ISSN Print: 2520-5552

ACE Journal of Neurosciences
https://acejneuro.com/

Research Article

Patterns of Behavioural and Psychological Symptoms in Dementia (BPSD) in a Tertiary Care Hospital: A Cross-Sectional Study

Pranav Bhowmik[1], Niloy Kumar Das[2], Sarmistha Chakrabarti[3], Kaustav Chakraborty[4*] and Mithun Biswas[5]

[1]3rd Year MD PGT Psychiatry, Department of Psychiatry, College of Medicine and JNM Hospital, Kalyani, Nadia, West Bengal, India

[2]Assistant Professor, Department of Anatomy, College of Medicine and JNM Hospital, Kalyani, Nadia, West Bengal, India

[3]Senior Resident, Department of Community Medicine, College of Medicine and JNM Hospital, Kalyani, Nadia, West Bengal, India

[4]Professor & Head, Department of Psychiatry, College of Medicine and JNM Hospital, Kalyani, Nadia, West Bengal, India

[5]RMO cum Clinical Tutor; Department of Psychiatry, Department of Psychiatry, College of Medicine and JNM Hospital, Kalyani, Nadia, West Bengal, India

***Corresponding Author**
Kaustav Chakraborty
(drkaustav2003@yahoo.co.in)

Article History
Received: 23.07.2026
Accepted: 19.08.2026
Published: 08.09.2026

doi: 10.61336/acejn.0403.14

Abstract: Background: Behavioural and psychological symptoms of dementia (BPSD) are frequent across dementia syndromes and contribute substantially to patient distress, caregiver burden and clinical complexity. Their phenomenological profile may vary according to dementia subtype and stage of illness. **Aim:** To estimate the prevalence and pattern of BPSD among patients with dementia and to examine their relationship with selected sociodemographic and clinical characteristics. **Materials and Methods:** This cross-sectional study included 100 consecutive patients aged above 50 years with dementia diagnosed according to ICD-10 Diagnostic Criteria for Research and attending the outpatient department of a tertiary care hospital. Patients with delirium, major comorbid psychiatric disorders, substance use disorders other than nicotine, developmental disorders and other specified exclusion conditions were excluded. Sociodemographic and clinical data were recorded and BPSD were assessed using the Neuropsychiatric Inventory (NPI). **Results:** Of the 100 participants, 68 had Alzheimer's disease, 19 had vascular dementia and 13 had mixed dementia. The mean age was 64.14±6.97 years. All participants had at least one neuropsychiatric symptom. Depression was the most frequent symptom (64%), followed by irritability (54%), sleep/night-time behavioural disturbance (44%), anxiety (35%), appetite/eating abnormalities (33%), apathy (26%), delusions (19%) and aberrant motor behaviour (17%). Depression was particularly frequent in vascular dementia. Significant differences were also observed between early- and late-onset groups for systolic and diastolic blood pressure and aberrant motor behaviour. **Conclusion:** BPSD are highly prevalent in dementia and constitute an important component of clinical assessment. Depression, irritability and sleep/night-time behavioural disturbances were prominent in this tertiary-care sample. Systematic identification and management of these symptoms, alongside attention to modifiable vascular and metabolic risk factors, may improve dementia care.

Keywords: Dementia, Behavioural and Psychological Symptoms of Dementia, Alzheimer's Disease, Vascular Dementia, Neuropsychiatric Inventory, Depression, Irritability

INTRODUCTION

Behavioural and Psychological Symptoms of Dementia (BPSD) are very common irrespective of the type of dementia. They are present in almost all patients during the course of their disease, even noted in the early stages of dementia varying from 35–85% in subjects with mild cognitive impairment [1]. The frequency of BPSD reported in different studies largely depends on the sample type and setting considered.

The severity of the neuropsychiatric symptoms in patients admitted to hospitals or long-term care facilities is as high as 91–96%, while in community-dwelling subjects with dementia, the symptoms are generally less frequent with a range of 56–98%. The most prevalent BPSD observed in most of the studies are apathy, depression, irritability, agitation and anxiety, while euphoria, hallucinations and disinhibition are less common [2]. The most clinically significant symptoms are depression, apathy and anxiety [2]. In most cases, multiple symptoms are observed simultaneously and 50% of patients show at least four neuropsychiatric symptoms [3].

