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Prevalence of Psychiatric Co-Morbidities in Patients with Dementia: A Prospective Study

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Abstract
Introduction: *Dementia can be defined as a clinical syndrome comprising of cognitive decline which is sufficient to interfere with social and occupational functioning. Though it etiopathogenesis is complex increasing age appears to be one of the most significant risk factors associated with dementia. Cognitive impairment and affective-behavioral changes also called as Behavioral and psychological symptoms of dementia (BPSD) are two major neuro-psychological problems seen in patients with dementia and their management is an essential component of patients with dementia. The diagnosis of dementia is usually clinical and diagnostic functional imaging studies only have a supportive role in the diagnosis. Management depends upon the etiology and outcome is better in patients with reversible causes of dementia. We conducted this study to find the prevalence of psychiatric co-morbidity among the patients with various type of dementia.*
Materials and Methods: *The present study was a cross sectional study, conducted in Neurology and Psychiatry Department in a tertiary care centre in Thanjavur. 30 subjects of more than 50 years of age and having dementia (using DSM –V criteria) were included in this study on the basis of a predefined inclusion and exclusion criteria. Socio-demographic details were noted in all the cases. Hachinski's Ischemic Score was used to differentiate between vascular and other type of dementia. Folstein's Mini-Mental Score10 was applied to identify the severity of cognitive impairment in Dementia. Distribution of psychiatric and behavioral disturbances in various types of Dementia was studied. Results were tabulated and statistically analyzed using Chi-Square Test, T-Test and One way ANOVA. P value less than 0.05 was taken as statistically significant.*
Results: *Out of 30 studied cases there were 13 (43.33%) males and 17 (56.67%) females with a M:F ratio of 1:1.30.The most common cause of dementia in studied cases was found to be Alzheimer's disease which was seen in 21(70%) patients. The other causes of dementia were found to be vascular dementia (13.3%) Fronto-temporal Dementia (13.3%) and Lewy Body Dementia (3.3%).The mean MMSE score in Alzheimer's Dementia was found to be 8.48 whereas in vascular, Fronto-temporal and Lewy Body Dementia the mean MMSE score was found to be 9.75, 10.75 and 18.0 respectively. Based on the MMSE scores, there were 13*

patients in moderate cognitive impairment and 17 patients with severe cognitive impairment. Alzheimer's Dementia patients had significant NPI scores in the areas of apathy, delusion, aggression, irritability, depression, euphoria, hallucination, disinhibition and motor disturbances. Vascular Dementia patients had significant NPI scores in the areas of depression, irritability, apathy and aggression. Fronto-temporal Dementia patients had significant NPI scores in the areas of aggression, disinhibition, irritability, depression, euphoria and motor disturbances. Lewy Body Dementia patient had significant NPI scores in the areas of hallucination, apathy and depression.

Conclusion: *Alzheimer's Dementia, Lewy Body Dementia and fronto-temporal Dementia have different patterns of neuropsychiatric manifestations. The distinctive neuropsychiatric pattern may correspond to different patterns of cerebral involvement characteristic to this dementia which in turn help in deciding appropriate management strategy.*

Keywords: *Dementia, Alzheimer's disease, neuro-psychological manifestations, Management.*

Introduction

Dementia can be defined as a clinical syndrome comprising of cognitive decline which is sufficient to interfere with social and occupational functioning[1]. It is an emerging problem not only in developed countries but also in developing countries like India along with transition towards ageing. Increasing age appears to be one of the most significant risk factors for dementia. It remains a severely underdiagnosed condition because its diagnosis is usually clinical and there are no definitive tests to objectively diagnose it[2].

The etiological causes of dementia are varied. Types of dementia are Alzheimer's disease, dementia with Lewy bodies, and fronto-temporal dementia, which is subdivided into the behavioral variant, the semantic variant and nonfluent variant. Numerous other neurodegenerative illnesses have an associated dementia, including corticobasal degeneration, Creutzfeldt–Jakob disease, Huntington's disease, progressive supranuclear palsy, multiple system atrophy, Parkinson's disease dementia, and amyotrophic lateral sclerosis. Vascular dementia and AIDS dementia are secondary dementias[3].

