Original Article

The Association of Depression and Quality of Life in Patients with Neurocognitive Disorder in a Tertiary Care Center: An Observational Study

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Abstract

Objective: Depression can be a psychological reaction of a patient toward the diagnosis of neurocognitive disorder, and it can be a part of the complex biological response involving both illnesses. Both depression and neurocognitive disorders can cause low quality of life (QoL), especially in the elderly population. In this present study, we intended to assess the association of depression and the QoL among patients suffering from mild to major neurocognitive disorder at a tertiary hospital. **Methods:** This observational study was carried out at the department of psychiatry in a tertiary care hospital, among 100 patients, whose diagnosis was made according to *DSM-5* criteria for mild to major neurocognitive disorder. Patients were administered semi-structured pro forma for collection of sociodemographic data, Addenbrooke'sCognitive Examination III R, Mini-Mental State Examination (MMSE) to assess the severity of mild and major neurocognitive disorders, Cornell Scale for Depression in Dementia was administered to assess the depression, World Health Organization (WHO) QoL-BREF Scale to assess the QoL among patients with mild to major neurocognitive disorders. **Results:** The mean age ± standard deviation of the study population was 70.31 ± 6.9 years. The sum of 43.3% of the study population belonged to the category of mild cognitive impairment, 46.7% the moderate, and 10% the severe type of cognitive impairment. The sum of 29.2% of the study population had depressive episodes, and 6.7% of the study population belonged to the category of definite major depression. Domain 2 of WHO QoL-BREF was maximum affected by mild and major neurocognitive disorders ($p < 0.001$). **Conclusion:** This study found that majority of the patients with neurocognitive disorders was affected by higher levels of depressive scores with a remarkable decrease in their QoL. Compared to neurodegenerative disorders, depression is much easily been effectively treated, this study stresses the importance of the aggressive diagnosis and treatment for depression for all patients with neurocognitive disorder.

Key words: quality of life, geriatric population, Mini-Mental State Examination, Addenbrooke's Cognitive Examination

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Introduction

The World Health Organization (WHO) estimated that the combined population of senior and geriatric population will be around 2.1 billion by 2050 [1]. It was estimated that about 40 million people are already suffering from mild and major neurocognitive disorders [2]. The prevalence of mild neurocognitive disorder is 10%–15% in the general population [3].

Many studies have found that higher age, lower education, family history of dementia, depression, gender, history of trauma, substance abuse, medical comorbidities like hypertension, type 2 diabetes, history of any cardiac or neurological events like trauma, CAD has some role in precipitating mild and major neurocognitive disorders [4, 5]. The interaction between genetic and environmental factors might play a crucial rôle, which most of the time goes unnoticed [6].

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Behavioral disturbances depend on the type of mild and major neurocognitive disorders [7]. The major behavioral disturbances include depression (58%), anxiety (49%), personality changes (45%), psychosis (44%), apathy (36%), sleep disturbances (34%), as well as agitation and aggression (30%) [8]. There is an associated risk of wandering when the disease progresses along with disinhibited behavior [9].

Depression is one of the common mental disorders in old adults, and it has got a multilevel impact on life [10]. Depression increases the burden of life and worsens the disability, and it also has an impact on physical comorbidities, resulting in poor self-care, irregular medication, and follow-up of patients [11]. Lack of social support and loneliness play an important rôle in the poor management of depression, especially in late-life depression [12-14].

A major depressive disorder is one of the most chronic and disabling diseases. It was found that recurrent depressive disorder is ranked in the fourth position among the most disabling disorders [15]. If it is accompanied by an anxiety disorder, substance abuse, hypothyroidism, dysthymia, and neurocognitive disorders, then it has been found to have a poorer prognosis [16]. No difference exists in outcome between younger (under 40 years), middle-aged (40–59 years), older (≥ 60 years), and depressed patients if they are properly managed [17]. But it was found that depression in elderly people was found to be lasting long, recurring, and most of the time it is under treated [18]. Usually, nondysphoric depression is commonly observed in patients with mild and major neurocognitive disorders [19].

Quality of life (QoL) as defined by the WHO covers the psychological and social aspects, cultural beliefs, level of independence, and their relationship to family, society, and environmental conditions [20]. Physical functioning is important, and it places an important role in the QoL of the patient [21]. It is important to have multicomponent interventions which would help improve the physical functioning and would improve the QoL, especially in a patient with a mild and major neurocognitive disorder, irrespective of the stage of illness [22].

