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Prevalence Of Neurocognitive Impairment In Patients With Depressive Disorder And It's Correlation With Suicide Attempt And Intent.

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ABSTRACT

The World Health Organization (WHO) reported that more than 600 million people age 60 years and older worldwide. The WHO further estimated that, by 2025, this number would double to two billion older people. It is well-known that older people are at greater risk for diseases and body injuries, poverty, social isolation, loneliness, and loss of independence, all of which contribute to deterioration in mental health. The prevalence rate of suicide ranges from 8.54 to 33%. In older adults, the most frequently diagnosed mental disorders are anxiety disorders (10.9%) and mood disorders such as depression (7.4%) Moreover, suicide is a global concern. Almost 78% of all completed suicides occur in low- and middle-income countries, and in general, suicides account for 1.4% of premature deaths worldwide.

Keywords: suicide, anxiety, mental disorder.

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INTRODUCTION

Major Depressive Disorder (MDD) poses a substantial burden on global public health, affecting approximately 16.6% of individuals over their lifetime [1]. Cognitive impairment is a prevalent and often distressing aspect of Major Depressive Disorder (MDD), affecting a substantial majority, approximately 90%, of individuals diagnosed with the condition [2]. Extensive research has delineated various cognitive challenges within MDD, spanning four primary domains: attention, memory, executive function, and processing speed. The cognitive deficits observed in Major Depressive Disorder (MDD) have consistently been linked to unfavourable outcomes, indicating their significant impact on the course and prognosis of the disorder [3]. Studies have consistently demonstrated that individuals with depression exhibit cognitive deficits across various domains, which can significantly impact their daily functioning and quality of life [2]. Neurocognitive dysfunction emerges as a significant factor influencing the risk of suicidal behaviour within the context of Major Depressive Disorder (MDD). Suicide remains a tragic outcome of untreated or inadequately managed depression, claiming the lives of over 800,000 people annually worldwide [5]. Research indicates that neurocognitive deficits may contribute to the development and persistence of suicidal ideation, as well as the planning and execution of suicidal behaviour [6]. Mental disorders stand out as prominent vulnerability factors contributing to suicidal behaviour across various age groups, encompassing both attempted and completed suicides among adults, adolescents, and young individuals. Among these risk factors, depression emerges as the primary precursor to suicidal behaviour. Despite their potential to distinguish suicide attempters, basic neuropsychological functions have received relatively less attention in studies investigating suicidal behaviour. Research indicates that impaired attention control is prevalent among suicide attempters and at-risk populations, particularly when exposed to provocative distractors such as suicide-related words [7]. Hence this study is aimed at understanding the prevalence and correlates of neurocognitive impairment in depressed individuals and its association with suicide intent which is of paramount importance for suicide prevention efforts and clinical management strategies.

Aims and objectives

The Primary objective of this study is to find out prevalence of neurocognitive impairment in patients with depressive disorder. And also, to evaluate the association between neurocognitive changes and suicide intent.