The frequencies of all the neuropsychiatric syndromes significantly differ with the severity of the disease. Among all the important symptoms, apathy and depression are the most prevalent behavioural symptoms in patients with Alzheimer's disease [4,5]. Although studies are limited in the Indian subcontinent, it is estimated that 99% of people with dementia have at least one behavioural and psychological symptom and 71% have ≥ 4 symptoms [6].

Objectives

- **Primary Objective:** To estimate the prevalence of behavioural and psychological symptoms in subjects with dementia
- **Secondary Objective:** To study the correlation between socio-demographic and clinical parameters and behavioural and psychological symptoms in subjects with various types of dementia

MATERIALS AND METHODS

The present study was conducted on patients with dementia attending the Outpatient Department (OPD) at a tertiary care hospital. The 100 consecutive cases of various types of dementia were taken. The sample size was estimated from previous studies using an expected prevalence of approximately 51%, with 10% precision and a 95% confidence level, yielding a minimum estimated sample of 97 participants. Data were recorded cross-sectionally on selected cases for those fulfilling the inclusion and exclusion criteria.

For cases, the inclusion criteria included a diagnosis of dementia qualifying according to ICD-10 DCR, aged above 50 years and either the patient or the patient's family members willing to consent were recruited for the study.

The exclusion criteria for the study were medically critical conditions making assessment difficult like delirium, comorbid psychiatric disorders (schizophrenia, bipolar disorder), substance use disorder except nicotine, history of developmental delay, intellectual disability, autism, etc.

Assessment Tools

- **ICD10 DCR:** The Division of Mental Health of the World Health Organization, which deals with mental and behavioural disorders has developed a version for research purposes, which is known as the Diagnostic Criteria for Research (ICD-10 DCR). It gives operational criteria for the diagnosis of mental disorders [7]
- **Socio-Demographic and Clinical Proforma:** It is a pre-tested semi-structured proforma specially made for the current study containing various sociodemographic variables (e.g. patient's OPD Registration number, age, religion, education, occupation, family income, location of residence) and clinical variables (age at onset, age at diagnosis, medications used, etc.)
- **Neuropsychiatric Inventory (NPI):** (Cummings *et al* in 1994) It consists of a 144-point scale where 12 items cover the behavioural symptoms based on severity (scores 1–3) and frequency (1–4). It takes approx. 25–30 min. Higher scores indicate a higher frequency and severity of behavioural symptoms. The maximum score is 12 (frequency x severity) per item. Questions related to hallucinations, delusions, agitation/aggression, anxiety, apathy, disinhibition, sleep behaviour and others are asked. Its internal consistency with an α-range of 0.88 which is quite good and Inter-rater reliability ranged from 93.6% to 100% for frequency, while for severity it was 89.4 to 100% [8]

Ethics Statement

Permission was sought from the Institution Ethics Committee for conducting the project and the current result was obtained from the same data set. The rights of the participants were explained and queries were answered. The written informed consent was sought from all participants and ethical principles were followed as per standard procedures for ethical committee.

Analysis of Data

A master chart was prepared using the Statistical Package for Social Sciences, version 22 (SPSS 22) and data recorded in SPSS was coded as appropriate variables on the master chart. For the analysis of two categorical variables, the Chi-square test and Fisher's exact test were used. Distribution was found to be normal and independent t-test and ANOVA were used for the analysis of two and three continuous variables respectively.

RESULTS

The study included 100 patients with dementia. Alzheimer's disease was the predominant subtype (68%), followed by vascular dementia (19%) and mixed dementia (13%). Sixty-five participants were male and 35 were female. The mean age of the sample was 64.14±6.97 years. Seventy-two percent were rural residents and 92% belonged to nuclear families. Educational attainment was generally low, with 46% being illiterate. Most families (93%) reported a monthly income below INR 10,000 (Table 1).

