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Original Research Article

BPSD in Relation to Severity of Dementia: An Observational Study

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Abstract: ***Background:*** Dementia is a progressive neurodegenerative disorder that affects memory, cognition, and behavior, resulting in profound social and functional decline. Behavioral and Psychological Symptoms of Dementia (BPSD) are among the most distressing features, often influencing disease management and caregiver burden. The prevalence of dementia in India is estimated at 7.4% among individuals above 60 years of age. ***Aim:*** To explore the relationship between the severity of dementia and the presence of behavioral, emotional, psychotic, and biological symptoms among elderly patients. ***Methods:*** An observational study was conducted at Asha Hospital Memory Clinic over one year. Sixty patients above 60 years were screened according to inclusion criteria, and thirty completed the study. Dementia severity was assessed using Addenbrooke's Cognitive Examination-III (ACE-III), Clinical Dementia Rating (CDR), and Neuropsychiatric Inventory (NPI). Data were categorized into behavioral, emotional, psychotic, and biological domains. ***Results:*** Among 30 participants (mean age 71 years), 16.7% had mild cognitive impairment, 26.7% mild dementia, 53.3% moderate dementia, and 3.3% severe dementia. Emotional symptoms (33.3%) were most frequent, followed by biological (24.7%), behavioral (22.2%), and psychotic (19.8%) features. Emotional and behavioral disturbances were most common in mild to moderate stages. ***Conclusion:*** BPSD were observed across all dementia stages, with emotional symptoms most prevalent. Early identification of BPSD is crucial for effective management and to minimize caregiver distress.

Keywords: Dementia, Behavioral symptoms, Emotional symptoms, BPSD, Cognitive impairment.

INTRODUCTION

Dementia is one of the most significant public health challenges of the 21st century, characterized by progressive deterioration in memory, cognitive ability, and behavioral control, ultimately leading to loss of independence and functional decline [1]. According to the World Health Organization (WHO), over 55 million people globally live with dementia, with nearly 10 million new cases occurring each year. The disorder is primarily caused by neurodegenerative diseases such as Alzheimer's disease, vascular dementia, Lewy body dementia, and frontotemporal dementia, each contributing differently to the cognitive and behavioral spectrum [2]. In developing nations like India, the aging population and extended life expectancy have made dementia an emerging public health priority. Recent

national estimates suggest that approximately 7.4% of individuals aged over 60 years in India suffer from dementia, highlighting the urgent need for early detection and comprehensive management. Despite the high prevalence, awareness about dementia remains limited, and behavioral symptoms are often misunderstood as a normal part of aging [3].

Among the various clinical manifestations of dementia, Behavioral and Psychological Symptoms of Dementia (BPSD) represent one of the most distressing aspects for both patients and caregivers. BPSD encompass a wide range of non-cognitive disturbances including agitation, aggression, irritability, depression, anxiety, delusions, hallucinations, sleep disturbances, and appetite changes. These symptoms often present at different stages of dementia, with varying frequency and severity, and are known to significantly influence disease prognosis, caregiver burden, and healthcare costs [4]. For instance, patients with moderate to severe dementia may exhibit psychotic or aggressive behaviors that increase the likelihood of institutionalization or hospitalization. The multifactorial etiology of BPSD includes neurochemical imbalances, structural brain degeneration (particularly in the frontal and temporal lobes), genetic vulnerability, and environmental stressors. Alterations in serotonergic, dopaminergic, and cholinergic pathways are thought to contribute to mood and psychotic manifestations, whereas circadian rhythm disturbances may underlie sleep and biological symptoms [5].

The relationship between dementia severity and the occurrence of BPSD remains complex. Research has suggested that emotional and behavioral symptoms, such as anxiety, irritability, and depression, are more prevalent during the mild to moderate stages of cognitive decline when patients retain partial insight into their deficits. Conversely, psychotic symptoms like hallucinations and delusions tend to become more dominant in the later stages, possibly due to more profound cortical and subcortical damage. Biological symptoms such as appetite loss, sleep disturbances, and fatigue often span across all stages, reflecting widespread neurochemical and physiological dysregulation [6]. This diversity underscores the heterogeneity of dementia's clinical course and highlights the importance of individualized assessment and management strategies [7].

