

Evaluation of Executive Functions in Patients of Unipolar and Bipolar Depression

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ABSTRACT

Background: Depression, bipolar and unipolar both have disturbances in executive functioning with loss of spontaneous and reactive cognitive flexibility. The cognitive rigidity associated with dorsolateral prefrontal dysfunction in depression may prevent patients to cope with life events and lead to a perpetuation of depressed mood by continuation of stress exposure. Though this is an area which has not been widely explored, yet it has great potential as an aid to clinical diagnosis in distinction of bipolar from unipolar depression.

Methods: The study was carried out in the Department of Psychiatry, Major S D Singh Medical College and Hospital, Farrukhabad, between the periods, June 2014 to Sep 2015. The present study was conducted to evaluate the executive function ability in patients of unipolar and bipolar depression. Patients of both groups were compared during their active phase of illness and after recovery for severity of depression by using Hamilton rating scale of depression (HAM-D) and for executive function abilities by WCST at regular intervals.

Results: Out of 60 patients, 7 patients dropped out due to no apparent reason. Out of remaining 53 patients, 27 patients were in unipolar group & 26 patients were in bipolar depression group. On comparison of mean HAM-D score at the beginning, unipolar and bipolar depression patients were found to differ significantly in severity. It was found that bipolar depression patients were more depressed in severity. But on reassessment at 6 weeks and 6 months after appropriate treatment, both groups were not different significantly on HAM-D scores. On comparison, the number of categories completed and perseverative errors committed by bipolar depression patients were significantly different in comparison to unipolar depression patients at the beginning of study, also after 6 weeks and 6 months of treatment. This also shows that patients of bipolar depression completed lesser number of categories and committed more perseverative errors than patients of unipolar depression. In comparison to unipolar, patients of bipolar depression showed poorer performance of executive functioning on WCST.

Conclusion: The study indicates that patients of unipolar and bipolar depression demonstrate significant deficits in the executive functioning as assessed by WCST. The patients of bipolar depression showed more significant deficit in executive functions compared to patients of unipolar depression. This finding is consistent with the observation that there is more definitive cognitive deterioration in bipolar depression compared to unipolar depression. Also patients with more severe depression were having greater impairment in executive functioning than those suffering with lesser degree of depression.

Key words: Depression, unipolar, bipolar, executive function.

INTRODUCTION

Mood disorders have plagued mankind since the earliest documentation of

human experience and have been described as a common disease of mankind for nearly 2500 years. Mood disorders are highly

prevalent across cultures and place an enormous burden on society. Mood disorders are among the most pressing public health problems worldwide and are associated with significant functional impairment, lower quality of life and decline in social functioning.

One of the most important distinctions between mood disorders is the distinction between unipolar and bipolar categories ^[1,2] (Leonhard 1987a, b). Unipolar mood disorders are characterized by depressive symptoms in the absence of history of pathologically elevated mood. In bipolar mood disorder, depression alternates or is mixed with hypomania or mania.

The diagnosis whether the patient is having unipolar or bipolar disorder is of utmost importance as this will have impact on the treatment plans and prognosis.

Up to one third of all patients seeking treatment for depression suffer from bipolar disorder ^[3] (Hirschfeld). Recognizing bipolarity in depressed patients with no antecedent of previous mania and hypomania can be difficult ^[4] (Bowden CL 2001). Keeping in view the enigma about the diagnosis of unipolar or bipolar disorder makes one to ponder “isn’t it that we are just waiting for the chance or to that matter luck to occur and guide us in making the correct and timely diagnosis.”

Although biological markers such as dexamethasone suppression test and thyrotropin releasing hormone have been reported to distinguish bipolar from unipolar depression, they have not been shown to be useful in routine practice ^[5] (Zisook et al, 1985. Gurpegui M, Casanova, et al. 1985. ^[6] Rybakowaski J.K. Twardowaska K. 1999)

Presence of cognitive dysfunction in bipolar mood disorder is a core and enduring deficit of the illness. The deficit is best characterized as impairment in the executive control of action, and represents an important marker for future neurobiological and pharmacological research. In addition to the impact of cognitive dysfunction on an individual's quality of life, impaired processing of the kind reported in patients

with bipolar disorder may have implications for treatment. For example, the demonstrated association between cognitive impairment and the number of episodes suggests that each episode is not biologically benign. Thus, early diagnosis and active treatment potentially could reduce the cognitive morbidity associated with bipolar disorder. In view of these implications, it is critical to ascertain whether bipolar mood disorder has a unique cognitive profile and whether distinct subgroups can be identified and to find out much more about the natural history of these difficulties.