Dementia mainly consists of two major neuro-psychological problems namely cognitive impairment and affective-behavioral changes also called as Behavioural and psychological symptoms of dementia (BPSD). BPSD is defined as a heterogeneous range of psychological reactions, psychiatric symptoms and behaviour occurring in people with dementia of any etiology. It ranges from psychotic features and depressive symptoms to a series of other behaviors such as agitation, aggression and disinhibition. Spalletta G et.al[4] in a study suggested that both cognition and behaviour are independent dimensions, but they can influence each other. Such disturbances are associated with early hospitalization, poor prognosis, greater cost and are a cause of concern and burden to the care givers. Assessment of BPSD helps in evaluating the severity of the disease, morbidity, care needs and disease progression. The assessment presents particular difficulty since both cognitive deficits and lack of insight may make the history from patient unreliable and mostly depends upon interview with caregivers. Moreover since the incidence of dementia increases with advancing age presence of co-morbidities makes the medical management difficult due to relative contraindications to drugs. Remarkable improvement in patients' functional abilities can be achieved if BPSD are properly managed[5].

The diagnosis of dementia is usually clinical and diagnostic functional imaging studies only have a supportive role in the diagnosis. The primary role of imaging is to rule out the causes of secondary dementia and historically imaging has been used to diagnose conditions which may have dementia as one of the presenting complaints such as presence of intracranial space occupying lesions, infarcts, cortical atrophy, senile degeneration and some infectious pathology. With recent advances in imaging technique complex imaging techniques such as structural, functional, and molecular imaging is being increasingly undertaken[6].

The management of dementia depends upon etiology and outcome in relatively younger patients with potentially reversible causes of dementia the treatment may have a very good outcome whereas in older individuals with irreversible causes of dementia the outcome is generally poor. Irrespective of the etiology of dementia the management of Behavioral and psychological symptoms of dementia is an essential part of management[7]. We conducted this study to analyse theprevalence of psychiatric co-morbidity among the patients with various type of dementia.

Materials and Methods

The present study was a cross sectional study, conducted in Neurology and Psychiatry Department in a tertiary care centre in Thanjavur. The samples consists of 30 subjects randomly selected from both in-patient and out-patient population, with a provisional diagnosis of Dementia. Informed consent was obtained from all the subjects and the informant. Socio-Demographic data such as age, gender, educational qualification, type of family and marital status of the patients were was collected using a structured proforma. Patients having any exclusion criteria were excluded from the study. A provisional diagnosis of Dementia was made using DSM –V criteria and the type of dementia was determined based on history, clinical examination and investigations like imaging and DSM – V criteria[8]. Hachinski's Ischemic Score was used to differentiate between vascular and other type of demntia[9].

Table 1: Hachinski's Ischemic Score

Sr.No	Item Description	Score
1	Abrupt onset	1
2	Stepwise deterioration	1
3	Fluctuating course	1
4	Nocturnal confusion	2
5	Relative preservation of personality	2
6	Depression	2
7	Somatic Symptoms	2
8	Emotional incontinence	1
9	History of hypertension	2
10	History of stroke	1
11	Evidence of Associated atherosclerosis	2
12	Focal Neurological Symptoms	1
13	Focal Neurological Signs	1
	Total Score	**19**
< 4=Alzheimer's disease 4-7 Mixed Form >7 = Vascular Dementia		

Folstein's Mini-Mental Score[10] was applied to identify the severity of cognitive impairment in Dementia. It consisted of 11 questions which measures orientation, registration, attention and calculation, recall and language. A score of 19-24 indicates mild impairment, 10-18 indicates moderate impairment and less than 9 indicates severe impairment. Patients with moderate and severe cognitive impairment in MMSE score were included in the study. Neuro Psychiatric Inventory (NPI)[11], an established comprehensive tool for assessment of psychiatric and behavioural abnormalities in Dementia, was applied to all the subjects. In the NPI, the following behavioral and psychotic changes in dementia were rated on the basis of the patient's condition in the past one month before the interview: delusions, hallucination, depression, anxiety, agitation and aggression, disinhibition, euphoria, irritability and liability, apathy and aberrant motor behavior. According to the criteria based rating scheme, the severity of each manifestation was classified into grades (from 1 to 3; 0 if absent), and frequency of each manifestation was also classified into grades (from 1to 4; 0 if absent). The NPI score (severity x frequency) was calculated for each manifestation (range of possible score, 0-12).The maximum total score is 120. Distributions of psychiatric and behavioural disturbances in various types of Dementia were studied. Results were tabulated and statistically analyzed using Chi-Square Test, T-Test and One way ANOVA. P value less than 0.05 was taken as statistically significant.