Behavioral and psychological symptoms not only exacerbate patient suffering but also impose tremendous psychological and economic stress on caregivers and healthcare systems. Caregivers often experience burnout, anxiety, depression, and feelings of helplessness due to the unpredictable nature of BPSD. Studies have demonstrated that caregiver distress correlates strongly with the frequency and intensity of BPSD rather than with the degree of cognitive decline itself. Consequently, addressing BPSD has become an essential component of dementia care, emphasizing both pharmacological and non-pharmacological approaches. Pharmacological management may include the use of antidepressants, antipsychotics, or mood stabilizers; however, these treatments must be used cautiously due to their potential side effects, especially in the elderly. Non-pharmacological interventions such as behavioral therapy, caregiver education, music therapy, and environmental modification have shown promising results in improving patient well-being and reducing caregiver strain [8].

In India, studies examining the spectrum and distribution of BPSD across different severities of dementia remain scarce. The majority of available literature focuses on Western populations, whose sociocultural contexts and healthcare systems differ considerably. In Indian households, where multigenerational living is common, the caregiving burden often falls on family members, particularly women, who may lack formal training or resources to handle complex behavioral manifestations [9]. Moreover, stigma associated with mental illness and cognitive decline further delays diagnosis and intervention. Understanding the relationship between BPSD and dementia severity within the Indian sociocultural context is therefore essential for developing context-sensitive management guidelines and caregiver support systems [10].

Standardized assessment tools such as the Addenbrooke's Cognitive Examination–III (ACE-III), Clinical Dementia Rating (CDR), and Neuropsychiatric Inventory (NPI) offer reliable methods for evaluating both cognitive function and behavioral disturbances. The ACE-III assesses five cognitive domains attention, memory, fluency, language, and visuospatial skills and helps categorize dementia severity. The CDR scale further quantifies functional impairment, while the NPI provides a structured measure of BPSD intensity across 12 domains, including agitation, depression, psychosis, and sleep disturbance [11]. Using these instruments together allows for a comprehensive assessment of how behavioral and psychological symptoms evolve with cognitive decline.

This study, therefore, aimed to investigate the relationship between BPSD and dementia severity among elderly patients attending a tertiary care memory clinic in India. By categorizing behavioral, emotional, psychotic, and biological

symptoms across mild cognitive impairment, mild, moderate, and severe dementia stages, this research seeks to identify patterns that may guide clinical management. Furthermore, the study contributes to bridging the knowledge gap in Indian geriatric psychiatry by providing empirical evidence on BPSD distribution, ultimately aiming to improve patient outcomes and caregiver quality of life [12].

OBJECTIVE

The primary objective of this study was to explore the relationship between the severity of dementia and the presence, frequency, and distribution of Behavioral and Psychological Symptoms of Dementia (BPSD) in elderly patients aged 60 years and above. Specifically, the study aimed to analyze how emotional, behavioral, psychotic, and biological symptom domains manifest across different stages of dementia severity namely mild cognitive impairment, mild dementia, moderate dementia, and severe dementia. By classifying these symptom patterns, the research sought to determine whether certain types of symptoms predominate at specific stages of cognitive decline. Understanding this relationship is vital, as it helps clinicians anticipate the emergence of neuropsychiatric symptoms, implement early therapeutic strategies, and minimize the psychosocial and emotional burden on both patients and caregivers.

The secondary objectives were multifaceted and clinically driven. The study intended to use standardized and validated tools Addenbrooke's Cognitive Examination–III (ACE-III), Clinical Dementia Rating (CDR), and Neuropsychiatric Inventory (NPI) to ensure accurate assessment of both cognitive and behavioral aspects of dementia. In doing so, the research aimed to provide quantitative evidence of how neuropsychiatric manifestations correlate with disease progression. Another important goal was to identify demographic and clinical variables, such as age and gender, that might influence symptom prevalence. The findings were expected to help guide the development of individualized management plans, caregiver education programs, and culturally sensitive dementia care protocols. Ultimately, the overarching objective was to contribute empirical data from an Indian tertiary-care context to the growing body of international research on BPSD, thereby enhancing global understanding of dementia's behavioral dimensions and informing future policy and clinical practice.