Neuro-cognitive functions especially executive function is thought to allocate attentional resources in the processing and manipulation of information in executive operations such as reasoning, planning and problem solving and so underpins many of the activities of daily life and contribute significantly to the subject's ability to function occupationally and, hence the timing of his or her return to work.

Thus assessment of impairment of executive functioning in patients of unipolar and bipolar depression appears to be highly promising and rewarding as it can provide an aid to clinical diagnosis and differentiation of these two different mood disorders.

The term “Executive Functions” is often used to explain behaviors and refers to higher-level cognitive abilities that enable an individual to successfully engage in independent goal-directed behavior. These capacities are most commonly linked to the frontal cortex and they guide complex behavior over time through planning, decision-making and self-monitoring of judgments and impulses.

Patients with depression often perform poorly on tests designed to capture executive dysfunction, including the Wisconsin Card Sorting Test (WCST) ^[7] Franke et al., 1993; ^[8] (Pendleton Jones, Henderson, & Welch, 1988) tests of phonemic and semantic fluency ^[9] (Brown, Scott & Bench, 1994; ^[10] Trichard et al.,

1995) and the stroop interference test [11] (Nathan, Wilkinson, Stammers, & Low, 2001).

Symptomatic bipolar patients would have abnormalities in sustained attention, inhibitory control [12] (Sweeney 2000, [13] Von gorp 1998), and the capacity to alternate the attention focuses, these alterations do not appear to go into remission along with the symptoms.

Mental flexibility has been shown to be impaired in a number of different studies of unipolar and bipolar depressives [14] (Lezak 1983, [15] Purcell et al. 1997 [16] Lai TJ, Steffens 2000,), with persistent inappropriate strategies, which could, in part, explain the depressive ruminations, which, while recognized as strange and undesirable are not rejected. Construction of planning strategy abnormalities are observed in both unipolar and bipolar patients [17] (Simpson, Balwin, Jackson, Burns 1999). Depressives appear to have executive impairment related to the initiation of a task, while their supervisory capacity remains normal [18] (Lafont, Robert, et al. 1998).

Recent article in Indian journal of Psychiatry (2003) by P. Brian Moore and Peter Gallagher [19] has clearly outlined the use of neuro-cognitive testing to quantify neuro-cognitive dysfunction in mood disorders.

A clinical report by [20] Rajul Tandon, Anand Pratap Singh, P. K. Sinha and J. K. Trivedi in Indian Journal of Psychiatry (2002), have assessed depressed and normal patients using clinical rating scales and also for executive functioning using WCST with the aim to study the executive function ability of the depressed patients as compared to normal healthy control and to look for the effect of psychopathology and duration of illness upon it.

As the field of cognitive functioning is quite vast; only test of executive functioning has been taken in the present study. This is an area which has not been widely explored. Hence, the present study

has been contemplated to evaluate executive function abilities in unipolar and bipolar depression patients and to find out if these functions can be used as differentiation criteria between the two.

MATERIALS & METHODS

Thirty patients each suffering from unipolar depression and bipolar depression fulfilling the following criteria were taken as the working units of the sample for the present study.

INCLUSION CRITERIA:

1. Patients aged between 18-60 years.
2. Patient fulfilling DSM-IV diagnostic criteria of unipolar or bipolar depression.

EXCLUSION CRITERIA:

- Age less than 18 or more than 60 years.
- Patients having psychotic features.
- Patient meeting criteria for schizophreniform disorder, schizophrenia or schizoaffective disorder.
- Patient with history of neurological disease or any other past or current physical disorder that could have affected the brain.
- Patient with substance abuse in past or present.
- Patient having weight loss of more than 20% in the past 6 months.

PROCEDURE:

Patients of both groups were assessed by

- Detailed history,
- Socio-demographic proforma,
- Hamilton Rating Scale for depression (HAM-D) - assessment of severity of depression.
- Wisconsin Card Sorting Test (WCST) - for executive function assessment.