Table 1: Neuropsychiatric Presentation of Alzheimer's', Vascular and Mixed Dementia

NPI Symptoms	Y/N	Overall (N = 100)	Alzheimer's (N = 68)	Vascular Dementia (N = 19)	Mixed Dementia (N = 13)
Delusion	Yes	19 (19%)	16 (23.5%)	3 (15.8%)	0 (0%)
	No	81 (81%)	52 (76.5%)	16 (84.2%)	13 (13%)
Hallucination	Yes	6 (6%)	6 (8.8%)	0 (0%)	0 (0%)
	No	94 (94%)	62 (91.2%)	19 (100%)	13 (13%)
Agitation	Yes	35 (35%)	28 (41.2%)	5 (26.3%)	2 (15.4%)
	No	65 (65%)	40 (58.8%)	14 (73.7%)	11 (84.6%)
Depression	Yes	64 (64%)	40 (58.8%)	15 (79%)	9 (69.2%)
	No	36 (36%)	28 (41.2%)	4 (21%)	4 (30.8%)
Anxiety	Yes	35 (35%)	20 (29.4%)	9 (47.4%)	6 (46.2%)
	No	65 (65%)	48 (70.6%)	10 (52.6%)	7 (53.8%)
Elation	Yes	2 (2%)	2 (3%)	0 (0%)	0 (0%)
	No	98 (98%)	66 (97%)	19 (100%)	13 (100%)
Apathy	Yes	26 (26%)	20 (29.4%)	4 (21%)	2 (15.4%)
	No	74 (74%)	48 (70.6%)	15 (79%)	11 (84.6%)
Disinhibition	Yes	1 (1%)	1 (1.5%)	0 (0%)	0 (0%)
	No	99 (99%)	67 (98.5%)	19 (100%)	13 (100%)
Irritability	Yes	54 (54%)	38 (55.9%)	9 (47.4%)	7 (53.8%)
	No	46 (46%)	30 (44.1%)	10 (52.6%)	6 (46.2%)
Aberrant motor behavior	Yes	17 (17%)	15 (22%)	2 (10.5%)	0 (0%)
	No	83 (83%)	53 (78%)	17 (89.5%)	13 (100%)
Night-time behavior	Yes	44 (44%)	35 (51.5%)	4 (21%)	5 (38.5%)
	No	56 (56%)	33 (48.5%)	15 (79%)	8 (61.5%)
Appetite & eating disorder	Yes	33 (33%)	28 (41.2%)	5 (26.3%)	0 (0%)
	No	67 (67%)	40 (58.8%)	14 (73.7%)	13 (100%)

Table 2: Neuropsychiatric Presentation of Alzheimer's', Vascular and Mixed Dementia

NPI domains (N = 100)	AD (N = 68) Mean(±SD)	VaD (N = 19) Mean(±SD)	MxD (N = 13) Mean(±SD)	F-test	p-value
Delusion	1.51 (±3.20)	1.58 (±3.92)	0.00 (±0.00)	1.33	0.27
Hallucination	0.20 (±0.74)	0.00 (±0.00)	0.00 (±0.00)	1.20	0.30
Agitation	2.04 (±2.52)	2.21 (±4.10)	0.92 (±2.25)	0.95	0.39
Depression	3.11 (±3.38)	4.21 (±3.24)	4.92 (±4.35)	1.87	0.16
Anxiety	1.26 (±2.43)	2.42 (±3.20)	2.76 (±4.36)	2.25	0.11
Euphoria	0.02 (±0.17)	0.00 (±0.00)	0.00 (±0.00)	0.47	0.63
Apathy	2.07 (±3.67)	1.47 (±2.97)	0.92 (±2.25)	0.74	0.48
Disinhibition	0.09 (±0.73)	0.00 (±0.00)	0.00 (±0.00)	0.23	0.79
Irritability	2.82 (±3.22)	2.42 (±3.80)	2.61 (±2.87)	0.12	0.89
Aberrant motor behavior	1.48 (±3.13)	0.95 (±2.83)	0.00 (±0.00)	1.53	0.22
Nighttime and Sleep Disorder	3.01 (±3.22)	1.58 (±3.22)	2.31 (±3.04)	1.58	0.21
Appetite and eating behavior disorder	1.91 (±2.58)	1.26 (±2.88)	0.00 (±0.00)	3.39	0.04*
Total NPI score 10	14.65 (±13.27)	15.26 (±16.71)	12.15 (±8.69)	0.23	0.79
Total NPI score 12	18.38 (±13.74)	16.21 (±17.37)	17.28 (±14.0)	0.85	0.43