METHODOLOGY

This study is a Observational, cross-sectional study, non-interventional institution based study done in a tertiary care hospital in Puducherry among patients diagnosed with depression as per ICD-10 by the consultants in Department of Psychiatry. Sample size was calculated based on the previous study with prevalence rate of 10% [1] and confidence interval of 95%, margin of error of 5% $n = Z^2xp(1-p) / d^2$. Sample size was 138 which was rounded of to 140 subjects. Participants were recruited in to the study between September 2022 to January 2023. Inclusion criteria include all patients between the age of 18 to 65 years who was diagnosed to have depressive disorder based on ICD10 criteria clinically by senior consultants. Participants with any other known psychiatric illness, organic comorbidities, intellectual disability, sensory abnormality or substance use were excluded from the study. Data collection was done using a semi structured proforma was used to collect demographic data like age, sex, education, occupation, marital status, socioeconomic status by Modified Kuppusswamy rating scale, age of onset, duration, course of illness, no. of suicide attempts, past history and family history. Depression was assessed using the Hamilton Depression Rating Scale (HDRS-17) which is a widely used screening tool for assessing the severity of depression in individuals. Developed by Max Hamilton in 1960, it comprises 17 items that evaluate various symptoms of depression, such as mood, guilt, suicidal ideation, and insomnia. The HDRS-17 is known for its reliability and validity in clinical settings, making it valuable for both diagnosis and treatment monitoring (Hamilton, 1960) [9]. It is a clinician rating scale, with Cronbach alpha >0.70 [8]. Scores on the scale range from 0 to 52, 7 - 13 mild; 14-17 mild to moderate; >17 moderate to severe, Cognitive assessment was done using the Montreal Cognitive Assessment (MoCA). It is a widely utilized screening tool for detecting mild cognitive impairment. Developed by Dr. Ziad Nasreddine in 1996, the MoCA assesses various cognitive domains, including attention, memory, language, visuospatial skills and executive function. It is clinician rating scale, with Cronbach alpha >0.64 [10]. Scores on the MoCA range from 0 to 30, (Nasreddine et al., 2005) [11]. Score of 26 and >26 considered to be normal; score< 26 indicates MCI. Beck's Suicide Intent Scale is a comprehensive tool designed to assess the severity of suicidal intent in individuals who have attempted suicide. Developed by Aaron T. Beck and colleagues in 1974, the

SIS-20 extends upon the original SIS to provide a more detailed evaluation of suicidal behaviour. It includes items that assess the degree of planning, lethality of methods chosen, and reasons for the suicide attempt. (Beck et al., 1974;) [12]. It is a clinician rating scale with Cronbach alpha >0.8 [13]. Beck's suicide intent scale consists of 20 items, with each item scored on a scale of 1 to 3 points. Scores between 15 and 19 are categorized as indicating low intent, scores between 20 and 28 indicate medium intent, and scores of 29 and above indicate high intent.

Results were analysed using SPSS (statistical package for the social sciences)23.0 version. For continuous variables for mean, standard deviation and frequency will be used and for categorical variables, chi square will be used for significance of association, t-test for continuous variables, p-value <0.05 was considered significance.

RESULTS

A total of 140 individuals were included in the study. Each participant underwent a comprehensive semi-structured clinical interview, in which demographics, illness characteristics, past medical history, and family history were systematically collected from each participant. Followed which they were assessed using three distinct scales: the Hamilton Rating Scale for Depression (HAM-D), the Montreal Cognitive Assessment (MOCA), and Beck's Suicide Intent Scale.

Mean age of the participants were 38 ± 12.16 ranging from minimum age of 18 to a maximum age of 73. The age distribution within the dataset reveals that individuals are categorized into five age groups. The majority of the participants, constituting 25-34 age group accounts for 51(36.4%) of the dataset. Following closely, the 38(27.1%) of the total, fall within the 18-24 age range, indicating a significant presence. Moving into the middle-aged category, 29(20.7%) of participants are aged 35-44, showcasing a slightly lower representation compared to the younger cohorts. The 45-54 age bracket comprises 15(10.7%) of the dataset, indicating a decline in participation among individuals in their fifties. Finally, individuals aged 55 and above, representing 7(5.0%) of the total, form the smallest proportion of the dataset, suggesting a lesser presence of older participants. The demographic analysis reveals a balanced distribution of gender, with females slightly outnumbering males, constituting 77(55.0%) and 63(45.0%) of the sample population, respectively. Education levels indicated a significant portion with secondary education 60(42.9%), while primary education 44(31.4%) and graduate education 19(13.6%), illiterate 17(12.1%) also hold notable representation. Among the participants the highest proportion was married individuals 55(39.3%), followed closely by separated individuals 38(27.1%), unmarried individuals 28(20%), divorced 9(6.4%) demonstrating a diverse range of relationship statuses within the sample. Occupation distribution highlights a substantial portion of the population being unemployed 55(39.3%), unskilled 25(17.8%), semi-skilled 16(11.4%), skilled 12(8.5%), clerical/shop/farm 13(9.2%), semi-professional 11(7.8%), professional 8(5.7%), suggesting potential socioeconomic dynamics and employment challenges within the surveyed population. Socioeconomic status is classified under Kuppuswamy classification. It showcases a varied landscape, with the largest proportion falling into the lower socioeconomic 52(37.1%), followed by the upper lower class at 38(27.1%), lower middle at 28(20%), and upper middle at 22(15.7%).