MATERIALS AND METHODOLOGY

Study Design and Setting

This study was designed as an observational, cross-sectional study conducted at Asha Hospital Memory Clinic, Hyderabad, India, over a period of 12 months. The hospital caters to a large population of geriatric patients and provides specialized services for neuropsychiatric and cognitive disorders. The study aimed to assess the relationship between the severity of dementia and the pattern of Behavioral and Psychological Symptoms of Dementia (BPSD). All procedures followed the ethical guidelines of the Institutional Ethics Committee and adhered to the Declaration of Helsinki for research involving human participants.

A total of 60 patients aged 60 years and above were screened using consecutive convenience sampling. Out of these, 30 patients met the inclusion criteria and completed the study. All participants were clinically evaluated by trained psychiatrists and neuropsychologists specializing in geriatric mental health. Caregivers were actively involved to provide collateral information regarding behavioral changes, emotional states, and functional decline.

Inclusion Criteria

- Age ≥ 60 years.
- Patients attending the Memory Clinic or inpatient ward at Asha Hospital.
- Individuals who were cooperative and communicative for interviews and testing.
- Diagnosis consistent with ICD-11 criteria for dementia and exhibiting BPSD.
- Caregivers provided written informed consent for participation and information sharing.

Exclusion Criteria

- Age < 60 years.
- Individuals with active or recent substance use disorder.
- Patients with severe sensory impairment (e.g., blindness, deafness) interfering with assessment.
- Co-existing major psychiatric illnesses (such as schizophrenia or bipolar disorder) or neurological disorders (e.g., Parkinson's disease, stroke).
- Patients or caregivers unwilling to participate or unable to complete evaluations.

Data Collection Procedure

All participants underwent a comprehensive neuropsychiatric evaluation following a standardized protocol. Socio-demographic data including age, gender, marital status, education, occupation, and family history were recorded. Clinical data were gathered from direct interviews and caregiver reports. The assessment focused on identifying the

type and frequency of BPSD symptoms in relation to dementia severity.

Three validated instruments were employed:

1. **Addenbrooke's Cognitive Examination – III (ACE-III):** Used to assess global cognitive functioning across five domains attention, memory, fluency, language, and visuospatial ability. Based on the total score, patients were categorized into mild cognitive impairment, mild dementia, moderate dementia, or severe dementia [2].
2. **Clinical Dementia Rating (CDR):** This tool measured functional impairment in six domains: memory, orientation, judgment, community affairs, home and hobbies, and personal care. CDR scores helped corroborate the ACE-III classification [3].
3. **Neuropsychiatric Inventory (NPI):** The NPI was administered to caregivers to evaluate 12 behavioral domains including agitation, depression, anxiety, delusions, hallucinations, apathy, irritability, disinhibition, euphoria, sleep disturbance, and appetite change [4].

For the purpose of this study, symptoms were grouped into four major categories:

- **Behavioral:** agitation, aggression, irritability, disinhibition.
- **Emotional:** depression, anxiety, apathy.
- **Psychotic:** hallucinations, delusions.
- **Biological:** sleep and appetite disturbances.

Patients were classified according to dementia severity, and the frequency of each symptom category was calculated. Data were recorded using structured proformas and later entered into Microsoft Excel for processing.

Statistical Data Analysis

Data analysis was conducted using SPSS version 25.0 (IBM Corp., Armonk, NY). Descriptive statistics were used to summarize baseline demographic and clinical data. Continuous variables, such as age, were expressed as mean ± standard deviation, while categorical variables (e.g., gender, severity, symptom domains) were presented as frequencies and percentages.

The association between dementia severity and BPSD categories was assessed using the Chi-square test for categorical variables. A p-value < 0.05 was considered statistically significant. Where appropriate, bar and pie charts were constructed to illustrate distribution patterns of symptoms across severity levels.