* ANOVA/Kruskal Wallis p≤0.05

Table 3: Neuropsychiatric presentation of Early onset dementia (EOD) and Late onset dementia (LOD)

NPI domains (N = 100)	Total (N = 100) Mean (±SD)	EOD (N = 64) Mean (±SD)	LOD (N = 36) Mean (±SD)	t-test	p-value
Delusion	1.33 (±3.16)	1.29 (±3.30)	1.39 (2.93)	-0.14	0.89
Hallucination	0.14 (±0.62)	0.15 (±0.67)	0.11 (0.52)	0.35	0.73
Agitation	1.93 (±2.85)	2.09 (±3.00)	1.64 (2.57)	0.76	0.44
Depression	3.56 (±3.52)	3.79 (±3.79)	3.14 (2.97)	0.89	0.37
Anxiety	1.68 (±2.93)	1.81 (±3.03)	1.44 (2.76)	0.60	0.55
Euphoria	0.02 (±0.14)	0.00 (±0.00)	0.05 (0.23)	-1.92	0.06
Apathy	1.81 (±3.39)	1.58 (±2.88)	2.22 (4.16)	-0.91	0.36
Disinhibition	0.06 (±0.60)	0.00 (±0.00)	0.16 (1.00)	-1.34	0.18
Irritability	2.72 (±3.27)	2.59 (±3.43)	2.94 (2.99)	-0.51	0.61
Aberrant motor behavior	1.19 (±2.89)	0.75 (±2.31)	1.97 (3.62)	-2.06	0.04*
Night time and Sleep Disorder	2.65 (±3.22)	2.37 (±3.11)	3.14 (3.39)	-1.14	0.25
Appetite and eating behavior disorder	1.54 (±2.54)	1.84 (±2.65)	1.00 (2.25)	1.61	0.11
Total NPI score 10	14.44 (±13.41)	14.08 (±12.56)	15.08 (14.97)	-0.36	0.72
Total NPI score 12	17.28 (±14.03)	17.17 (±13.12)	17.47 (15.69)	-0.10	0.92

Regarding medical comorbidity, 46% of participants had hypertension and 22% had diabetes mellitus. Hypothyroidism was present in 8%. Hypertension was particularly frequent among participants with vascular and mixed dementia (Table 2).

All participants had at least one neuropsychiatric symptom on the NPI. Twenty-six percent had three symptoms, while 3% had nine symptoms. The mean 12-item NPI score was 17.28±14.03, with a reported range of 0–60 (Table 3).

DISCUSSION

Socio-Demographic and Clinical Profile in BPSD

A total of 100 patients with dementia were included in our study. In the index study, Alzheimer's Disease (AD) 68% was the most common type of dementia followed by Vascular Dementia (VaD) 19% and mixed dementia 13%. AD is the most common type of dementia, both in India and in studies in Western countries. [5,6,9-11] Two-third of the study sample was male and the rest were female. The mean age of the total sample was 64.14 (±6.97) years. The mean age of male participants was 65.09 (±6.84) years and female patients had a slightly lower mean age of 62.37 (±6.97) years. The majority (72%) of the total sample were rural residents and the rest resided in urban areas. Most participants (88%) were Hindu and the remaining were Muslim. It may be due to the nature of the samples were from rural backgrounds and awareness and medical treatment sought more for males. Additionally, 92% belonged to nuclear families and 8% lived in joint families. Lack of caregivers in families may influence treatment-seeking. Nuclear families have implications in treating patients as the caregiver burden is supposed to be reduced in joint families. The education levels of the participants were generally low. 46% were illiterate, 20% had primary-level education and 22% had middle school certificates. 6% had finished high school education. A systematic review by Sharp *et al*. observed that 58% of studies reported significant effects of lower education on risk for dementia [12]. Hence low education may have some implications in impairment of cognition. Income levels of the family of the patients were predominantly low with 93% of the participants' family earning less than 10000 INR per month and the remaining earning between 10001 to 29997 INR per month. Income level has much effect on the diagnosis and management of dementia. Patients with higher income levels seem to receive earlier diagnoses and better treatment [13].