Among the 140 participants, 54(38.6%) of individuals reported an onset between the ages of 30-39, followed by, 40(28.6%), experienced the onset of this event or condition between the ages of 18-29 and 32(22.9%) reported an onset between the ages of 40-49, suggesting a gradual decline in the frequency of onset as age increases. A smaller proportion, representing 13(9.3%) of the sample, reported an onset between the ages of 50-59, while only 1(0.7%) experienced onset beyond the age of 60. Mean age of onset illness is 37 years, SD (12.5).

The majority of respondents 59(42.1%) reported experiencing illness for less than 6 months, 56(40.0%) reported an illness duration between 6 months and 11 months and 17(12.1%) reported an illness duration ranging from 1 to 4 years. Additionally, a minority 8(5.7%) reported an illness duration of 5 years or more, representing individuals with chronic or longstanding illness.

The largest proportion of respondents 52(37.1%) reported experiencing 1 to 3 episodes, indicating a relatively low frequency of symptom recurrence for this subset of individuals. Similarly, 50(35.7%) of respondents reported experiencing 4 to 7 episodes, suggesting a moderate frequency of symptom recurrence for this group. A smaller but notable percentage 19(13.6%) reported experiencing 8 to 11

episodes, indicating a subset of individuals with a higher frequency of symptom recurrence. Additionally, an equal proportion 19(13.6%) reported experiencing 12 to 15 episodes, representing another subset with a relatively high frequency of symptom recurrence

Among respondents, 52(37.1%) reported experiencing a continuous course of illness, indicating a persistent and ongoing trajectory without distinct intervals of remission. In contrast, the majority of participants 88(62.9%) reported an episodic course of illness, characterized by recurrent episodes of symptom exacerbation followed by periods of partial or complete remission. Among respondents, 79(56.4%) reported mild symptoms, falling within the Ham-D score range of 8-16, 47(33.6%) of participants reported moderate symptom severity, with Ham-D scores ranging from 17-23, 14(10.0%) of respondents reported severe symptoms, reflected by Ham-D scores exceeding 24. Among the valid responses, the mean number of suicide attempts is 1.59, indicating that, on average, individuals in the sample have made approximately one to two suicide attempts and standard deviation of 0.688. The majority of respondents 72(51.4%) reported having made one suicide attempt, 54(38.6%) reported having made two suicide attempts, 13(9.3%) reported having made three suicide attempts and 1(0.7%) reported having made four suicide attempts.

The correlation analysis between the Montreal Cognitive Assessment (MOCA) scores and the Hamilton Depression Rating Scale (HAM-D) reveals that visuospatial function shows a weak and non-significant correlation with HAM-D scores ($\rho = -0.053$, $p = 0.537$), indicating that performance on visuospatial tasks is not strongly associated with depression severity. Similarly, naming ability also demonstrates a weak and non-significant correlation with depression scores ($\rho = -0.144$, $p = 0.089$), suggesting that difficulties in naming objects or concepts may not be strongly linked to depressive symptoms. However, attention, language, abstraction, delayed recall, orientation, and the total MOCA score all exhibit significant negative correlations with HAM-D scores, indicating that higher depression severity is associated with lower performance in these cognitive domains. Specifically, attention ($\rho = -0.200$, $p = 0.018$), language ($\rho = -0.225$, $p = 0.007$), abstraction ($\rho = -0.182$, $p = 0.031$), delayed recall ($\rho = -0.166$, $p = 0.049$), orientation ($\rho = -0.124$, $p = 0.143$), and the total MOCA score ($\rho = -0.168$, $p = 0.047$) all show significant negative correlations with depression severity.

