Open Access

Original Article

# Cognitive Impairment and Its Correlation with Depression

**Sikandar Ali Khan, Jawad Jalil, Mehreen Sajjad**

Department of Psychiatry, Combined Military Hospital, Gujranwala/National University of Medical Sciences (NUMS) Pakistan

## ABSTRACT

***Objective:*** To determine the correlation between the severity of depression and cognitive impairment.
***Study Design:*** Cross-sectional study.
***Place and Duration of Study:*** Department of Psychiatry, Combined Military Hospital, Gujranwala, Pakistan from May 2016 to December 2016.
***Methodology:*** The cross-sectional study was conducted on outpatients in the Department of Psychiatry at Combined Military Hospital Gujranwala. The diagnosis of depression was made based on the WHO's ICD10 diagnostic criteria, and symptom severity was assessed using the Beck Depressive Inventory. Deirdre M. used the Montreal Cognitive Assessment version 7.1 to assess cognitive impairment.
***Results:*** Eighty-six subjects were included in this study. A comparison of cognitive impairment and depression revealed that in a total of 16 subjects with minimal depression, only 5 had cognitive impairment; in 14 subjects with mild depression, 11 showed cognitive impairment; 26 subjects had moderate depression, out of which 18 showed signs of cognitive impairment; and among 30 subjects with severe depression, there was cognitive impairment in 25 individuals. The Spearman correlation showed a weak correlation of 0.321 ($p$<0.001).
***Conclusion:*** A high level of depressive symptoms, although weak, is significantly correlated with cognitive impairment.

**Keywords:** depression, cognition, cognitive impairment.

***How to Cite This Article:*** *Khan SA, Jalil J, Sajjad M. Cognitive Impairment and Its Correlation with Depression. Pak Armed Forces Med J 2024; 74(3): 874-878. DOI: https://doi.org/10.51253/pafmj.v74i3. 12410*



## INTRODUCTION

Depression is a common condition that can simply be described as a disease of losses, in which everything seems to be lost. Depression is a chronic, remitting, and relapsing disease that causes tremendous economic burden and disability.[1] Like neurological disorders, depression can affect cognitive functions, leading to profound impairment in cognitive faculties. This impairment leads to defective social and occupational functioning.[2] Cognitive function implies defects in attention, verbal and non-verbal learning, short-term and working memory, visual and auditory processing, problem solving, processing speed, and motor functioning. Patients with depression commonly complain of difficulty maintaining concentration, reduced attention, difficulty thinking, decisiveness, decision-making, and memory lapses.[3] Attention is divided into three categories: processing speed, selective attention, and automatic processing. In depression, difficult attention-related tasks become impaired.[4] While it is common to observe a decline in cognitive abilities in depression, it is important to note that not all cognitive impairments can be classified as characteristic features of depression, as each patient's cognitive impairment varies in severity and characteristics.[5] Several studies have also shown that the characteristics and severity of cognitive impairment are different in the first episode of depression as compared to subsequent episodes or recurrent depression.[6] Studies have confirmed that cognitive impairment is a reality in the acute phase of depression. Studies indicate that cognitive impairment not only appears during the depressive episode but also remains during the reduction of symptoms.[7] On the other hand, there are studies that have contradictory findings, claiming that cognitive impairment subsides or improves when depression symptoms are reduced.[8] There are studies that have found that persistence of cognitive impairment after reduction of depressive symptoms correlates with the number of previous episodes and that cognitive impairment worsens with every episode.[9] Previously, it was believed that depressive symptoms were the cause of impairments in social and occupational functioning, such as productivity deterioration, absence from duty, and social relations.[10] Now it is well known that social and occupational functioning remains defective even after a reduction in depressive symptoms. Long-term cognitive impairment is one of the reasons for this

**Correspondence: Dr Sikandar Ali Khan,** Department of Psychiatry, Combined Military Hospital, Gujranwala, Pakistan
*Received: 09 Nov 2017,revision received: 05 May 2018; accepted: 10 May 2018*

persistent impairment. In traditional practice, only depressive symptoms are kept in mind when diagnosing depression; cognitive impairment and its severity are overlooked. Cognitive impairment is a serious and important part of depressive illness, which has implications not only for the course of the illness but also for various accidents caused by defective attention, indecisiveness, and poor decision-making. Therefore, this study intends to highlight the correlation between cognitive impairment and depressive illness.