Inclusion criteria

1. Age of the patient should be 50 years or above.
2. Patients who qualify for the diagnosis of Dementia based on DSM 5 criteria.

3. Patients with moderate and severe cognitive impairment with MMSE cut off score of less than 20.
4. Informed consent was obtained from patients as well as care-givers.

Exclusion criteria

1. Individuals less than 50 years of age.
2. Complications of other neurological disease.
3. History of previous psychiatric illness.
4. Evidence of intracranial space occupying lesion on imaging.
5. Absence of reliable informant.
6. Patient or care-giver refused consent.

Results

We conducted this study to analyze Socio-Demographic factors and Clinical Presentation of Dementia in Elderly. In this study out of 30 patients 13 (43.33%) were males and 17 (56.67%) were females with a M:F ratio of 1:1.30.

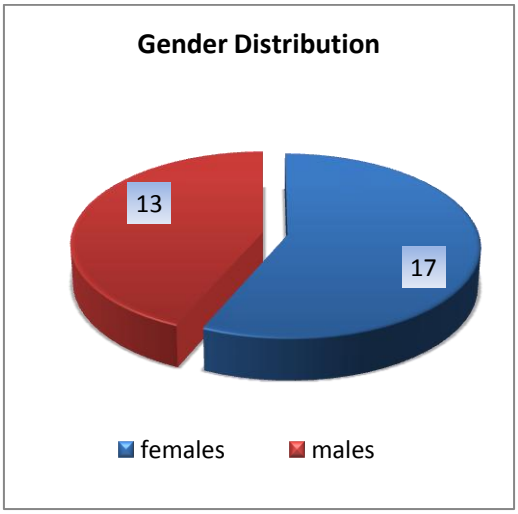

Figure 1 Gender Distribution of the studied cases.

The analyses of socio-demographic factors of the studied cases showed that amongst the studied cases 18 (60%) were literate whereas 12 (40%) patients were illiterate. The marital status showed that 29 (96.7%) were married whereas only 1 (3.33%) patient was unmarried. Most of the cases (63.3%) were living in joint family whereas 11 (36.7%) patients were living in nuclear family.

Table 2: Distribution of Socio Demographic variables of patients with dementia

	No. Of Patients	Percentage
	Education	
Illiterate	12	40.0
Literate	18	60.0
Total	30	100.0
	Marital Status	
Unmarried	1	3.3
Married	29	96.7
Total	30	100.0
	Type Of Family	
Nuclear	11	36.7
Joint	19	63.3
Total	30	100.0

The most common cause of dementia in studied cases was found to be Alzheimer's disease which was seen in 21(70%) patients. The other causes of dementia were found to be vascular dementia (13.3%) Fronto-temporal Dementia (13.3%) and Lewy Body Dementia (3.3%).

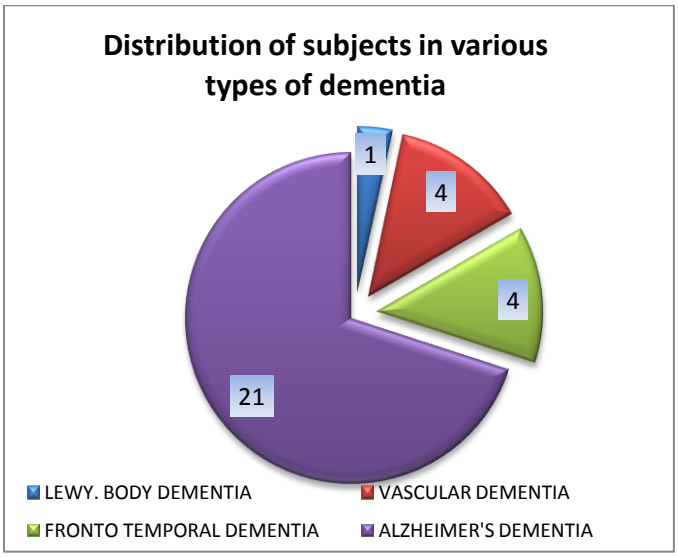

Figure 2: showing the frequency distribution of number of subjects in various types of Dementia

The mean age of the studied cases was found to be 67.93±6.77 years. In Alzheimer's Dementia there were 21 subjects - 8 were males and 13 were females with a mean age of 68.14± 7.2, Vascular Dementia there were 4 subjects - 1 was a male and 3 were females with mean age of 65.0 ± 4.08, in Fronto-temporal dementia all the 4 subjects were males with mean age of 71.25±6.292 and only one female was with Lewy Body Dementia with a mean age of 62 years.