Table 1: The correlation between the Montreal Cognitive Assessment (MOCA) scores and the Hamilton Depression Rating Scale (HAM-D)

MOCA- HAM-D	Correlation co-efficient	P value
Visuospatial function	-0.053	0.537
Naming	-0.144	0.089
Attention	-0.200	0.018
Language	-0.225	0.007
Abstraction	-0.182	0.031
Delayed recall	-0.166	0.049
Orientation	-0.124	0.143
Total MOCA score	-0.168	0.047

The correlation analysis between the Montreal Cognitive Assessment (MOCA) scores and Beck's Suicide Intent Scale scores reveals several noteworthy findings. Firstly, visuospatial function and naming demonstrate weak and non-significant correlations with suicide intent, with correlation coefficients of ($\rho = -0.147$, $p = 0.083$) and ($\rho = -0.143$, $p = 0.091$) respectively, suggesting that performance on visuospatial tasks and naming abilities may not strongly correlate with suicide intent. However, attention shows a statistically significant negative correlation with suicide intent ($\rho = -0.177$, $p = 0.036$), indicating that individuals with poorer attentional abilities may have higher levels of suicide intent. Language, abstraction, delayed recall, orientation, and the total MOCA score all exhibit weak and non-significant correlations with suicide intent, with correlation coefficients ranging from -0.074 to -0.092 and p-values above 0.05. These findings suggest that while there may be some association between attentional deficits and suicide intent, other cognitive domains assessed by the MOCA, including language, abstraction, delayed recall, and orientation, may not be strongly linked to suicide intent. Additionally, the total MOCA score, reflecting overall cognitive performance, does not show a significant correlation with suicide intent.

Table 2: The correlation between the Montreal Cognitive Assessment (MOCA) scores and Beck's Suicide Intent Scale

MOCA- Becks' Suicide intent scale	Correlation coefficient	P value
Visuospatial function	-0.147	0.083
Naming	-0.143	0.091
Attention	-0.177	0.036
Language	-0.074	0.385
Abstraction	-0.049	0.563
Delayed recall	-0.027	0.749
Orientation	-0.125	0.143
Total MOCA score	-0.092	0.278