## METHODOLOGY

The cross-sectional study was conducted at the Department of Psychiatry at Combined Military Hospital Gujranwala, Pakistan after the approval of the Ethical Committee. A sample size was estimated using the Epi Tools epidemiological calculator, keeping the odds ratio at 3.4.[11]

**Inclusion Criteria:** New cases of depression, aged 18 to 40 years and of either gender were included.

**Exclusion Criteria:** Patients with possible causes of cognitive impairment like head injury, substance abuse, epilepsy, cerebrovascular accidents, chronic illnesses, and learning disabilities were excluded.

We consecutively sampled eighty-six newly diagnosed cases of depression in Outpatient
Department using the convenience non-probability sampling technique. After written consent, all the purposes of this study were explained, and confidentiality was ensured.

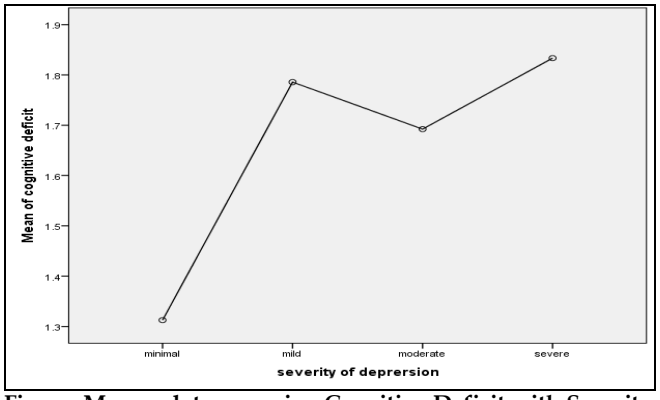


**Figure: Means plot comparing Cognitive Deficit with Severity of Depression**

A detailed assessment and diagnosis of depression was performed using the WHO's ICD10 diagnostic criteria, and symptom severity was assessed using the Beck Depressive Inventory.[12] The Beck Depressive Inventory consists of 21 questions, each with four possible answers that are assigned a score ranging from 0 to 3. Higher scores indicate more severe symptoms. To calculate the total score, add all 21 scores, which range from 0 to 63. The cut-off score for the presence of symptoms is.[9] The Beck Depressive Inventory is for detecting symptoms, not diagnosing depression. Scores of 0–9 indicate minimal depression, 10–18 indicate mild depression, 19–29 indicate moderate depression, and scores of 30-63 indicate severe depressive symptoms. Cognitive impairment was assessed using the Montreal Cognitive Assessment version 7.1; it assesses the domains of attention, concentration, executive function, memory, language, visio-constructional skills, conceptual thinking, calculation, and orientation. The total possible score is 30; a score of 26 or higher is considered normal.[13]

Statistical Package for Social Sciences (SPSS) version 20.0 was used for the data analysis. Quantitative variables with normal distribution were expressed as Mean±Sd and qualitative variables were expressed as frequency and percentages. Spearman correlation test was applied to measure the strength of the linear relationship between variables. The *p*-value lower than or up to 0.05 was considered as significant.

## RESULTS

Eighty-six subjects were included in this study, with a mean age of 30.4±7.5 years. 42(48.8%) were male, 44 (51.2%) were female, 74(86%) were married, and 12(14%) were unmarried. Scores on the Beck Depressive Inventory show that 16(18.6%) had minimal depression, 14(16.3%) had mild depression, 26(30.2%) had moderate depression, and 30(34.9%) had severe depression. Scores on Montreal Cognitive Assessment version 7.1: 59(68.6%) subjects showed cognitive impairment, while 27(31.4%) did not have any cognitive impairment, as shown in Table-I.

When cognitive impairment was compared with the level of depression, it revealed that there were a total of 16(18.6%) subjects with minimal depression. The study found that 5(31.25%) subjects had cognitive impairment, 14(16.3%) subjects had mild depression, of which 11(78.5%) had cognitive impairment, 26(30.2%) subjects had moderate depression, of which 18(69.2%) had cognitive impairment, and 25(83.3%) of the 30(30.4%) subjects with severe depression had cognitive impairment. There was a strong link between cognitive impairment and depression, with a Spearman correlation coefficient of 0.321 (*p*-value 0.003) at a confidence interval of 95%, as shown in Table-II. Figure displays a comparison between

cognitive deficit and depression severity using a means plot.