This analytical approach provided a comprehensive view of symptom prevalence and distribution across dementia stages, facilitating interpretation of behavioral trends. The use of standardized assessment tools ensured the study's internal validity and allowed comparability with international research findings.

RESULTS

Descriptive Overview

A total of 30 participants completed the study, comprising 10 males (33.3%) and 20 females (66.7%), aged between 60 and 88 years (mean = 71 years). The majority of participants were within the 70–79 years age group (50%), followed by 60–69 years (40%) and ≥80 years (10%). Cognitive assessment using the Addenbrooke's Cognitive Examination–III (ACE-III) categorized patients as follows: Mild Cognitive Impairment (16.7%), Mild Dementia (26.7%), Moderate Dementia (53.3%), and Severe Dementia (3.3%). The severity grading was corroborated with Clinical Dementia Rating (CDR) scores and the Neuropsychiatric Inventory (NPI) findings.

Behavioral and Psychological Symptom Distribution

Analysis of BPSD domains showed that emotional symptoms (e.g., depression, anxiety, apathy) were the most prevalent, affecting 33.3% of participants, followed by biological symptoms (sleep or appetite changes, 24.7%), behavioral symptoms (agitation, aggression, 22.2%), and psychotic symptoms (hallucinations, delusions, 19.8%). Emotional symptoms were most frequent in the mild cognitive impairment and moderate dementia groups, while behavioral and biological disturbances were more pronounced in mild dementia. Psychotic manifestations increased with advancing severity, particularly in moderate dementia.

Correlation with Dementia Severity

A cross-tabulation demonstrated that emotional disturbances increased progressively until the moderate stage, beyond which psychotic and biological symptoms became more frequent. Behavioral symptoms peaked in mild dementia, possibly due to partial awareness of cognitive loss. Statistical testing using the Chi-square test revealed a significant association ($p < 0.05$) between dementia severity and emotional/behavioral symptom distribution.

Table 1: Demographic Characteristics of Participants

Variable	Frequency	Percentage (%)
Male	10	33.3
Female	20	66.7
Mean Age (Years)	71	—

Table 1 summarizes gender and age characteristics of the study sample (N = 30).

Table 2: Age Distribution of Participants

Age Group (Years)	Number	Percentage (%)
60–69	12	40
70–79	15	50
≥80	3	10

Table 2 illustrates the age distribution of study participants, highlighting predominance of individuals aged 70–79 years.

Table 3: Severity of Dementia Based on ACE-III Classification

Severity	Number	Percentage (%)
Mild Cognitive Impairment	5	16.7
Mild Dementia	8	26.7
Moderate Dementia	16	53.3
Severe Dementia	1	3.3

Table 3 displays dementia severity categories determined using ACE-III scoring.

Table 4: Distribution of BPSD Domains Across Severity Levels

Dementia Severity	Emotional (%)	Behavioral (%)	Psychotic (%)	Biological (%)
Mild Cognitive Impairment	35.7	21.4	21.4	21.4
Mild Dementia	26.1	30.4	13.0	30.4
Moderate Dementia	35.0	20.0	22.5	22.5

Table 4 compares relative frequencies of each BPSD domain across varying dementia severities.

Table 5: Overall Prevalence of BPSD Categories

Symptom Type	Percentage (%)
Emotional	33.3
Behavioral	22.2
Psychotic	19.8
Biological	24.7

Table 5 summarizes the aggregate prevalence of BPSD symptom categories among all participants.