HAMILTON RATING SCALE FOR DEPRESSION (HAM-D):

[Hamilton 1960] [21] Although the HAM-D form lists 21 items, the scoring is based on the first 17. It generally takes 15-20 minutes to complete the interview and score the results. Eight items are scored on a 5-point scale, ranging

from 0 = not present to 4 = severe. Nine are scored from 0-2. It provides a simple way for assessing the severity of depression. To rate the severity of depression in patients who are already diagnosed as depressed, administer this questionnaire. The higher is the score, the more severe the depression.

- Total HAM-D Score Level of Depression
- 0 - 7 = Normal
- 8 - 13 = Mild Depression
- 14-18 = Moderate Depression
- 19 - 22 = Severe Depression
- 23 = Very Severe Depression

WISCONSIN CARD SORTING TEST (WCST): [west reference] ^[21]

In Wisconsin Card Sorting Test (WCST) the subject is asked to match 128 response cards to one of four stimulus cards on the basis of a sorting rule that is determined by the examiner. Each response card contains a design represented by three features: color (yellow, green, red, blue), number (1-4), and form (circles, stars, triangles, crosses). Sorts can be made by any of these features.

To determine whether each card is sorted correctly, a specific rule is chosen. A trial is correct if it is placed in the pile which matches the card on the dimension of the rule. The participant must deduce the current sorting rule on the basis of on feedback from the examiner. After the participant has matched 10 consecutive cards correctly, the examiner covertly changes the rule. This change requires the subject to deduce the new rule and successfully employ it. The task continues for 128 trials or until all rule changes have been accomplished successfully (called achieved categories).

ASSESSMENT:

Each patient was assessed for their severity of depression and executive functioning at 3 time intervals-

- At the beginning of procedure.
- After 6 weeks of treatment.
- After 6 months of treatment or when a minimum of 50% response has occurred

in the severity of depression whichever is later.

STATISTICAL ANALYSIS

The data so obtained was analyzed to find out if any-

1. Difference exists between unipolar and bipolar depressive patients on the basis of their executive functions.
2. Correlation of executive functioning with the severity of depression.

The statistical analysis of data was performed using the computer program, Statistical Package for Social Sciences (SPSS for Windows, version 16.0. Chicago, SPSS Inc.) and Microsoft Excel (Redmond, Washington: Microsoft, 2003. Computer Software).

RESULTS

The total number of patients taken for study were 60, 30 each from unipolar and bipolar depression group, however 7 patients (3 from unipolar and 4 from bipolar depression group) dropped out due to no apparent reason. Out of the remaining 53 patients, 27 patients were in unipolar depression group and 26 patients were in bipolar depression group. The age wise & sex wise distribution pertaining to these 53 patients is depicted in Table 1.

Patients in both unipolar & bipolar groups were tested on HAM-D and comparisons were made in both groups at different time intervals. The mean HAM-D score of unipolar and bipolar depression patients at different intervals is shown in Table 2. Both groups show significant decline in mean HAM-D score from the baseline score, after treatment at 6 weeks and 6 months. On comparison of mean HAM-D score at the beginning, unipolar and bipolar depression patients were found to differ significantly in severity. It was found that bipolar depression patients were more depressed in severity. But on reassessment at 6 weeks and 6 months after appropriate treatment, both groups were not different significantly on HAM-D scores.

Performance of the patients in unipolar and bipolar group was tested on WCST. The categories completed (CC) and perseverative (PE) errors done at different intervals by patients of both groups and inter group comparison is shown in (Table 3). On comparison, the number of categories completed and perseverative errors committed by bipolar depression patients were significantly different in comparison to unipolar depression patients at the beginning of study, also after 6 weeks and 6 months of treatment. This also shows that patients of bipolar depression completed lesser number of categories and committed more perseverative errors than patients of unipolar depression. In comparison to unipolar, patients of bipolar depression showed poorer performance of executive functioning on WCST.

Table 4 shows executive function performance of unipolar depression patients on WCST at different intervals, comparing the mean categories completed and mean perseverative errors committed at each interval. There is significant improvement in the performance with more number of categories completed and less perseverative errors made, at 6 weeks and at 6 months compared to baseline.

Table 5 shows executive function performance of bipolar depression patients on WCST at different intervals, comparing the number of categories completed and number of perseverative errors committed at each interval. It shows the comparative data between, the beginning score, at 6 weeks, at 6 months, revealing significant improvement in the performance with more number of categories completed and less perseverative errors made, at 6 weeks and at 6 months compared to baseline.

