Original Research Article

Association of Cell Phone Dependence with Cognitive Impairment in Persons with Bipolar Disorder

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Abstract

Background: Bipolar disorder is a mood disorder, also known as manic-depressive disorder. Manic episodes are characterized by an abnormally persistent elevated, expansive or irritable mood with abnormally increased goal-directed activity. Depressive episodes present with depressed mood, anhedonia, easy fatiguability, and suicidal ideation. commonly affected cognitive functions include attention, processing speed, set-shifting, executive function, and verbal memory performance. These cognitive impairments persist in bipolar disorder even after the remission of mood symptoms.

Material and Methods: the design of the study was a cross-sectional observational study. 92 subjects with bipolar disorder seeking treatment from the department of psychiatry, Atal Bihari Vajpayee Institute of Medical Sciences and Dr. Ram Manohar Lohia Hospital were recruited, Young Mania rating scale and Hamilton depression scale were applied and YMRS 6 or less, HAM-D 7 or less was recruited. The Cell phone dependence scale was applied to assess the severity of dependence. Trail making test, Stroop test, verbal memory n back test, and Global assessment of functioning scale were applied to see the association of cell phone dependence with cognitive impairment a in person with bipolar disorder.

Results: Significant correlation was observed between severe cell phone dependence and trail making test, Stroop color and word test, verbal memory n back test, and global assessment of functioning in persons with bipolar disorder.

Conclusion: The study findings suggest an association between cell phone dependence and cognitive impairment in a person with bipolar disorder.

Keywords: Cell phone dependence, Cell phone addiction, smart phone abuse, bipolar disorder, Cognitive impairment.

Introduction

Bipolar disorder is a mood disorder, also known as manic-depressive disorder. Manic episodes are characterized by an abnormal persistently elevated, expansive, or irritable mood with abnormally increased in goal-directed activity. Depressive episodes present with depressed mood, anhedonia, easy fatiguability, and suicidal ideation. Its prevalence is almost similar in both genders. Bipolar affective disorder is a serious mental illness characterized by periods of mania and depression that impair a person's intellect, emotion, behavior, and social abilities. [1] It is the 6th biggest cause of Disability Adjusted Life Years (DALY) in the 15-44 age range, with a global burden of 2.4 percent and 0.1 percent in India. [2]

The 10th edition of the International Classification of Diseases says (ICD-10), Bipolar Affective Disorder (BPAD) is defined by a series of episodes (at least two) in which the patient's mood and

An overall about 38% of bipolar affective disorder patients are found addicted with cannabis and other polysubstance [4] With the advent of technology, there is an increasing rise in the usage of cell phones, smart phones and other devices. Potential addiction to usage of cell phone, the smart phone penetrance in India is estimated to be around 279.2 million in 2018 and the prevalence of 'Nomophobia' or the fear of being without cell. While cell phones allow us to connect with others and provide unlimited access to information, recent studies point to many harmful cognitive effects [5].

Material and Methods

This was a cross-sectional observation study, conducted in the department of Psychiatry, Atal Bihari Vajpayee Institute of Medical Sciences and Dr. Ram Manohar Lohia Hospital, New Delhi between 1st January 2021 to 31st May 2022. After obtaining approval from the

activity levels are significantly disrupted, with the disturbance consisting on some occasions of an elevation of mood and increased energy and activity (mania or hypomania), and on other occasions of a lowering of mood and decreased energy and activity(depression). [3]

Repetitive episodes of bipolar disorder are associated with higher morbidities, its lifetime prevalence being 1.3 to 1.6%. In comparison with the general population, it has two to three times higher mortality,

Cognitive functioning in bipolar disorder is directly and negatively related to the total number of episodes. The commonly affected cognitive functions include attention, processing speed, set-shifting, executive function and verbal memory performance. These cognitive impairments persist in bipolar disorder even after remission of mood symptoms. Such persistent cognitive impairment negatively impacts the overall functioning in an already compromised patient. Institutional Ethical Committee and prior written informed consent from all patients or their relatives bilingually (English and Hindi), 92 patients with bipolar disorder were recruited in the study. The inclusion criteria for study were patients with bipolar disorder in remission, age 18-60 years, and at-least 5 years of formal education. The exclusion criteria for study were history of substance abuse (except for nicotine), any other, comorbid psychiatric disorder and any neurological illness.