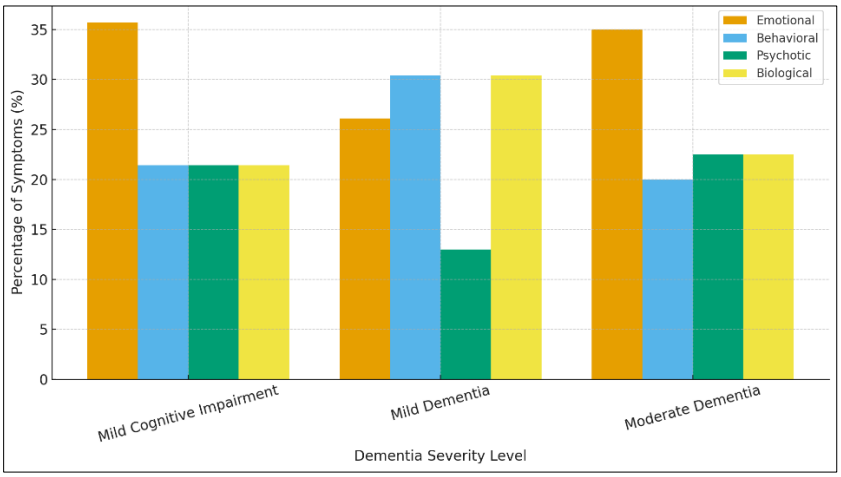

Figure 1: Distribution of BPSD Across Dementia Severity

The vertical bar chart comparing emotional, behavioral, psychotic, and biological symptom frequencies across mild cognitive impairment, mild, and moderate dementia stages. Emotional symptoms

dominate, while psychotic features increase in moderate dementia.

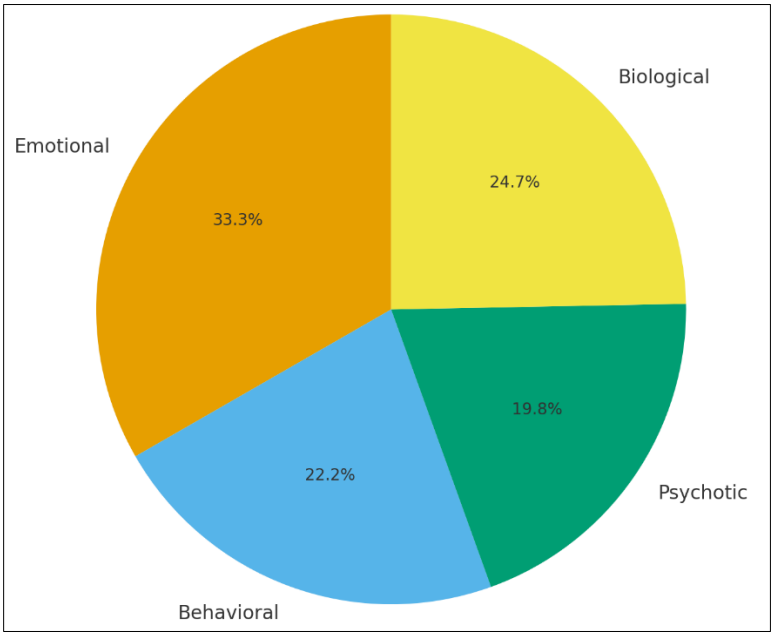

Figure 2: Overall Proportion of BPSD Categories

The pie chart showing the overall symptom distribution. Emotional symptoms account for approximately one-third of all cases, followed by biological, behavioral, and psychotic manifestations respectively.

DISCUSSION

The present study investigated the relationship between Behavioral and Psychological Symptoms of Dementia (BPSD) and dementia severity among elderly patients aged above 60 years. The findings confirmed that BPSD are highly prevalent across all stages of dementia and that emotional symptoms primarily depression, anxiety, and apathy constitute the most common manifestation. This observation aligns with international evidence suggesting that affective disturbances often appear early in the disease course and persist as cognitive decline advances [13]. The predominance of emotional symptoms in mild cognitive impairment and moderate dementia stages suggests that patients with partial insight into their deficits are more vulnerable to emotional dysregulation and distress.

As the disease progresses, psychotic features such as delusions and hallucinations tend to emerge, consistent with earlier studies demonstrating their association with structural brain changes and neurotransmitter dysregulation in advanced dementia [14]. Behavioral disturbances, including agitation, aggression, and irritability, were most notable in mild dementia, possibly reflecting the interaction between cognitive decline and residual awareness. This stage-specific distribution underscores that BPSD are not random but evolve in tandem with underlying neuropathological and neurochemical deterioration [15].