DISCUSSION

The average number of suicide attempts was 1.59 in our study, with a standard deviation of 0.688. This contrasts with the findings of a previous study conducted by Subin Park et al., [14] which categorized participants into different risk levels based on their history of suicide attempts. In that study, high-risk attempters had an average of 3.79 suicide attempts, with a standard deviation of 5.25. Medium-risk attempters had an average of 2.06 attempts, with a standard deviation of 1.90, while low-risk attempters had an average of 1.64 attempts, with a standard deviation of 1.04. Depression severity was assessed using the Hamilton Rating Scale, revealing that 79(56.4%) of participants were classified as experiencing mild depression, 33.6% as moderate, and 10% as severe. This contrasts with the findings of Islam MR et al. [15], whose study showed that 28% had mild depression, 57% had moderate depression, and 14% had severe depression. In our study, we observed that the Mean scores for HAM-D and MOCA were 15.99 (SD=5.2) and 24.17 (SD=5.702), respectively. These findings differ from those reported by Gülfizar Sözeri-Varma et al., [16] where they found mean HAM-D and MOCA scores of 20.9±4.0 and 21.1±3.1, respectively. Our research revealed a noteworthy prevalence of neurocognitive impairment among individuals (140) with depressive disorder, with 39.3% of cases exhibiting such impairment. This finding aligns with the research conducted by Husni Zaim Ab Latiff et al [17], the prevalence of neurocognitive impairment in depressive disorder was reported to be approximately 32.7%. This finding underscores the importance of recognizing and addressing neurocognitive deficits in the context of depressive disorders, as these impairments can significantly impact various aspects of an individual's functioning and overall well-being. Our study utilizing the Becks' Suicide Intent Scale revealed a predominant occurrence of medium intent among the surveyed population, comprising 71(50.7%) of cases, with low intent closely following at 50(35.7%). This distribution starkly contrasts with findings from a study conducted by Gajbhiya et al. [18], where the majority of participants exhibited no intent (74.8%), with low intent following at 17.8%. Furthermore, when examining the correlation between MOCA and HAM-D total scores in our study, we found a significant negative correlation ($\rho = -0.168$, $p = 0.047$). This suggests that as MOCA scores increase, HAM-D scores tend to decrease, indicating an association between cognitive function and depression severity. This mildly deviates from the study conducted by Gülfizar Sözeri-Varma et al., [16] where they found a correlation coefficient of $\rho = -0.158$, which was not statistically significant ($p=0.330$). Our findings indicate a significant negative correlation between neurocognitive impairment, as measured by the Montreal Cognitive Assessment (MOCA), and the No. of suicide attempts. Specifically, deficits in visuospatial function ($\rho = -0.243$, $p = 0.004$), attention ($\rho = -0.266$, $p = 0.002$), and delayed recall ($\rho = -0.257$, $p = 0.002$) were associated with a higher frequency of suicide attempts. This suggests that individuals with greater neurocognitive deficits may be at an elevated risk for engaging in suicidal attempts. This aligns with previous research by J. G. Keilp et al [19] demonstrating a similar negative correlation between cognitive performance and suicide attempts, underscoring the importance of assessing cognitive functioning in suicide risk assessment. Moreover, our investigation reveals a correlation between neurocognitive impairment and suicide intent, albeit limited to specific cognitive domains. While attention showed a significant negative correlation ($\rho = -0.177$, $p = 0.036$) with suicide intent, other domains such as visuospatial function, naming, language, abstraction, delayed recall, and orientation did not exhibit significant correlations. This suggests that certain cognitive deficits may be more closely linked to suicidal behaviour than others, highlighting the need for targeted interventions addressing cognitive vulnerabilities in suicide prevention efforts.

CONCLUSION

Our study tried to estimate the prevalence of neurocognitive impairment among individuals with depressive disorder and its profound implications for mental health outcomes, particularly concerning suicide attempts and intent. We found a significant prevalence of neurocognitive impairment, with 39.3% of individuals exhibiting such deficits. This aligns with previous research, emphasizing the critical importance of recognizing and addressing these impairments within the context of depressive disorders. Our investigation further revealed a compelling correlation between neurocognitive impairment and both the frequency and severity of suicide attempts. Specifically, deficits in visuospatial function, attention, and delayed recall were associated with a higher frequency of suicide attempts, highlighting the heightened risk among individuals with greater neurocognitive deficits. Moreover, our findings underscore the intricate relationship between neurocognitive function and suicide intent, with attentional deficits showing a significant negative correlation with suicide intent. This suggests that certain cognitive domains may be more closely linked to suicidal behaviour than others, emphasizing the need for targeted interventions addressing these specific cognitive vulnerabilities in suicide prevention efforts. Overall, our study emphasizes the multifaceted nature of depressive disorders and the critical role of neurocognitive function in shaping mental health outcomes, particularly concerning suicidal behaviour. By recognizing and addressing neurocognitive deficits, clinicians and policymakers can implement more effective interventions aimed at reducing the burden of depressive disorder and preventing suicidal attempts.

