005) was observed that Muslims had a relatively lower prevalence of alcohol consumption (4.1% among males and 0.2% among females) and Christian's relatively higher prevalence of alcohol consumption (28.8% among males and 4.7% among females) compared to Hindus (20.3% among males and 2.5% among females).

This study showed that the majority of the patients had a family history of alcohol dependence in family members (80%) (Table 2). This finding is consistent with previous findings. Family history of alcohol abuse is a well-documented risk factor for heavy alcohol use and alcohol-related problems (Chalder, Elgar, & Bennett, 2006; Cotton, 1979; Hussong, Curran, & Chassin, 1998; Kuntsche Rehm, & Gmel, 2004; Pullen, 1994; Turnbull, 1994; Warner, White, & Johnson., 2007). Genetics or environmental upbringing was found responsible in regard to excessive alcohol consumption (Leeman et al., 2007; LaBrie et al., 2009; Pullen, 1994).

Meditation and Wisconsin Card Sorting Test:

In the present study found a significant ($p<.01$) decrement in Wisconsin card sorting test in which decrement in the score of total trials administered pretest (125.80±6.95) to posttest (99.40±21.44), total Errors pretest (53.40±12.51) to posttest (25.70±14.04), Preservative Responses pretest (37.70±12.11) to posttest (16.80±8.25), Preservative Errors pretest (32.20±9.94) to posttest (15.30±8.02), Non-perseverative Errors pretest (21.20±7.48) to posttest (10.40±7.19) after one week of meditation in the experimental group.

In this study, it was found that mediation has a positive impact on the executive function of alcohol patients which is a line of the previous study (Berg, 1948).The previous study showed that continuous orientation towards breath promote attention switching or cognitive flexibility which foster sustained attention which decreases the perseverative response on the Wisconsin Card Sorting task. This type of task induces a repeated pattern of similar responses and then changes demands in such a way that the earlier responses fail and have to be abandoned and changed. The process of immediately redirecting attention requires that the distracting stimuli, for instance, emerging thoughts, are considered mere (mental) events that are noticed but not reflexively acted upon. This means that impulses of automatic responding are inhibited. Consequently, breathing meditation is assumed to support cognitive inhibition. Meditation helps the executive network in disengaging from the distracting stimuli and attention is directed back to the object of interest, while the orienting and the executive network enable attention shifting and supports cognitive inhibition (Malinowski, 2013).

V. CONCLUSION:

The current study and result show that meditation has a positive effect on improving the Executive functioning in patients who were dependent on the alcohol. A meditative exercise helped in disengaging from

the distraction stimuli and improves attentional capacity through which cognitive flexibility fostered. So this study found that meditative exercises lead to a significant change in executive functioning.

LIMITATION:

- The sample size was small so the result cannot be generalized.
- Both pre and post-assessment was done inside the hospital, and there were no follow-up assessments which measured the efficacy of meditation after the discharge of the hospital.
- The study consisted exclusively of male patients. The lack of representation of female patients limits the generalizability of our findings.

FUTURE DIRECTION:

- ❖ Future studies may include larger sample sizes for better generalizability.
- ❖ Longer follows up studies may be done to see whether the results obtained are maintained in long term.
- ❖ Future studies can be designed taking both male and female gender.

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