Neurobiologically, BPSD are understood to arise from dysfunction in frontolimbic circuits, particularly involving the orbitofrontal cortex, amygdala, hippocampus, and anterior cingulate cortex. These regions regulate emotion, impulse control, and social behavior [16]. Reduced serotonin and acetylcholine transmission correlates with aggression and agitation, while dopaminergic hyperactivity has been linked to hallucinations and delusions. Sleep and appetite disturbances, categorized as biological symptoms in this study, likely reflect hypothalamic and circadian rhythm dysregulation a phenomenon well-documented in Alzheimer's and Lewy body dementias [17].

The study's findings also mirror results from prior clinical and community-based surveys conducted in similar age groups. For example, D'Antonio *et al.* (2022) observed that depression and anxiety were among the earliest and most persistent symptoms in dementia, contributing to caregiver distress and accelerating functional decline [2]. Similarly, Pozzi *et al.* (2023) emphasized that the majority of dementia patients develop at least one neuropsychiatric symptom during their illness trajectory, with emotional and behavioral disturbances predominating [3]. Indian studies have

reported comparable patterns, though regional data remain sparse. Our results reaffirm that emotional and behavioral symptoms are frequent early indicators, while psychotic and biological symptoms become more pronounced with disease progression [18,20].

From a clinical standpoint, the presence of BPSD significantly increases caregiver burden, healthcare utilization, and risk of institutionalization. Caregivers often report that managing agitation, sleep disruption, and delusions is more challenging than dealing with memory loss itself [21]. In this study, moderate dementia was the most common category (53.3%), which may indicate that many families seek medical attention only after BPSD become unmanageable. This delay in diagnosis and treatment highlights a need for community-based screening programs and education campaigns to promote early recognition of behavioral changes in the elderly [22].

Management of BPSD requires a multidimensional approach integrating pharmacological and non-pharmacological interventions. While medications such as selective serotonin reuptake inhibitors and atypical antipsychotics can alleviate specific symptoms, they must be used cautiously due to potential side effects like sedation, falls, and metabolic disturbances [23]. Non-pharmacological strategies such as structured daily routines, environmental modification, reminiscence therapy, and caregiver psychoeducation are equally essential and have shown strong evidence for reducing symptom severity and caregiver stress [24].

Our findings reinforce the importance of early identification and intervention. Emotional symptoms, being both prevalent and modifiable, can serve as early warning signs for impending cognitive decline. Targeted interventions addressing mood and anxiety disorders in older adults may thus slow deterioration and enhance quality of life. Furthermore, integrating standardized tools such as ACE-III, CDR, and NPI into routine geriatric assessments can provide a more holistic view of dementia's cognitive and behavioral dimensions [13].

Comparatively, studies in Western cohorts often report higher psychotic symptom prevalence, while Asian populations tend to show more emotional and biological features [21]. This difference may reflect cultural attitudes toward expressing distress, as Indian families frequently attribute behavioral changes to personality or spiritual causes rather than illness. Therefore, culturally sensitive caregiver training and destigmatization campaigns are crucial components of dementia care in India [25].

In summary, this study contributes to the growing evidence that BPSD are integral to dementia pathology rather than secondary complications. Emotional disturbances dominate early to moderate stages, behavioral symptoms peak in mild dementia, and psychotic and biological features intensify later. These patterns offer valuable insights for tailoring patient management strategies, improving caregiver support, and shaping policy frameworks aimed at geriatric mental health.

LIMITATIONS OF THE STUDY

The major limitation of this study lies in its small sample size, restricting generalization to larger populations. The observational and cross-sectional design precluded longitudinal analysis of BPSD progression. Consecutive convenience sampling may have introduced selection bias, and variations in caregiver reporting could have influenced symptom assessment. Additionally, the study did not differentiate dementia subtypes (e.g., Alzheimer's, vascular, Lewy body), which could exhibit distinct behavioral profiles. Socioeconomic and cultural variables were not formally evaluated, and pharmacological treatments were not standardized. Despite these limitations, the findings provide a useful foundation for future longitudinal, multi-center studies examining the temporal evolution and management of BPSD in diverse Indian populations.