Table 6 shows distribution of unipolar and bipolar depression patients according to severity of depression assessed by HAM-D. In unipolar group 11 patients with mild, 10 with moderate, 4 with severe,

2 with very severe depression were at the beginning of study. While In bipolar group 4 with mild, 11 with moderate, 7 with severe, 4 with very severe depression were at the beginning. This shows that most patients in unipolar group were suffering from mild to moderate severity (21 patients out of 27), while most patients of bipolar group were suffering from moderate to severe depression (18 patients out of 26).

Table 7 shows comparison of WCST performance score with the severity of illness in unipolar and bipolar depression at the beginning of study. This shows very significant difference in number of categories completed, between mild and moderate depression in both groups. Significant difference was there between moderate to severe unipolar depression group, but very significant difference between moderate to severe bipolar group. It shows statistically insignificant difference between severe to very severe depressions in both groups.

Table 8 shows comparison of WCST performance score with the severity of unipolar and bipolar depression. This shows significant difference in perseverative errors between mild and very severe depression but no significant difference between mild and moderate, moderate and severe unipolar depressions. While this shows significant difference between mild to moderate and mild to very severe bipolar depression in number of perseverative errors, but no significant difference between moderate to severe and severe to very severe bipolar depression. There is an association between severity of depression and perseverative errors committed on WCST but this is not conclusive.

Table 1. Demographic Characteristics (n=53)

	Unipolar depression	Bipolar depression
Age		
Mean(SD)	35.19 +/-10.45	28.88 +/-10.37
Gender		
Male	40.74(%)	50(%)
Female	59.26(%)	50(%)

Table 2. Comparison of mean HAM-D between Unipolar and Bipolar Depression at different intervals

Group	At the Beginning	After 6 Weeks	After 6 Months
U.D (n=27)	15.37+/-4.413	9.22+/-3.457	3.85+/-2.783
B.D (n=26)	18.15+/-3.957	11.04+/-3.400	4.69+/-2.396
t- score	2.411	1.932	1.176
p value	<.05	>.05	>.05

*U.D= unipolar depression, B.D= bipolar depression

Table 3. Performance & comparison of unipolar & bipolar depression patients on WCST at different intervals.

Time	Categories Completed (CC)				Perseverative Errors (PE)			
	U.D	B.D	t-score	p value	U.D	B.D	t-score	p value
At the beginning(A)	3.85+/-1.512	3.03+/-1.399	2.047	<0.05	26.81+/-10.60	33.54+/-13.589	2.014	<0.05
After 6 weeks (B)	4.63+/-1.214	3.81+/-1.357	2.320	<0.05	20.85+/-9.453	26.88+/-9.981	2.259	<0.05
After 6 months(C)	5.30+/-0.724	4.69+/-1.158	2.309	<0.05	14.26+/-6.915	18.38+/-7.585	2.068	<0.05

*U.D= unipolar depression, B.D= bipolar depression

Table 4. Comparison of performance of Unipolar Depression Patients on WCST at different intervals

Group	A vs B		B vs C		A vs C	
	CC	PE	CC	PE	CC	PE
U. D (n=27)	3.85+1.512	26.81+10.609	4.63+1.214	20.85+9.453	3.85+1.512	26.81+10.609
	4.63+1.214	20.85+9.453	5.30+0.724	14.26+6.915	5.30+0.724	14.26+6.915
t score	2.085	2.179	2.463	2.924	4.78	5.150
p value	<.05	<.05	<.05	<.01	<.01	<.01

*U.D= unipolar depression, B.D= bipolar depression

Table 5. Comparison of performance of Bipolar Depression Patients on WCST at different intervals

Group	A vs B		B vs C		A vs C	
	CC	PE	CC	PE	CC	PE
B. D (n=26)	3.03+1.399	33.54+13.589	3.81+1.357	26.88+9.981	3.03+1.399	33.54+13.589
	3.81+1.357	26.88+9.981	4.69+1.158	18.38+7.585	4.69+1.158	18.38+7.585
t score	2.012	2.013	2.515	3.457	4.661	4.967
p value	<.05	<.05	<.05	<.01	<.01	<.01

*U.D= unipolar depression, B.D= bipolar depression

Table 6. Distribution of Unipolar and Bipolar Depression patients according to severity of depression on HAM-D at the beginning