When the patient suffers from both depression and major neurocognitive disorder, their QoL will be severely impaired. People with behavioral and psychological symptoms of dementia get a negative impact on the QoL of the patient [23]. In caregiver ratings, depression and irritability predicted lower QoL, while delusion and apathy indicated lower patient ratings [24].

Understanding the prevalence of neuropsychiatric manifestations and QoL will be useful for the clinicians, the individual, and the family members as it will help in additional monitoring giving support, care, and treatment as required. Assessment of QoL in this group will assist in intervention and treatment strategies, help improve treatment outcomes, and establish effective rehabilitation strategies. There are few studies in India regarding depression, QoL of life, and neurocognitive disorders. Hence, this study was undertaken in our department.

Methods

Study patients

This study was done in a geriatric psychiatric clinic, Department of Psychiatry and Department of Neurology, Narayana Medical College and Hospital. We recruited 100 consecutive patients attending the outpatient into the study. The Institutional Ethics Committee of Narayana Medical College approved the study protocol (protocol number = No. NMC/Adm/Ethics and date of acceptance = March 12, 2020), requiring to obtain signed informed consent from the study patients. This was a hospital-based cross-sectional study. The study duration was 18 months between January 2021 and June 2022.

Inclusion and exclusion criteria of study patients

We recruited patients who were (a) age above 60 years, (b) attending outpatient clinics with their caregiver, (c) fulfilling the *DSM-5* criteria for mild and major neurocognitive disorders, (d) being both males and females, and (e) willing to give informed consent in both patients and relatives.

Excluded from participating in this study were patients who (a) were suffering from other comorbid psychiatric disorders, (b) did not have any primary caregivers, and (c) were not willing to give signed informed consent.

Instruments

Semi-structured pro forma

The pro forma has details regarding the sociodemographic and clinical variables.

The Mini-Mental State Examination

Mini-Mental State Examination (MMSE) is a 30-point questionnaire that is used to measure the severity of cognitive impairment. It is used to estimate the severity and progression of cognitive impairment and to follow the course of cognitive changes in an individual over time. The total score is 30 points, out of which a score below 25 – is mild, below 20 – moderate, and below 10 – severe cognitive impairment [25].

Addenbrooke's Cognitive Examination III R

Addenbrooke's Cognitive Examination (ACE) is a neuropsychological test used to identify cognitive impairment. It was developed at the Cambridge memory clinic as a motivated extension of MMSE. This consists of 19 activities which test five cognitive domains which include attention, memory, fluency, language, and visuospatial processing. The total score is 100, the cutoff point is 82, and lowering score denotes severity [26].

Cornell Scale for Depression in Dementia

Cornell Scale for Depression in Dementia (CSDD) was specifically developed to assess the signs and symptoms of major depression in patients with dementia. It was developed by Alexopoulos et al. [27]. CSDD is a 19-questionnaire scale

where both caregiver and patient are interviewed separately. Each item is rated for severity on a scale of 0–2. The maximum score is 38, and the minimum is 0. A score of more than 10 means probable major depression. Moreover, above 18 means definite major depression [27].

World Health Organization - QoL - BREF

It is a four-domain rating scale. This scale contains 26 items. Domain scores are scaled in a positive direction; the higher score denotes the higher QoL on a five-point scale [28, 29].

Data collection procedures

Subjects were selected based on inclusion and exclusion criteria. Informed consent was obtained, and sociodemographic and clinical details were recorded using the pro forma designed for the study. Subjects received an assessment of MMSE and ACE for the severity of mild and major neurocognitive disorders. CSDD was used to assess depression, and WHO-QoL-BREF was used to assess the QoL among patients.

Statistical analysis

In the present study, the investigator uses parametric and nonparametric tests for identifying the significant difference between variables. Quantitative data were summarized as mean and standard deviation (SD). Qualitative data were expressed in proportions and percentages. Age and duration of illness with the severity of neurocognitive disorders were calculated by using the Chi-square test. Correlation between QoL domain scores and ACE score by using Spearman correlation. QoL of depressed and nondepressed was compared among the patients with neurocognitive disorder using Mann–Whitney U test.

In this study, we used Microsoft Excel and Statistical Package for the Social Sciences software version 25 for Windows (SPSS Inc., Chicago, Illinois, USA) to compute all study variables. The differences between groups were considered significant if *p*-values were lesser than 0.05.