**Table-I: Descriptive Statistics of The Patients (n=86)**

| | Age | Gender | Marital status | Severity of depression | Cognitive deficit |
|---|---|---|---|---|---|
| Mean±SD | 30.4 ±7.5 | - | - | - | - |
| Male | - | 42(48.8%) | - | - | - |
| Female | - | 44F(51.2%) | - | - | - |
| Married | - | - | 74(86.0%) | - | - |
| Un-married | - | - | 12(14%) | - | - |
| Minimal | - | - | - | 16(18.6%) | - |
| Mild | - | - | - | 14(16.3%) | - |
| Moderate | - | - | - | 26(30.2%) | - |
| Severe | - | - | - | 30(34.9%) | - |
| Present | - | - | - | - | 27(31.4%) |
| Absent | - | - | - | - | 59(68.6%) |

**Table-II: Presence of Cognitive Deficit in relation to Severity of Depression (n=86)**

| Severity of Depression | Cognitive deficit | | Total | Spearman's Correlation Coefficient (r) | *p*-Value |
|---|---|---|---|---|---|
| | Absent | Present | | | |
| Minimal | 11(68.7%) | 5(31.2%) | 16 | 0.321 | 0.003 |
| Mild | 3(21.4%) | 11(78.5%) | 14 | | |
| Moderate | 8(30.7%) | 18(69.2%) | 26 | | |
| Severe | 5(16.6%) | 25(83.3%) | 30 | | |
| Total | 27 | 59 | 86 | | |

## DISCUSSION

This cross-sectional study was conducted to highlight the presence of cognitive impairment, which is thought to accompany a significant number of patients who develop depression. Commonly, the component of cognitive impairment is often aside while devising a management plan for a depressed patient. In order to have a comprehensive management plan, this piece of the puzzle cannot be ignored, as it leads to deterioration in social and occupational functioning even if the depressive symptoms start to reduce.

The results of this study align with previous research, demonstrating a strong correlation between depression and cognitive impairment.[13] It is important to note that there are very few studies that have tried to identify the correlation between the severity of depressive symptoms and cognitive impairment.[14] Therefore, the results of this study highlight the importance of the level of severity and the presence of cognitive impairment. This study revealed that as the severity of the depressive symptoms increased, cognitive impairment became more frequent. 31 percent of subjects with a minimal level of depression had cognitive impairment as the level of depressive symptoms increased to moderate severity. When the severity of depressive symptoms escalated to a severe level, 83 percent of the subjects experienced cognitive impairment, a significantly higher percentage than those with minimal depression. It is also important to highlight that in this study, a high number of cognitive impairments were seen in subjects who had a mild level of depressive symptoms. This finding can be taken as an inflated result due to the small sample size.

Individuals with depression and cognitive impairment are more vulnerable to making errors in their daily routine work, such as computing or financial affairs. In addition, they are prone to losing confidence, remain absent from work more frequently, and may lose their job. Cognitive impairment has an adverse effect on academic performance with a reduced capability to understand subjects; it may also lead to domestic or traffic accidents due to compromised attention, consequently leading to underachievement and a feeling of inferiority.[15]

This study substantiates the findings of Irfan *et al*.[16] who observed that in severe depression due to deterioration in cognitive faculty, there was a significant impairment in language performance. It is important to note that their study was conducted on patients with acute ischemic stroke, whereas in this study it was ensured that individuals with comorbid medical illnesses were excluded.

Like other studies, the results of this study put emphasis on the identification of cognitive impairment and its effective management. In this regard, McIntyre

*et al*.[17] recommended systematic measurement of cognition to improve the outcome of depression. The results of this study also indicate the importance of measuring cognitive functions, as cognitive impairment is directly proportional to the severity of depression; the greater the severity of depression, the greater would be the cognitive impairment. Therefore, for effective management of depression, it is necessary to devise a management plan that incorporates strategies to address cognitive impairment. Giri *et al*. highlighted in their study that cognitive impairment is highly correlated with depression, whereas this study not only finds a correlation between depression and cognitive impairment, but also indicates that cognitive impairment is positively correlated with the severity of the depressive symptoms.[18] Our study highlights the importance of addressing cognitive impairment in depression.

## LIMITATIONS OF STUDY

Some limitations of this study need to be highlighted. Firstly, the sample size significantly influences the inflated results of cognitive impairment in cases of mild depression. Second, the Montreal cognitive assessment scale version 7.1 used in this study has not been standardised in Pakistan; therefore, the validity and specificity of the scale cannot be commented upon with confidence as it had to be translated by the rater for better comprehension of the participants.

## CONCLUSION

Cognitive impairment is found in a significant proportion of depressed patients. Although weakly correlated with cognitive impairment, high levels of depressive symptoms are significant. Therefore, it is prudent to consider cognitive impairment as part of a comprehensive management plan.

**Conflict of Interest:** None.

**Authors' Contribution**

Following authors have made substantial contributions to the manuscript as under:

SAK & JJ: Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.