Group	No. of Pts.	Mild		Moderate		Severe		Very Severe	
		No.	%	No.	%	No.	%	No.	%
Unipolar depression	27	11	40.74	10	37.04	4	14.81	2	7.40
Bipolar depression	26	4	15.38	11	42.31	7	26.92	4	15.38

Table 7. Comparison of WCST & HAM-D scores in patients of Unipolar & Bipolar Depression

Groups	Mild	Moderate	Severe	Very severe
Category completed(CC) [Unipolar]	5.27+/-0.647	3.4+/-0.966	2.25+/-0.500	1.5+/-0.707
	3.4+/-0.966	2.25+/-0.500	1.5+/-0.707	5.27+/-0.647
t- score	5.259	2.226	1.549	7.514
p- value	<0.01	<0.05	>0.05	<0.01
Category completed(CC) [Bipolar]	5.25+/-0.500	3.55+/-0.522	2.00+/-0.577	1.25+/-0.500
	3.55+/-0.522	2.00+/-0.577	1.25+/-0.500	5.25+/-0.500
t- score	5.632	5.901	2.166	11.314
p- value	<0.01	<0.01	>0.05	<0.01

Table 8. Comparison of WCST & HAM-D scores in patients of Unipolar & Bipolar Depression

Groups	Mild	Moderate	Severe	Very severe
Perseverative error(PE) [Unipolar]	20.64+/-6.087	28.4+/-10.875	30+/-8.287	46.5+/-4.950
	28.4+/-10.875	30+/-8.287	46.5+/-4.950	20.64+/-6.087
t- score	2.044	0.263	2.510	5.614
p- value	>0.05	>0.05	>0.05	<0.01
Perseverative error(PE) [Bipolar]	20.25+/-3.304	30.91+/-8.404	39.57+/-15.437	43.50+/-18.376
	30.91+/-8.404	39.57+/-15.437	43.50+/-18.376	20.25+/-3.304
t- score	2.421	1.550	0.381	2.491
p- value	<0.05	>0.05	>0.05	<0.05

DISCUSSION

Depression, bipolar and unipolar both have disturbances in executive functioning with loss of spontaneous and reactive cognitive flexibility. The cognitive rigidity associated with dorsolateral prefrontal dysfunction in depression may

prevent patients to cope with life events and lead to a perpetuation of depressed mood by continuation of stress exposure. Though this is an area which has not been widely explored, yet it has great potential as an aid to clinical diagnosis in distinction of bipolar from unipolar depression. The Wisconsin

Card Sorting Test (WCST) is perhaps the best described Executive function test.

Thirty consecutive patients each of unipolar and bipolar depression were selected for the study. Both groups were assessed at the beginning for severity of depression on HAM-D and then for executive functions on WCST. Thereafter they received appropriate treatment and assessed again at 6 weeks and at 6 months during their recovery phase. After the initiation of study a total of 7 patients dropped out without any apparent reason.

The gender wise distribution of patients in unipolar depression showed males at 40.74% & females at 59.26%, while that in bipolar depression both males & females were in equal distribution (Table 1). In other studies it has been found that major depression occur in women twice as likely as men, while bipolar disorder occur equally in both sexes but bipolar depression is a little commoner in females.

The mean age in the unipolar and bipolar depression group is 35.19+/-10.45 and 28.88+/-10.37 respectively. The difference in mean age between the two groups is statistically significant with age range of 18-60 years (Table 1). In the bipolar depression group 65.38% patients were in age group of 18-31 years and 26.3% were in the age range of 32-46 years, while 44.44% patients of unipolar depression group were in age group of 18-31 years and 40.74% in age range of 32-46 years. This shows the earlier onset of the bipolar illness in age group of 18-30 years, while that of unipolar depression a few years later. [23] Weissman et al. (1996) also observed that the mean age at onset of unipolar depression is 24.8-34.8 years with an average of 27 years, while the average age at first onset of bipolar disorder is 6 years younger than unipolar depression, usually by the second or third decade of life.

Unipolar and bipolar depression patients were assessed on HAM-D for severity of depression and for executive functioning on WCST during their active phase of illness that is at the beginning of

study and during their recovery phase that is after 6 weeks and 6 months of treatment. The WCST generates result on six subscales viz. number of categories completed, number of trials, number and percent of errors, number & percent of perseverative errors, number and percent of perseverative responses, conceptual level responses & percent conceptual response.