All the recruited patients were assessed on M.I.N.I. to rule out other psychiatric disorders and HAM-D17 and YMRS were applied further for assessment of depressive and manic symptoms respectively for remission of the current episode.

CPDS was applied to assess the severity of cell phone dependence. This was followed by Trail making test A and B, Stroop

colour and word test and verbal memory N-back test were applied. Global assessment of functioning was applied to assess the functionality.

Statistical analysis

The collected data was entered in Microsoft Excel and statistically evaluated using SPSS-21 version. Normality of each variable was assessed by using the Kolmogorov- Simirnov test. Quantitative data was expressed by mean, standard deviation or median with interquartile range and depends on normal distribution, difference between two means were tested by student t test or Mann Whitney U test. Qualitative data will be expressed in percentage and difference between the proportions will be tested by chi square test or Fisher's exact test. 'P' value less than 0.05 would be considered statistically significant

Results

Males (70%) outnumbered females (29%) in our study subjects. The majority of them were married (70%), with only five cases being divorced/separated/widowed 5.5% and rest were unmarried. Majority of the individuals in the study had completed matriculation or above, and 37% of the sample completed higher secondary education. The majority of the participants, approximately two-thirds in both cases, were less than 40 years old and belonged to the early adulthood group, with the mean age of bipolar patients being 34.54 ± 10.21 years. Among cases, 7.6% were between age group of 11 to 20 years, 31.5% from 21-30 years, 35.9% from 31-40 years, 18.5% from 41-50 years, 6.5% from 51-60 years.

Table 1: Association of Severity of cell phone dependence with cognitive impairment in study subjects (n=92)

	Mild	Moderate	Severe	P-value
Trail making test A	21.08 ± 6.50	21.72 ± 6.29	26.96 ± 13.79	0.37
Trail making test B	70.25 ± 10.83	72.22 ± 15.15	80.23 ± 17.50	0.04
Word task stroop test	103.33 ± 6.51	92.09 ± 11.51	94.67 ± 13.32	0.02
Coloured task stroop test	56.25 ± 10.25	51.56 ± 10.13	47.96 ± 10.85	0.03
Coloured word task stroop test	45.92 ± 3.57	33.69 ± 8.26	33.29 ± 10.63	<0.001
T score	54.25 ± 4.63	49.41 ± 5.74	46.92 ± 9.28	0.02
1-back hits	7.0 ± 1.47	5.0 ± 1.76	5.29 ± 2.26	<0.01
2-back hits	6.50 ± 1.73	$5.0 \pm .1.98$	3.94 ± 1.36	<0.001
1-back error O+C	3.08 ± 2.23	3.94 ± 1.36	5.50 ± 2.67	<0.01
2-back error O+C	3.17 ± 1.69	4.22 ± 2.19	5.65 ± 2.84	<0.01
Global assessment function Score	89.58 ± 4.98	82.66 ± 7.40	82.19 ± 9.04	0.01

ANOVA test or Kruskal Wallis H test was used

With the severity of cell phone dependence, Trail making test B, 1-back error O+C and 2- back error O+C scores were significantly decreased while Word task Stroop test, Coloured word task Stroop test, T score, 1-back hits, 2 back hits and Global assessment function score were significantly decreased.

Discussion

Cognitive dysfunctions in bipolar disorder are a well-researched and its impact on functionality and quality of life got the attention of researchers. So, Understanding the drivers and severity of Cognitive dysfunction is critical for limiting the functional impairment produced by it and its impact on the patient's quality of life, thereby reducing the burden of Bipolar disorder [7].

In present study, Trail making tests A and B were used to study neurocognitive function pertaining to attention, processing speed, visual scanning, and executive function (specifically attentional set-shifting, cognitive flexibility, and response inhibition), as deficits in these have always appeared to be emphasized even during the euthymic phase of BD. In addition, Sparding et al. (2015) discovered that tests evaluating the afore mentioned functions (e.g., TMT and SCWT) showed the strongest ability to discern extremely minute variations in the cognitive functioning of BD patients [8].

People who have cognitive deficits even during the euthymic state support the previously established hypothesis, which has been supported by numerous reports and meta-analyses, that at least a portion of BD patients continue to have cognitive dysfunction even after the acute episodes have passed [9,10]

When the association between clinical characteristics was examined, it was discovered that patients who had experienced more manic episodes in the past performed worse on Trial A (13%) and Trail B (22.8%). Other clinical characteristics (age of commencement, duration of illness, total number of episodes, number of depressive episodes, duration of euthymic time after the last episode) showed no significant impact on the performance of the cognitive tests utilized in this study. Although previous studies have shown that clinical variables, particularly the age of onset and duration of illness, are significantly associated with neurocognitive functions; an Indian study revealed them to be significantly associated, particularly with TMT-B scores, similar association was found in this study [11–13].