Regarding comorbidities, 22% of the study sample had diabetes mellitus while 46% had hypertension. Only 4% of the sample had a family history of dementia and only 5% of the sample had a family history of mental illness. Among the hundred patients, there were 8 patients with hypothyroidism, 1 with bronchial asthma and 2 patients each with COPD and CKD. We observed that overall patients' mean SBP was 132.76 mmHg (±18.47) mmHg, which was also similar in both male and female patients. Additionally, the mean Diastolic Blood Pressure (DBP) was 81.28 (±10.38) mmHg and had similar mean values in individual male and female categories. In our study, as per history among all AD cases, 32% had hypertension while 57.9% of the total VaD cases had hypertension and in the mixed dementia category, all of them had hypertension. Hence hypertension may have played an important role in the progression of cognitive impairment and dementia. A study concluded by Qiu *et al*. concluded that both high and low blood pressure play a part in the development of dementia [14]. The prevalence of diabetes mellitus in our study was 22%, which is quite similar to the study by Ott *et al*. [15]. In addition, we also observed 14% cases of type 2 DM in total AD patients, with 21% having DM among VaD cases and 61% prevalence among the mixed dementia cases. Alsharif *et al*. found more than half of the diabetic population had developed dementia during the sixteen years and out of the total dementia cases, nearly one-third were diagnosed with VaD, one-fifth with AD and half had unspecified dementia [16]. Diabetes mellitus has been recognized with a 1.5- to 2.5-fold greater risk of dementia among the elderly population, not only vascular dementia but also Alzheimer's disease [17]. Effectively managing these risk factors early in life might be crucial for preventing future dementia. 8% of the total patients were noted to have hypothyroidism, 8.8% of the total AD cases and 15% of the total mixed dementia cases had hypothyroidism. Hypothyroidism is associated with an increased risk of dementia and elevated TSH levels increase the risk of dementia [18,19].

Patterns of Behaviour and Psychological Symptoms in Various Types Dementia

In the index study, in the 12-item NPI test, all the patients had at least one symptom whereas, 26% had 3 symptoms. The maximum number of symptoms in the test in our study was 9, seen in 3% of the study population. Most of the studies have reported BPSD symptoms in dementia patients but there are variations in the number of reported symptoms in different populations [3,9,20]. The mean of the NPI 12-item score in our study was 17.28 (±14.03) (range 0–60), The NPI scores are varied in different populations [9,21]. Our study population has predominantly rural backgrounds with low educational status compared to the studies mentioned above, which also affects the family support system, so the more severe cases are often bed-ridden and are bound in a home setting hence they are unable to seek health care facilities.

Depression

Depression was the most frequent (64%) behavioural symptom in this study. It also corroborates with some Indian and Western studies [6,9,22,23]. We observed that depression was more prevalent in VaD cases where it was close to four-fifths of the total cases, as compared to AD cases and mixed dementia cases. Depression in VaD may be due to subcortical lesions compared with other types. In our sample, the prevalence of most of the BPSD symptoms in the AD category is more than in VaD cases, except depression, but the study done by Anor *et al*. has reported a higher prevalence of agitation, sleep disturbances and aberrant motor behaviour in VaD cases compared to AD cases [24]. In this study, fewer VaD cases and less severe cases in our sample might have led to resultant differences.

Aggression and agitation

Aggression and agitation are major sources of distress for carers. They are a frequent reason for admission. We observed irritability (54%) in more than half of our dementia cases, which is close to the findings by Altomari *et al*. and while a study by Goud *et al*. showed a higher prevalence of irritability, most of the studies outside India observed prevalence in below half of the patients. (24-44%) [20,21, 25- 27] Aggression is much more common in men with AD. It became more common with increasing cognitive impairment, rising from 8% in mild AD to 24% in severe AD [2].

Eating behaviour

Difficulties with feeding are common in dementia. These may progress from initial problems with associated spillage of food to complete dependence on others for feeding. Later, binge eating is common, occurring in 10% of patients with AD [28]. Appetite and eating disorders were also seen in 33% of the study population. Similar results were seen in other studies as well, while Goud *et al*. reported a higher prevalence of 85% [20-22,27,29].