Results

Table 1 lists the sociodemographic and illness-related variables of 100 study patients. The mean age of the sample included in this study was 70.31 ± 6.88 years. The most common age group of patients who participated in the study was above 70 years. Fifty-two patients were from this age group, contributing 52%. The youngest study subject was 56 years old and the oldest was 82 years. The sum of 40% of patients in the study was female and 60% were male. All subjects were literate. Only 20% had completed graduation or postgraduation. Almost 58% of the study population had medical comorbidities. Forty-three percent of the study population belonged to the mild cognitive impairment category. The sum of 47% belonged to moderate and 10% of the study population belonged to the severe cognitive impairment category.

Table 2 shows that the mean ± SD was 18.18 ± 4.104 for the MMSE score, 64.18 ± 12.523 for the ACE score, and 9.83 ± 6.10 for the CSDD score.

Table 3 describes the age and severity of the neurocognitive function of the study patients. The significant difference between age and neurocognitive function was found ($p < 0.01$).

Table 4 describes the duration of illness and severity of neurocognitive function of the study patients. The significant difference between duration of illness and neurocognitive function was found ($p < 0.001$).

Table 5 describes QoL and the status of depression of the study patients. The significant differences between QoL and

Table 1. Sociodemographic and illness-related variables of the study patients ($n = 100$)

Variable	*n* (%)
Age group, years	
51-60	13 (13)
61-70	35 (35)
> 70	52 (52)
Gender	
Male	60 (60)
Female	40 (40)
Education	
Up to high school	30 (30)
High school to inter	53 (53)
Degree and above	17 (17)
Past occupation	
Laborer	15 (15)
Farmer	25 (25)
Housewife	29 (29)
Nonprofessional/skilled	24 (24)
Professional	7 (7)
Marital status	
Unmarried	2 (2)
Married	76 (76)
Separated/divorced	2 (2)
Widow/died	20 (20)
Residence	
Rural	57 (57)
Urban	43 (43)
Medical comorbidities	
Yes	58 (58)
No	42 (42)
The severity of neurocognitive disorder	
Mild	43 (43)
Moderate	47 (47)
Severe	10 (10)

Table 2. Mean scores of Mini-Mental State Examination, Addenbrooke's Cognitive Examination, and Cornell Scale for Depression in Dementia of the study population ($n = 100$)

	Mean ± SD
MMSE	18.18 ± 4.104
ACE	64.18 ± 12.523
CSDD	9.83 ± 6.10

MMSE, Mini-Mental State Examination; ACE, Addenbrooke's Cognitive Examination; CSDD, Cornell Scale for Depression in Dementia; SD, standard deviation

Table 3. Age with the severity of mild and major neurocognitive disorders

Age group (years)	Mild	Moderate	Severe	χ^2
51-60	10	3	0	15.84**
61-70	14	14	7	
> 70	19	30	3	

*$p < 0.05$; **$p < 0.01$, significantly different in age groups and severity of neurocognitive function

Table 4. Duration of illness with the severity of mild and major neurocognitive disorders

Duration of illness (years)	Level of MMSE			χ^2
	Mild	Moderate	Severe	
0-4	36	13	0	70.36***
5-8	7	27	3	
9-12	0	6	4	
> 12	0	1	3	

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$, significantly different in duration of illness and severity of neurocognitive function.
MMSE, Mini-Mental State Examination

Table 5. Quality of life and depression status

QoL domain	Mean rank	Mann-Whitney *U*-score
Domain 1		
Depression present	32.93	522.5***
No depression	71.85	
Domain 2		
Depression present	22.81	168.5***
No depression	76.02	
Domain 3		
Depression present	27.29	325***
No depression	74.10	
Domain 4		
Depression present	24.54	299***
No depression	74.48	

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$, significantly different in all four domains between QoL and depression status using the Mann-Whitney *U*-test. QoL, quality of life

patients' status of depression in all four QoL domains were found ($p < 0.001$).

Table 6 describes the correlation between the severity of depression versus the severity of neurocognitive disorders (ACE). The ACE score was found to have a moderate negative correlation with the CSDD score.

Table 7 compares the severity of depression and the severity of neurocognitive function. For mild to moderate category of cognitive impairment, CSDD scores were increased, which was found to be significant ($p < 0.001$). for the moderate to severe category of cognitive impairment, CSDD score decreases, which was also significant ($p < 0.001$) when cognitive impairment was advanced from mild to moderate, a significant association existed with an increase in depression severity. But, when cognitive impairment advances from moderate to severe, a significant association existed with a decrease in depression severity.

Discussion

It was estimated that around 35 million people are already suffering from mild and major neurocognitive disorders [12]. In the present study, we intended to estimate the prevalence of depression and assessment of the QoL among patients with mild and major neurocognitive disorders, and to determine the association between the severity of depression with mild and major neurocognitive disorders. Another objective was to determine the association between QoL and the severity of mild and major neurocognitive disorders.