Cell phone has increasing use since last decades and it is found that person can be addicted to cell phone use as other substance use disorder and there is no study done yet which established that use of cell phone and its association with cognitive impairment in bipolar patients. [14]

In our study, we found significant positive correlation between CPDS score with Trail making test score A (r value =0.21; p value =0.04) and Trail making test score A (r value=0.25; p value =0.01)., with Trail making B (r value 0.25; p value =0.01).

Significant moderate negative correlation was seen between CPDS score and Coloured task stroop test (r value = -0.36; p value <0.001); between CPDS score and Coloured word task stroop test (r value = -0.28; p value <0.01); between CPDS score and T score (r value = - 0.328; p value <0.01).

There is significant weak positive correlation between CPDS score with Trail making test score A (r value =0.21; p value =0.04) and Trail making test score B (r value =0.25; p value=0.01).

Significant weak negative correlation was seen between CPDS score and 1-Back hits (r value = -0.25; p value =0.01); significant strong negative correlation between CPDS score and 2-Back hits (r value = -0.49; p value <0.001); significant strong positive correlation between CPDS score and 1 back error O+C (r value = 0.40; p value <0.001) and significant weak positive correlation between CPDS score and 1 back error O+C (r value = 0.31; p value<0.01).

With the severity of cell phone dependence, Trail making test B, 1-back error O+C and 2- back error O+C scores were significantly decreased while Word task stroop test, Colour word task stroop test, T score, 1-back hits, 2 back hits and Global assessment function score were significantly decreased.

There was significant negative correlation seen between duration of illness and Colour Task Stroop Test (r value = -0.34; p value =0.001); significant negative correlation between duration of

illness and Colour word Task Stroop Test (r value = -0.21; p value =0.003) and significant negative correlation between duration of illness and Colour word Task Stroop t score (r value = -0.216; p value =0.03).

There was significant negative correlation seen between duration of illness and 1-Back hits (rvalue = -0.21; p value =0.03); significant negative correlation between duration of illness and2-Back hits (r value = -0.31; p value <0.01); significant positive correlation between duration of illness and 1 back error O+C (r value = 0.32; p value <0.01) and significant weak positive correlation between duration of illness and 2 back error O+C (r value = 0.27; p value =0.01).

Conclusion

TMT A and TMT B were completed the slowest by the patient. Patients with low GAF ratings had a considerable impairment in functioning, which was determined to be statistically significant. The time required to complete TMT-A was found to be positively linked with the number of manic episodes when cognitive characteristics were correlated clinical variables.

When the association between TMT A, TMT B and CPDS scores was investigated, a significant correlation was discovered between severe cell phone dependence and the time required to complete TMT-A and TMT-B. (attention, psychomotor processing speed, visual scanning).

Limitations

The study's major weaknesses included a non-blinded investigator and probable confounding factors linked to illness characteristics, concurrent use of other psychotropic medicines, premorbid functioning, and the illness's longitudinal trajectory. Because the study is cross-sectional in design, causal linkages between these characteristics and the influence of the illness's longitudinal course are not possible. Because the sample was drawn from a single tertiary care postgraduate centre, the results cannot be extrapolated to the BD community in the community.

Recommendations

The findings should be replicated on larger sample and include the multiple centers for generalizability of the findings. A control group and a group of cell phone dependence without bipolar disorder can give better insight about impact of cell phone dependence on cognitive impairment and disability in patients with bipolar disorder. For more sensitive studies of time-varying connections, future research should quantify the longitudinal link between cognitive function and mobile phone use throughout different stages of illness in the same patient group.

Consent

Written informed consent was obtained from the patients for publication of this cross-sectional observational study. A copy of the written consent is available for the review by the Editor-in-Chief of this journal on request.

CREDIT authorship contribution statement

Author KS wrote the first draft of the manuscript, collected data and managed the literature searches.

Authors KS and AK, LS, KS, AKB treating Psychiatrist.

Author AK was scientific advisor.

All authors read and approved the final manuscript

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