Sleep

It may take the form of frequent walking, reduced sleep quality, or a disturbance to circadian rhythm. Day-night sleep reversal was reported in 28% of patients in one study [29]. In our study, sleep and night-time behavioural disorders (44%), can eventually lead to exhaustion for the spouse or caregivers if it persists, especially when it is associated with night wandering.

Anxiety

Anxiety is frequently associated with dementia and is more prevalent compared to depression [30]. Half of those with depression also had anxiety diagnoses. Anxiety independently increases the likelihood of later being diagnosed with dementia [30]. In this study anxiety (35%) was seen in nearly one-third of patients.

Apathy

Apathy is diminished motivation and manifests itself as a loss of desire to engage in goal-oriented behaviour and cognition [30]. It is often confused with low mood and anhedonia. Apathy is probably the most common behavioural change in AD [31]. In our study, apathy (26%) was noted in around one-fourth of patients.

Delusion

Delusion of theft and delusional misidentification are very common in AD occurring in about 23-30% of patients at some time and in about 19% during a single year.[28] The patients often believe that an object has been stolen, a spouse is unfaithful, or intruders have been in the house. We observed delusion in 19% of the cases, which is close to the prevalence of delusion seen in Indian studies [9,32].

Overactivity and Aberrant Behaviour Disorder

Several overlapping phenomena involving overactive behaviour are commonly found in AD. Agitation or painful inner tension associated with excessive motor activity. Wandering, purposeless hyperactivity and rummaging appear to affect about a quarter of dementia patients [34]. The aberrant motor behaviour was noted only in 17% of our cases which is close to the findings of Gauthier *et al*. and Baiyewu *et al*. [33,34]. Another study by Ahluwalia *et al*. reported a slightly higher prevalence [29].

Hallucinations

Hallucinations are less common than delusions and misidentification syndrome. A systematic review by Ballard & Walker found mean prevalence rates of 21% for all hallucinations (14% visual and 7% auditory) in clinical settings [35]. In our study also very few cases of hallucination, elation/euphoria and disinhibition were seen. A study by Kumar *et al*. and a Western study by Hessler *et al*. have noted a very lower prevalence of hallucination [32,35].

Disinhibition

Sexual disinhibition along with binge eating is another problem that causes great distress to carers. It occurs in about 7% of people with dementia [28]. Disinhibition was also very uncommon in studies by Ahluwalia *et al*.,2019.[30] Sexual disinhibition increases with the severity of dementia [28]. Mood changes and personality changes are also seen very early in AD and 75% of such people [28,34, 36].

Early vs Late-Onset Dementia

There were significant differences in systolic and diastolic blood pressure ($p = 0.00$ in both) and phenomenologically aberrant motor behaviour is significantly different between the two groups ($p = 0.04$). In various types of dementia (AD,

VaD, MxD) there is no significant difference in clinical presentation except appetite and eating behaviour. (p = 0.40) EOAD and LOAD represent two different forms of a single entity not only from a neuropathological, cognitive and functional level but also from a psychiatric point of view.

Limitations

As we conducted in a clinic-based setting at a tertiary care hospital, hence chances of referral bias are increased. Additionally, the small sample size limits the generalizability of our findings. Since our study was cross-sectional, we cannot definitively establish causal relationships. The diagnosis of dementia types was based on clinical diagnostic criteria supported by radiological parameters, without incorporating other neurobiomarkers such as FDG-PET and SPECT scans. We were unable to examine BPSD in other forms of dementia due to our limited set-up, hence we were unable to do the required investigation. Therefore, large community-based follow-up studies in the future may be performed to understand the problem better within the broader community and gain more insights into BPSD.

CONCLUSION

Behavioural and psychological symptoms of dementia (BPSD) are observed in almost all dementia patients when thoroughly assessed. In the index study, the most frequent BPSD included depression, irritability and sleep and night-time behavioural disorders. Other common neuropsychiatric symptoms identified in various studies are apathy, agitation and anxiety.

Additionally, it can be concluded that low educational levels may have increased the risk of dementia. Furthermore, conditions such as Type 2 diabetes mellitus and hypertension may increase the risk of cognitive impairment/dementia. Hypertensive patients are more at risk of developing cerebrovascular stroke and vascular dementia subsequently. Hypothyroid patients have an increased likelihood of developing dementia with long-duration hypothyroid levels contributing more. Hence, adequate management of these factors may decrease the burden of dementia.