The mean age of the study population was 70.31 ± 6.9 years (Table 3). The youngest study subject had the age of 56 years, and the eldest one was 82 years. Totally, 52.5% of the study population was above the age of 70 years, and 60% of the study population were male, and 40% were female. Urban and rural population studies by Haggerty JJ [30] and Arnold et al. [31] reported an increased female preponderance. This gender difference may be due to the difference in the study setting. Our study was a hospital-based study, whereas shaji et al.'s study [17] was community based.

In our study (Table 5), QoL was found to have a significant correlation with the severity of mild and major neurocognitive disorders ($p < 0.001$). This finding is similar to that of the caregiver study done by Conde-Sala et al. [32]. Barca et al. reported that QoL is poor in patients with low MMSE score, which was similar to our result [24]. Multiple regression analysis done by Winter et al. showed that the MMSE score can be considered an independent predictive factor of depression severity [33].

From our study (Table 5), we found that patients with both depression and mild and major neurocognitive disorders had poor QoL in all domains which is similar to the result obtained by Winter et al. [33].

Regarding the QoL domain subscores, domain 2 (psychological domain) (8.79 ± 0.989) was the most affected domain (Table 5). The second most affected domain was 3 (social interactions) (8.86 ± 1.649), which involves personal relation and social support. Domain 4 (environmental domain) (9.87 ± 1.28) and Domain 1 (physical domain) (10.59 ± 1.66) was the least affected domain. Our study findings showed significant associations ($p < 0.001$) in all four domains. Those findings are similar to those done by Nikmat et al. [34]. They also found that health and physical conditions do not affect the QoL [35].

The presence of depression in patients with mild and major neurocognitive disorders had a significant association with each domain scores and the scores were 8.43 ± 1.7 (domain 1), 6.43 ± 1.1 (domain 2), 5.91 ± 1.4 (domain 3), and 7.71 ± 1.07 (domain 4). The maximum affected domain was domain 3 (Table 5). A Dutch study by ten Doesschate et al. [35], assessing QoL, found that level of depressive features corresponds to a

Table 6. Correlation between the severity of depression versus severity of neurocognitive disorders (Addenbrooke's Cognitive Examination)

ACE score CSDD score	Mean	Spearman's rho
Yes	52.00	−0.551
No	69.19	

The ACE score was found to have a moderate negative correlation with the CSDD score. Spearman's correlation coefficient was −0.551.
ACE, Addenbrooke's Cognitive Examination; CSDD, Cornell Scale for Depression in Dementia

Table 7. Association between severity of depression versus severity of neurocognitive disorder (Mini-Mental State Examination)

	n	Mean ± SD	Mean difference	SE	*t*
Mild	43	5.6731 ± 1.71179	−7.684	0.237	32.369***
Moderate	47	13.3571 ± 6.94505	−5.743	6.188	6.1887***
Severe	10	11.4167 ± 0.51493	1.940	0.148	13.0542***

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$, significantly different in all three levels of severity between severity of depression and neurocognitive function.
SD, standard deviation; SE, standard error

decrease in the domains of QoL. That finding is similar to the study. Hurt et al. [23] found that the presence of depression predicts a lower QoL and Naumann and Byrne [36] study found that QoL scores are strongly correlated with the severity of depression in all domains.

Our study results were similar to those done by Sheline et al. [37] who found that depression worsens cognition and would increase the processing speed of degradation.

Study limitations

The readers are cautioned not to overinterpret the study results because this study has four major limitations:

- This study was done at a single geriatric psychiatric clinic, Department of Psychiatry and Department of Neurology, Narayana Medical College and Hospital, Nellore, Andhra Pradesh, India. The generalization of the findings to the whole nation of India is limited.
- The selection of study patients was consecutively recruited. No effort of randomization was done. Therefore, the representation of a typical patient is doubtful.
- The study had only 100 samples; a larger sample size would be required for a better generalization of the results
- No control group was included, so a comparison with age/sex-matched normal individuals was not possible.

Summary

This study has been found that majority of the patients with neurocognitive disorders affected by higher levels of depressive scores with a significant decrease in their QoL. Compared to neurodegenerative disorders, depression is much easily been effectively treated, and this study stresses the importance of the aggressive diagnosis and treatment for depression for all patients with neurocognitive disorders.

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Conflicts of Interest

The authors declare no conflicts of interest in writing this article.

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