Table 3: Mean Age and Gender Distribution In various types of dementia

Dementia	Age	Male:Female
Alzheimer's Dementia	68.14±7.23	8:13
Vascular Dementia	65±4.08	1:3
Fronto-temporal Dementia	71.25±6.292	4
Lewy Body Dementia	62	1
Total	67.93±6.77	13:17
Statistical Inference	P= 0.496 Not Significant	P=0.079 Not Significant

The mean MMSE score in Alzheimer's Dementia was found to be 8.48 whereas in vascular, Fronto-temporal and Lewy Body Dementia the mean MMSE score was found to be 9.75, 10.75 and 18.0 respectively. The difference in mean MMSE score was found to be statistically "not significant".

Table 4: Mean MMSE scores in various types of dementia

	Mean MMSE	Minimum Score	Maximum Score	Statistical Inference
Alzheimer's	8.48	3	16	P=0.052 Not Significant
Vascular Dementia	9.75	8	12	
Fronto-temporal Dementia	10.75	8	14	
Lewy Body Dementia	18			

Based on the MMSE scores, there were 13 patients in moderate cognitive impairment and 17 patients with severe cognitive impairment.

Table 5: Severity of cognitive impairment using MMSE

	MMSE Severity						Statistical Inference
	Moderate		Severe		Total		
	n	%	N	%	n	%	
Alzheimer's	10	76.9%	11	64.7%	21	70.00%	X^2=1.542 Df=3 P= 0.673 (Not Significant)
Vascular Dementia	1	7.7%	3	17.6%	4	13.33%	
Fronto-temporal Dementia	2	15.4%	2	11.8%	4	13.33%	
Lewy Body Dementia	0	0.00%	1	5.9%	1	3.33%	
Total	13	100%	17	100%	30	100.00%	

The mean Total NPI score in Alzheimer's Dementia and Vascular Dementia was 5.3 and 11.25 respectively. Fronto-temporal and Lewy Body Dementia had NPI score of 16.75 and 21.Alzheimer's Dementia patients had significant NPI scores in the areas of apathy, delusion, aggression, irritability, depression, euphoria, hallucination, disinhibition and motor disturbances. Vascular Dementia patients had significant NPI scores in the areas of depression, irritability, apathy and aggression. Fronto-temporal Dementia patients had significant NPI scores in the areas of aggression, disinhibition, irritability, depression, euphoria and motor disturbances. Lewy Body Dementia patient had significant NPI scores in the areas of hallucination, apathy and depression. One-way ANOVA revealed significant group differences for hallucination (F value = 13.52, p value < 0.05), aggression (F value = 9.001, p value < 0.05), depression (F value = 8.018, p value < 0.05), disinhibition (F value = 6.08, p value < 0.05) and irritability (F value = 3.745, p value < 0.05).