But in this study only two subscales have been used because most of studies have too few subjects to support an analysis of very many measures. In fact, most probably have too few subjects to produce a stable factor structure. This limitation may explain why most authors have reported data for only one or two WCST subscales. The WCST subscales used in this study were: (1) Number of categories completed (2) Perseverative errors.

The mean HAM-D score of unipolar & bipolar depression patients at the beginning of study was 15.37+/-4.413 and 18.15+/-3.957 (Table 2) respectively. After receiving treatment for 6 weeks they were reassessed and the mean HAM-D was 9.22+/-3.457 and 11.04+/-3.400 respectively. After 6 months on treatment their mean HAM-D was 3.85+/-2.783 and 4.69+/-2.396 respectively. Patients of unipolar depression showed significant decline in severity score of HAM-D at each interval. Patients of bipolar depression too showed significant decline in severity score after 6 weeks and 6 months of treatment. On comparison (Table 2), unipolar and bipolar depression patients showed statistically significant difference in severity of depression at the beginning of study. Bipolar depression patients were more depressed in severity than patients of unipolar depression. But after 6 weeks and 6 months of receiving treatment they were nearly at the same level of severity with no statistically significant difference.

On WCST the performance of patients of unipolar and bipolar depression were assessed at the beginning of study, after 6 weeks and after 6 months using two subscales, number of categories completed

and number of perseverative errors (Table 3). The mean categories completed and perseverative errors committed by patients of unipolar depression were found to differ significantly between baseline, at 6 weeks and at 6 months. There were more categories completed and less perseverative errors made by both group of patients at 6 month than at 6 week and baseline. The results were similar in patients of bipolar depression (Table-4&5). The mean categories completed, and mean perseverative errors in unipolar and bipolar group were 3.85 ± 1.512 , 26.81 ± 10.609 and 3.03 ± 1.399 , 33.54 ± 13.589 respectively at the beginning of study. On comparison, these two groups showed significant difference in mean categories completed and mean perseverative errors with less number of categories completed and more number of perseverative errors committed by patients of bipolar depression (Table 3). After 6 weeks of receiving treatment mean categories completed and perseverative errors committed by patients of unipolar and bipolar depression were 4.63 ± 1.214 , 20.85 ± 9.453 and 3.81 ± 1.357 , 26.88 ± 9.981 respectively (Table 3). After 6 months of receiving treatment, during the recovery phase of illness the mean categories completed and perseverative errors committed by patients of unipolar and bipolar depression were 5.30 ± 0.724 , 14.26 ± 6.915 and 4.69 ± 1.158 , 18.38 ± 7.585 respectively (Table 3). On comparison, the two groups were found to differ significantly in mean categories completed and perseverative errors committed, with lesser number of categories completed and more number of perseverative errors committed by patients of bipolar depression at 6 weeks and 6 months than unipolar depression (Table 3).

To find out the effect of severity of depression on executive functioning, patients of unipolar and bipolar depression were divided into mild, moderate, severe, and very severe depression groups on the basis of HAM-D scores. In unipolar depression group there were 11 patients

with mild (40.74%), 10 with moderate (37.04%), 4 with severe (14.81%), 2 with very severe (7.40%) depression. In bipolar depression group there were 4 patients suffering with mild (15.38%), 11 with moderate (42.31%), 7 with severe (26.92%), and 4 with very severe (15.38%) depression (Table-6). The moderately depressed unipolar group significantly completed lesser no of categories (3.4 ± 0.966) than mildly depressed group (5.27 ± 0.647). The severely depressed unipolar group also significantly completed lesser no of categories (2.25 ± 0.500) than moderately depressed unipolar group (3.4 ± 0.966). No such significant difference was noticed between severe (2.25 ± 0.500) and very severe (1.5 ± 0.707) grade of unipolar depression in categories completed (Table-6). While mean perseverative errors committed by mild (20.64 ± 6.087), moderate (28.4 ± 10.875), severe (30.00 ± 8.287), and very severe (46.50 ± 4.950) unipolar depression group were not significantly different from each other. But there was noticed very significant difference in mean perseverative errors between mild and very severe unipolar depression group. It was noticed that patients of unipolar depression with less severity of depression were able to perform better on WCST than with more severe disease (Table-7).