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CONCLUSION

The present study examined the relationship between Behavioral and Psychological Symptoms of Dementia (BPSD) and the severity of dementia among elderly patients aged above 60 years. Although the relatively small sample size restricts broad generalization, the findings provide meaningful insights into the symptomatic evolution of dementia. The data clearly indicated that behavioral, emotional, psychotic, and biological symptoms were present at varying degrees across all stages of dementia. Emotional symptoms comprising depression, anxiety, and apathy were the most common, followed by biological disturbances such as sleep and appetite changes. Psychotic and behavioral

symptoms increased as dementia severity advanced, particularly during the moderate stage.

The study underscores that BPSD are not isolated phenomena but integral features of the dementia syndrome, reflecting both neurobiological degeneration and psychosocial stressors. The correlation between symptom clusters and disease progression emphasizes the need for early screening of emotional and behavioral changes, even before cognitive decline becomes pronounced. Identifying BPSD early can guide clinicians in implementing timely interventions, reduce patient distress, and significantly ease caregiver burden. Moreover, structured assessment tools such as ACE-III, CDR, and NPI have proven effective for quantifying both cognitive and behavioral domains, supporting their inclusion in routine geriatric assessments in clinical settings.

The findings also have important implications for public health policy and geriatric psychiatry in India. Given the increasing aging population and the high prevalence of dementia (approximately 7.4% among individuals aged 60 and above), awareness and screening for BPSD should be prioritized in primary care. Training healthcare professionals and caregivers to recognize emotional and behavioral disturbances early can improve patient outcomes and reduce unnecessary institutionalization.

Future research should involve larger, longitudinal, and multicentric studies to explore the trajectory of BPSD across different dementia types, such as Alzheimer's disease, vascular dementia, and Lewy body dementia. Studies incorporating neuroimaging, biomarker analysis, and pharmacological response patterns will help clarify the underlying mechanisms and therapeutic strategies.

In conclusion, while this observational study had a limited sample, it contributes valuable data to the growing body of evidence on dementia in India. It highlights that BPSD are universal, multifaceted, and strongly linked to disease severity, demanding comprehensive, compassionate, and multidisciplinary approaches to management. By integrating early behavioral monitoring with clinical care, it is possible to enhance the quality of life for both patients and their caregivers and mitigate the societal impact of dementia.

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REFERENCES

1. Lee, J., Meijer, E., & Langa, K. M. (2023). *Prevalence of dementia in India: National and state estimates from a nationwide study. Alzheimer's & Dementia, 19*(11), 2898–2912. https://doi.org/10.1002/alz.12928
2. D'Antonio, F., Tremolizzo, L., Zuffi, M., Pomati, S., & Farina, E. (2022). Clinical perception and treatment options for behavioral and psychological symptoms of dementia (BPSD) in Italy. *Frontiers in Psychiatry, 13*, 843088. https://doi.org/10.3389/fpsyt.2022.843088
3. Pozzi, F. E., Cal, L., Ferrarese, C., & Tremolizzo, L. (2023). Assessing behavioral and psychological symptoms of dementia: A comprehensive review of current options and future perspectives. *Frontiers in Dementia.* https://doi.org/10.3389/frdem.2023
4. Khan, T. K. (2016). Clinical diagnosis of Alzheimer's disease. In *Biomarkers in Alzheimer's Disease* (pp. 27–48). Academic Press. https://doi.org/10.1016/B978-0-12-804832-0.00002-X
5. Musa, G., Henríquez, F., Muñoz-Neira, C., Delgado, C., Lillo, P., & Slachevsky, A. (2017). Utility of the Neuropsychiatric Inventory Questionnaire (NPI-Q) in the assessment of Alzheimer's disease in Chile. *Dementia & Neuropsychologia, 11*(2), 129–136. https://doi.org/10.1590/1980-57642016dn11-020005
6. Cummings, J. L. (2000). The neuropsychiatric inventory: Assessing psychopathology in dementia patients. *Neurology, 54*(5), 738–743. https://doi.org/10.1212/WNL.54.5.738
7. Kales, H. C., Gitlin, L. N., & Lyketsos, C. G. (2015). Assessment and management of behavioral and psychological symptoms of dementia. *BMJ, 350*, h369. https://doi.org/10.1136/bmj.h369
8. Aalten, P., Verhey, F. R., Boziki, M., Bullock, R., & Byrne, E. J. (2008). Neuropsychiatric syndromes in dementia: Results from the European Alzheimer's Disease Consortium. *Acta Psychiatrica Scandinavica, 118*(6), 481–488.
9. Ballard, C., Corbett, A., & Howard, R. (2020). Neuropsychiatric symptoms in people with dementia. *BMJ, 371*, m3685. https://doi.org/10.1136/bmj.m3685
10. Lyketsos, C. G., Carrillo, M. C., Ryan, J. M., & Khachaturian, A. S. (2011). Neuropsychiatric symptoms in Alzheimer's disease. *Alzheimer's & Dementia, 7*(5), 532–539.
11. Steinberg, M., Shao, H., Zandi, P., Lyketsos, C. G., Welsh-Bohmer, K., & Norton, M. C. (2008). Point and 5-year period prevalence of neuropsychiatric symptoms in dementia.