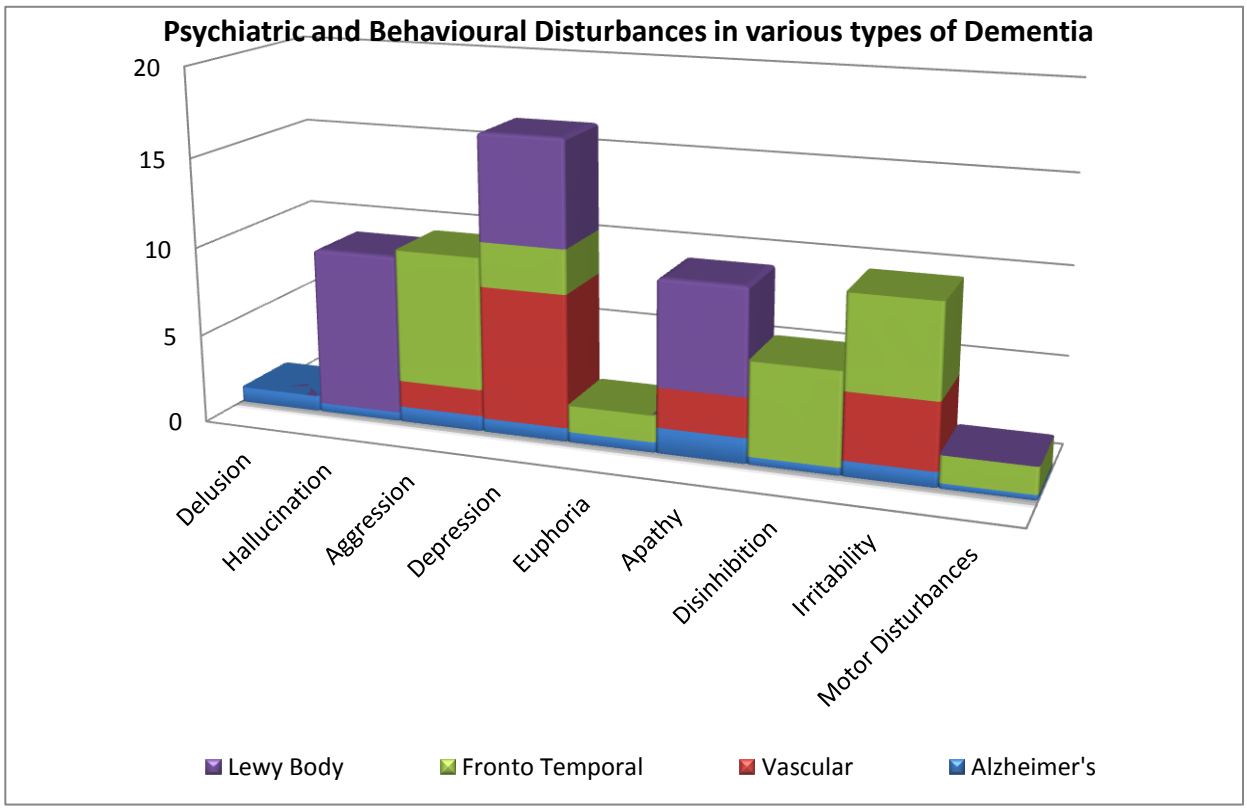

Figure 3: Distribution of psychiatric and behavioral disturbances in various types of Dementia

The frequency and severity of each neuropsychiatric symptom was compared with the severity of MMSE score. The mean NPI scores of aggression, depression, irritability, hallucination were high in patients with moderate cognitive impairment and the mean NPI scores of delusion, euphoria, apathy, disinhibition and aberrant motor behavior were high in severe cognitive impairment.