REFERENCES

- [1] Arvind BA, Gururaj G, Loganathan S, Amudhan S, Varghese M, Benegal V, Rao GN, Kokane AM, Chavan BS, Dalal PK, Ram D. Prevalence and socioeconomic impact of depressive disorders in India: multisite population-based cross-sectional study. *BMJ Open* 2019;9(6):e027250.
- [2] Liu J, Dong Q, Lu X, Sun J, Zhang L, Wang M, Wan P, Guo H, Zhao F, Ju Y, Yan D. Exploration of major cognitive deficits in medication-free patients with major depressive disorder. *Frontiers in Psychiatry* 2019;10:836.
- [3] Roca M, Del Amo AR, Riera-Serra P, Pérez-Ara M, Castro A, Roman Juan J, García-Toro M, García-Pazo P, Gili M. Suicidal risk and executive functions in major depressive disorder: a study protocol. *BMC Psychiatry* 2019;19(1):1-6.
- [4] Perini G, Cotta Ramusino M, Sinforiani E, Bernini S, Petrachi R, Costa A. Cognitive impairment in depression: recent advances and novel treatments. *Neuropsychiatric Disease And Treatment* 2019:1249-58.
- [5] World Health Organization. Depression [Internet]. Geneva: World Health Organization; 2022 [cited 2024 March 12]. Available from: <https://www.who.int/news-room/fact-sheets/detail/depression>.
- [6] Dombrovski AY, Szanto K, Clark L, Reynolds CF, Siegle GJ. Reward signals, attempted suicide, and impulsivity in late-life depression. *JAMA Psychiatry* 2013;70(10):1020-30.
- [7] Keilp JG, Gorlyn M, Russell M, Oquendo MA, Burke AK, Harkavy-Friedman J, Mann JJ. Neuropsychological function and suicidal behaviour: attention control, memory and executive dysfunction in suicide attempt. *Psychological Medicine* 2013;43(3):539-51.
- [8] Beck AT, Kovacs M, Weissman A. Assessment of suicidal intention: the Scale for Suicide Ideation. *Journal Of Consulting And Clinical Psychology* 1979;47(2):343.
- [9] Hamilton M. A rating scale for depression. *Journal Of Neurology, Neurosurgery, And Psychiatry* 1960;23(1):56.
- [10] McLennan SN, Mathias JL, Brennan LC, Stewart S. Validity of the Montreal cognitive assessment (MoCA) as a screening test for mild cognitive impairment (MCI) in a cardio vascular population. *Journal Of Geriatric Psychiatry And Neurology* 2011;24(1):33-8.
- [11] Nasreddine ZS, Phillips NA, Bédirian V, Charbonneau S, Whitehead V, Collin I, Cummings JL, Chertkow H. The Montreal Cognitive Assessment, MoCA: a brief screening tool for mild cognitive impairment. *Journal of the American Geriatrics Society* 2005;53(4):695-9.
- [12] Beck AT, Schuyler D, Herman I. Development of suicidal intent scales. Charles Press.
- [13] Iannuzzo RW, Jaeger J, Goldberg JF, Kafantaris V, Sublette ME. Development and reliability of the HAM-D/MADRS interview: an integrated depression symptom rating scale. *Psychiatry Research* 2006;145(1):21-37
- [14] Park S, Lee Y, Youn T, Kim BS, Park JI, Kim H, Lee HC, Hong JP. Association between level of suicide risk, characteristics of suicide attempts, and mental disorders among suicide attempters. *BMC Public Health* 2018;18:1-7.

- [15] Islam MR, Adnan R. Socio-demographic factors and their correlation with the severity of major depressive disorder: a population based study. *World Journal of Neuroscience* 2017;7(02):193.
- [16] Sözeri-Varma G, Bingöl C, Topak OZ, Enli Y, Özdel O. Relationship of apathy with depressive symptom severity and cognitive functions in geriatric depression. *Archives of Neuropsychiatry* 2019;56(2):133
- [17] Ab Latiff HZ, Ariaratnam S, Shuib N, Isa MR. Cognitive Decline and Its Associated Factors in Patients with Major Depressive Disorder. In *Healthcare* 2023;11(7):950
- [18] Gajbhiya AM, Menon P, Chaudhury S, Saldanha D. Assessment of suicidal ideation in psychiatry outpatient department patients: A cross-sectional study. *Medical Journal of Dr. DY Patil University* 2022;15(2):180-8.
- [19] Keilp JG, Gorlyn M, Russell M, Oquendo MA, Burke AK, Harkavy-Friedman J, Mann JJ. Neuropsychological function and suicidal behavior: attention control, memory and executive dysfunction in suicide attempt. *Psychological Medicine* 2013;43(3):539-51.