The mean categories completed by moderately (3.55 ± 0.522), and severely (2.00 ± 0.577) depressed bipolar group was very significantly lesser than mildly (5.25 ± 0.500), and moderately (3.55 ± 0.522) depressed bipolar group respectively. No such significant difference in mean categories completed was noticed between severe (2.00 ± 0.577) and very severe (1.25 ± 0.500) bipolar depression patients (Table-7). The mean perseverative errors committed by moderately depressed (30.91 ± 8.404) bipolar group, was significantly more than mildly depressed (20.25 ± 3.304) bipolar group. No such statistically significant difference was noticed in mean perseverative errors committed between moderate (30.91 ± 8.404)

and severe (39.57+15.437), severe and very severe (43.50+18.376) bipolar depression patients (Table-8). It was noticed that patients of bipolar depression with more severe depression were able to perform worse than those with less severe illness.

Thus the study indicates that patients of unipolar and bipolar depression demonstrate significant deficits in the executive functioning as assessed by WCST. The patients of bipolar depression showed more significant deficit in executive functions compared to patients of unipolar depression. This finding is consistent with the observation that there is more definitive cognitive deterioration in bipolar depression compared to unipolar depression. Also patients with more severe depression were having greater impairment in executive functioning than those suffering with lesser degree of depression. Several authors have reported these deficits as state dependent, which remain even after the recovery and predict the long term course of the illness [24] (Bulbena & Berrios, 1993, [25] Paradiso et al., 1997). It is seen in this study that in recovery phase, after 6 months of beginning of study both the groups were demonstrating some impairment in executive functions and still bipolar depression patients demonstrating more impairment than unipolar depression patients.

Previous studies that have been done to measure the executive function deficits in depressive patients were either on unipolar depression or bipolar depression only. Though one study have been done with the aim to compare the neuropsychological performance of patients with bipolar or unipolar mood disorders during acute episodes of depression using intelligence and frontal lobe function on 15 bipolar and 30 unipolar depression patients [26] (Bipolar disorders, volume 3, number 2, April 2001, pp. 88-94). But no study have been done to find out any difference between bipolar and unipolar depression patients on the basis of executive function abilities during active phase of illness and during recovery phase.

So this study was contemplated to assess, whether the two depression group can be differentiated on the basis of executive functions, to clear the diagnostic clouds.

LIMITATIONS:

Several factors may limit the credibility and generalization of these findings.

The small sample size and inability to address multiple confounding variables are the major limitation of this study and may influence the generalization of the findings.

As the patients were on medication receiving antidepressants, benzodiazepines and or mood stabilizers, with unipolar depression patients receiving antidepressants and benzodiazepines while bipolar depression patients receiving mood stabilizers, benzodiazepines and antidepressants. It has been shown that antidepressants do not interfere much with the cognitive performance on the small doses [27] (Thompson, 1991). However the benzodiazepine is definitely known to affect the judgment capacities and might have perpetuated the relatively poor performance of both groups of patients on WCST.

The interpretation of studies of WCST would be the consideration of complex interplay of sampling procedure, patient characteristics, assessment setting, techniques and sorting criteria. The finding of relatively greater deficits in both the groups as compared to western data might be due to several reasons:

1. Education is known to affect the performance on WCST.
2. Lower socioeconomic status with poor quality of education facilities or non-stimulating environment might limit their performance on WCST. Disparity in these variables might add to the difference in performance of individual patients.

SCOPE OF FURTHER RESEARCH:

The present study is only the beginning to highlight the diagnostic use of

executive function ability in differentiation of unipolar from bipolar depression and more studies are required to prove or disapprove the diagnostic utility of executive functions performance on WCST. A study with larger number of patients dealing more confounding variables (especially gender and educational status), and comparing all the WCST subscales like number of trials administered, number and percent of errors, number and percent perseverative errors, perseverative responses, non perseverative errors, conceptual level responses and percent conceptual level responses trials to complete first category, number of categories completed, and learning to learn responses, will able to provide a more comprehensive result.

The study comparing the executive function abilities of patients with unipolar depression and bipolar II depression is the most required and of utmost significance. As bipolar II disorders are the most common phenotype of mood disorders and 27-65% of all patients with major depression confirm to be bipolar II disorders, also many of the unipolar suicides as hidden case of bipolar II depression. So the differentiation of bipolar II depression from unipolar depression is crucial for therapeutic implications and prognostic reasons.

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