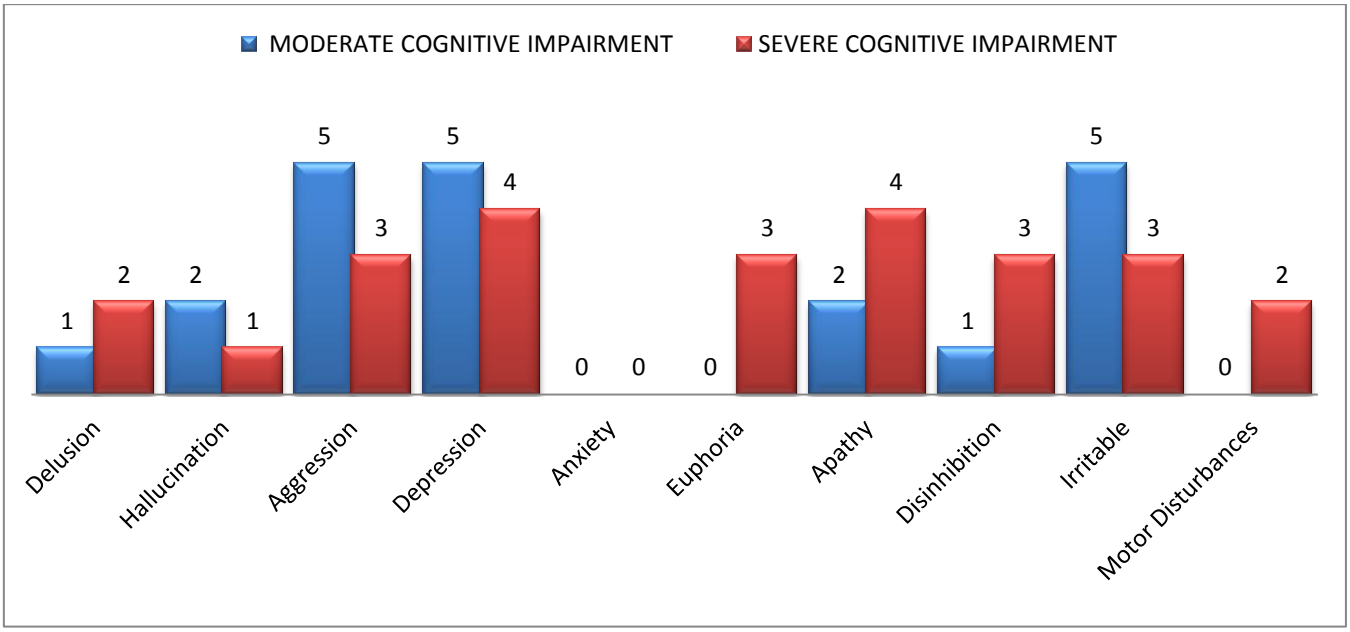

Figure 4: Frequency of each behavioral and psychiatric symptom based on the severity of cognitive impairment.

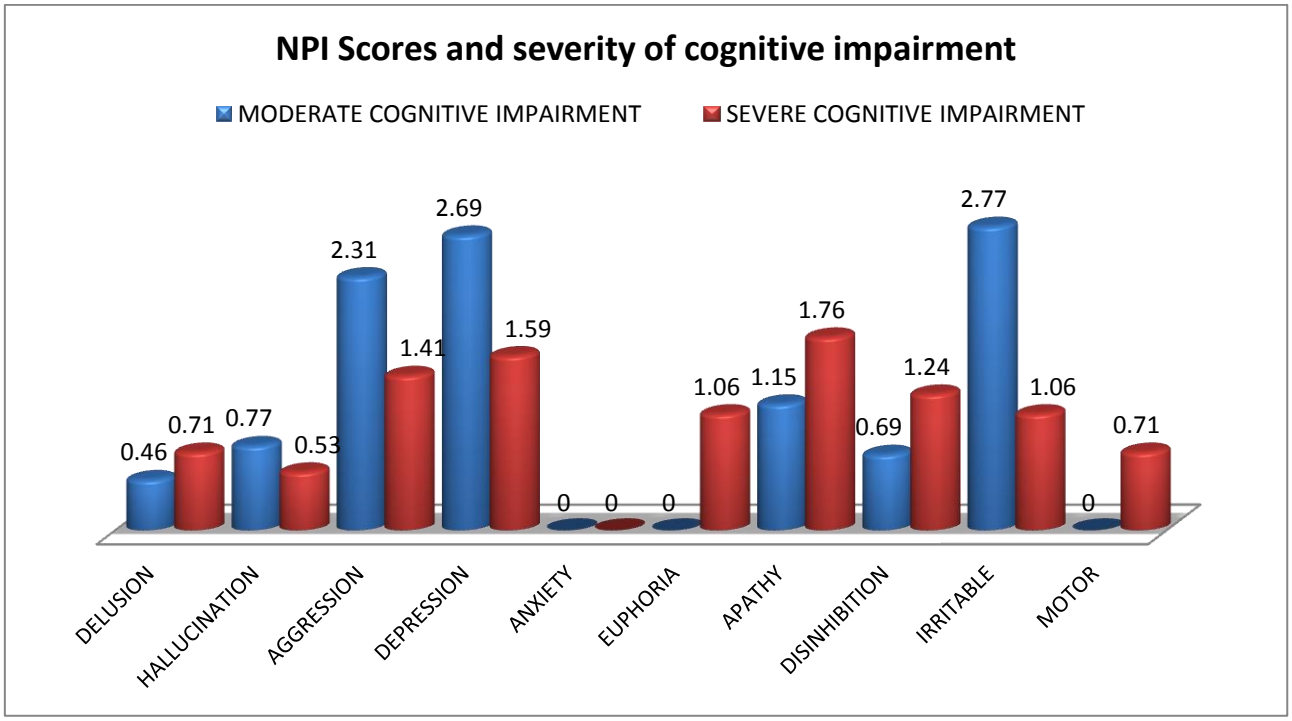

Figure 5: Severity of each behavioural symptom based on NPI score in moderate and severe cognitive impairment