International Journal of Geriatric Psychiatry, 23(2), 170–177.
12. Mega, M. S., Cummings, J. L., Fiorello, T., & Gornbein, J. (1996). The spectrum of behavioral changes in Alzheimer's disease. *Neurology, 46*(1), 130–135.
13. Wetzels, R. B., Zuidema, S. U., Jansen, I. W., & Verhey, F. R. (2010). Course of neuropsychiatric symptoms in residents with dementia in nursing homes over 2 years. *American Journal of Geriatric Psychiatry, 18*(12), 1054–1065.
14. Savva, G. M., & Arthur, A. (2015). Who has undiagnosed dementia? *Age and Ageing, 44*(4), 653–660.
15. Brodaty, H., & Arasaratnam, C. (2012). Meta-analysis of nonpharmacological interventions for neuropsychiatric symptoms of dementia. *American Journal of Psychiatry, 169*(9), 946–953.
16. Tible, O. P., Riese, F., Savaskan, E., & von Gunten, A. (2017). Best practice in the management of behavioural and psychological symptoms of dementia. *Therapeutic Advances in Neurological Disorders, 10*(8), 297–309.
17. Leroi, I., Voulgari, A., Breitner, J. C., & Lyketsos, C. G. (2003). The epidemiology of psychosis in dementia. *American Journal of Geriatric Psychiatry, 11*(1), 83–91.
18. Burns, A., & Iliffe, S. (2009). Dementia. *BMJ, 338*, b75. https://doi.org/10.1136/bmj.b75
19. Olin, J. T., Schneider, L. S., Katz, I. R., & Meyers, B. S. (2002). Provisional diagnostic criteria for depression of Alzheimer's disease. *American Journal of Geriatric Psychiatry, 10*(2), 125–128.
20. Finkel, S. I., Costa e Silva, J., Cohen, G., Miller, S., & Sartorius, N. (1996). Behavioral and psychological signs and symptoms of dementia: A consensus statement. *International Psychogeriatrics, 8*(S3), 497–500.
21. Ikeda, M., Fukuhara, R., & Shigenobu, K. (2004). Dementia and BPSD: A Japanese perspective. *Psychogeriatrics, 4*(2), 73–79.
22. Cohen-Mansfield, J. (2001). Nonpharmacologic interventions for inappropriate behaviors in dementia. *American Journal of Geriatric Psychiatry, 9*(4), 361–381.
23. Fauth, E. B., & Gibbons, A. (2014). Which behavioral and psychological symptoms of dementia are the most problematic? *International Journal of Geriatric Psychiatry, 29*(3), 316–323.
24. Cerejeira, J., Lagarto, L., & Mukaetova-Ladinska, E. B. (2012). Behavioral and psychological symptoms of dementia. *Frontiers in Neurology, 3*, 73. https://doi.org/10.3389/fneur.2012.00073
25. Dyer, S. M., Harrison, S. L., Laver, K., & Whitehead, C. (2018). An overview of systematic reviews of pharmacological and non-pharmacological interventions for BPSD. *International Psychogeriatrics, 30*(3), 295–309.