MS: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

## REFERENCES


1. Afridi MI, Hina M, Qureshi IS, Hussain M. Cognitive disturbance comparison among drug-naïve depressed cases and healthy controls. J Coll Physicians Surg Pak 2011; 21(6): 351-355.
2. Lam RW, Kennedy SH, Mclntyre RS, Khullar A. Cognitive dysfunction in major depressive disorder: effects on psychosocial functioning and implications for treatment. Can J Psychiatry 2014 ; 59(12): 649-54. https://doi.org/10.1177%2F070674371405901206
3. Austin MP, Mitchell P, Goodwin GM. Cognitive deficits in depression: possible implications for functional neuropathology. Br J Psychiatry 2001; 178: 200-206. https://doi.org/10.1192/bjp.178.3.200
4. McIntyre RS, Cha DS, Soczynska JK, Woldeyohannes HO, Gallaugher LA, Kudlow P, et al. Cognitive deficits and functional outcomes in major depressive disorder: determinants, substrates, and treatment interventions. Depress Anxiety 2013; 30(6): 515-527. https://doi.org/10.1002/da.22063
5. Hasselbalch BJ, Knorr U, Hasselbalch SG, Gade A, Kessing LV. Cognitive deficits in the remitted state of unipolar depressive disorder. Neuropsychology 2012; 26(5): 642-651. https://doi.org/10.1037/a0029301
6. Hammar A. Automatic and effortful information processing in unipolar major depression. Scand J Psychol 2003; 44(5): 409-413. https://doi.org/10.1046/j.1467-9450.2003.00361.x
7. Baune BT, McAfoose J, Leach G, Quirk F, Mitchell D. Impact of psychiatric and medical comorbidity on cognitive function in depression. Psychiatry Clin Neurosci 2009; 63(3): 392-400. 10.1111/j.1440-1819.2009.01971.x
8. Scheurich A, Fellgiebel A, Schermuly I, Bauer S, Wölfges R, Müller MJ. Experimental evidence for a motivational origin of cognitive impairment in major depression. Psychol Med 2008 ; 38(2): 237-246. https://doi.org/10.1017/S0033291707002206
9. Reppermund S, Ising M, Lucae S, Zihl J. Cognitive impairment in unipolar depression is persistent and non-specific: further evidence for the final common pathway disorder hypothesis. Psychol Med 2009 ; 39(4): 603-614. https://doi.org/10.1017/S003329170800411X
10. Martinez-Aran A, Vieta E, Torrent C, Sanchez-Moreno J, Goikolea JM, Salamero M, et al. Functional outcome in bipolar disorder: the role of clinical and cognitive factors. Bipolar Disord 2007 ; 9(1-2): 103-113. https://doi.org/10.1111/j.1399-5618.2007.00327.x
11. Årdal G, Hammar Å. Is impairment in cognitive inhibition in the acute phase of major depression irreversible? Results from a 10-year follow-up study. Psychol Psychother 2011; 84(2): 141-150. https://doi.org/10.1348/147608310X502328
12. Baune BT, Miller R, McAfoose J, Johnson M, Quirk F, Mitchell D. The role of cognitive impairment in general functioning in major depression. Psychiatry Res 2010; 176(2-3): 183-189. https://doi.org/10.1016/j.psychres.2008.12.001

13. Porter RJ, Gallagher P, Thompson JM, Young AH. Neurocognitive impairment in drug-free patients with major depressive disorder. Br J Psychiatry 2003; 182: 214-220. https://doi.org/10.1192/bjp.182.3.214
14. Lerner D, Adler DA, Rogers WH, Chang H, Lapitsky L, McLaughlin T, et al. Work performance of employees with depression: the impact of work stressors. Am J Health Promot 2010; 24(3): 205-213. https://doi.org/10.4278/ajhp.090313-QUAN-103
15. Katon W, Richardson L, Russo J, McCarty CA, Rockhill C, McCauley E, et al. Depressive symptoms in adolescence: the association with multiple health risk behaviors. Gen Hosp Psychiatry 2010; 32(3): 233-239. https://doi.org/10.1016/j.genhosppsych.2010.01.008
16. Irfan U, Khalid S. relationship between cognitive impairment and depressive symptoms. J Med Sci. 2011; 4(3): 122-127.
17. McIntyre RS, Xiao HX, Syeda K, Vinberg M, Carvalho AF, Mansur RB, et al. The prevalence, measurement, and treatment of the cognitive dimension/domain in major depressive disorder. CNS Drugs 2015; 29(7): 577-589. https://doi.org/10.1007/s40263-015-0263-x
18. Giri M, Chen T, Yu W, Lü Y. Prevalence and correlates of cognitive impairment and depression among elderly people in the world's fastest growing city, Chongqing, People's Republic of China. Clin Interv Aging 2016; 11: 1091-1098. https://doi.org/10.2147/CIA.S113668