Discussion

Our study results show that aggression, depression, irritability and hallucination are common and more severe in moderate cognitive impairment whereas delusion, apathy, disinhibition and motor disturbances were common and more severe in severe cognitive impairment. These findings are similar to the findings reported by the authors such as K. Abeet al[12] and Trivedi et al[13]. Our results also demonstrated that irritability, disinhibition, euphoria, aggression, depression, aberrant motor behavior were significantly higher than delusions and hallucinations in the Fronto-temporal Dementia patients. Our findings were in agreement with previous comparative studies of Alzheimer's Dementia and Fronto-temporal Dementiaal though there has never been a direct comparison between Fronto-temporal Dementia and Lewy Body Dementia[14].

Lewy et al examining patients with Alzheimer's Dementia and other patients with Fronto-temporal Dementia with the NPI, noted that disinhibition, aberrant motor behavior, euphoria, and apathy scores were significantly higher in the patients with Fronto-temporal Dementia. They also noted that the depression score was lower in patients with Fronto-temporal Dementia. Barber et al[15] in a study in which neuropsychiatric changes of patients with autopsy-proven Fronto-temporal Dementia and Alzheimer's Dementia were retrospectively examined by questioning their close relatives found that patients with Fronto-temporal Dementia were more likely to exhibit early personality changes such as disinhibition and socially inappropriate behaviors are less likely to exhibit delusions and hallucinations than were patients with Alzheimer's Dementia. Gustafson[16] also noted that hallucinations were less frequent in the Fronto-temporal Dementia patients the patients having Alzheimer's Dementia. Neuropsychiatric symptoms are reportedly very common in patients with Lewy Body Dementia and are considered to be a central feature of this disease[17]. Our study quantitatively confirmed observations of previous studies that the patient with Lewy Body Dementia had visual hallucinations. Delusions and hallucinations, which are regarded as supportive features of Lewy Body Dementia were reported to be significantly

more common in patients with Lewy Body Dementia than in patients with Alzheimer's Dementia[18]. However, in the present study, the severity and frequency of hallucinations in patient with Lewy Body Dementia was not compared with Alzheimer's Dementia because of limited case in Lewy Body Dementia and delusion was found to be more common in Alzheimer's as compared with other types of dementia in the present study. Although depression is also considered to be associated with frontal dysfunction, this symptom was not common in Fronto-temporal Dementia. It was found to be more common in vascular dementia and Lewy body dementia. This pattern can be explained by the way in which depression is defined by the NPI. The NPI depression items are designed to focus on mood changes rather than on anhedonia or vegetative symptoms, although anhedonia with vegetative symptoms is generally, for example in the DSM-V, weighted equivalently to mood changes for the diagnosis of major depression, Feelings of sadness and melancholia will be concealed by apathy when frontal dysfunction is severe, as it is in Fronto-temporal Dementia and the aphasic patient is unable to articulate the subjective experience of being depressed[19] .

In Vascular dementia depression, irritability, apathy, aggression score higher than delusion, hallucination on comparing with Alzheimer's dementia. Our study was found to be in agreement with Shaji et al that delusion and hallucination is common in Neuro degenerative than vascular dementia. These symptoms could be misinterpreted by the relatives especially in countries like India where public awareness of dementia as a health problem is very low[20].

Conclusion

Alzheimer's Dementia, Lewy Body Dementia and fronto-temporal Dementia have different patterns of neuropsychiatric symptoms. The distinctive neuropsychiatric features may correspond to different patterns of cerebral involvement characteristic to these dementias. However, as there is considerable overlap, the utility of this finding in differential diagnosis on a case-by-case basis may be limited. Behavioral and psychological symptoms of dementia are the common causes for which patients seek medical help. The research on BPSD can lead us to issues related to prevention, early intervention and overall treatment effectiveness.

Conflict of Interest: None

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