REFERENCES

1. Monastero, R. *et al*. "A systematic review of neuropsychiatric symptoms in mild cognitive impairment." *Journal of Alzheimer's Disease*, vol. 18, no. 1, 2009, pp. 11–30.
2. Cerejeira, J. and L. Lagarto. "Behavioural and psychological symptoms of dementia." *Frontiers in Neurology*, vol. 3, 2012, pp. 73.
3. Frisoni, G. *et al*. "Behavioural syndromes in alzheimer's disease: Description and correlates." *Dementia and Geriatric Cognitive Disorders*, vol. 10, no. 2, 1999, pp. 130–138.
4. Aalten, P. *et al*. "The course of neuropsychiatric symptoms in dementia. part I: Findings from the two-year longitudinal maasbed study." *International Journal of Geriatric Psychiatry*, vol. 20, no. 6, 2005, pp. 523–530.
5. Steinberg, M. *et al*. "Point and 5-year period prevalence of neuropsychiatric symptoms in dementia: The cache county study." *International Journal of Geriatric Psychiatry*, vol. 23, no. 2, 2008, pp. 170–177.
6. Umesh, S. *et al*. "A multicentric exploratory study of behavioural and psychological symptom characteristics of dementia." *Indian Journal of Psychiatry*, vol. 64, no. 4, 2022, pp. 370–376.
7. World Health Organization. *The ICD-10 Classification of Mental and Behavioural Disorders: ICD-10 Diagnostic Criteria for Research*. World Health Organization, 1993.
8. Cummings, J.L. *et al*. "The neuropsychiatric inventory: Comprehensive assessment of psychopathology in dementia." *Neurology*, vol. 44, no. 12, 1994, pp. 2308–2314.
9. Mukherjee, A. *et al*. "Behavioural and psychological symptoms of dementia: Correlates and impact on caregiver distress." *Dementia and Geriatric Cognitive Disorders Extra*, vol. 7, no. 3, 2017, pp. 354–365.
10. Alladi, S. *et al*. "Subtypes of Dementia: A study from a memory clinic in India." *Dementia and Geriatric Cognitive Disorders*, vol. 32, no. 1, 2011, pp. 32–38.
11. Mathias, J.L. and J. Burke. "Cognitive functioning in alzheimer's and vascular dementia: A meta-analysis." *Neuropsychology*, vol. 23, no. 4, 2009, pp. 411–422.
12. Sharp, E.S. and M. Gatz. "Relationship between education and dementia: An updated systematic review." *Alzheimer Disease & Associated Disorders*, vol. 25, no. 4, 2011, pp. 289–304.
13. Petersen, J.D. *et al*. "Association of socioeconomic status with dementia diagnosis among older adults in Denmark." *JAMA Network Open*, vol. 4, no. 5, 2021, pp. e2110432.
14. Qiu, C. *et al*. "The age-dependent relation of blood pressure to cognitive function and dementia." *The Lancet Neurology*, vol. 4, no. 8, 2005, pp. 487–499.
15. Ott, A. *et al*. "Association of diabetes mellitus and dementia: The rotterdam study." *Diabetologia*, vol. 39, 1996, pp. 1392–1397.
16. Alsharif, A.A. *et al*. "Prevalence and incidence of dementia in people with diabetes mellitus." *Journal of Alzheimer's Disease*, vol. 75, no. 2, 2020, pp. 607–615.

17. Ninomiya, T. "Epidemiological evidence of the relationship between diabetes and dementia." *Diabetes Mellitus: A Risk Factor for Alzheimer's Disease*, 2019, pp. 13–25.
18. Wieland, D.R. *et al*. "Thyroid disorders and dementia risk: A nationwide population-based case-control study." *Neurology*, vol. 99, no. 7, 2022, pp. e679–e687.
19. Thvilum, M. *et al*. "Increased risk of dementia in hypothyroidism: A Danish nationwide register-based study." *Clinical Endocrinology*, vol. 94, no. 6, 2021, pp. 1017–1024.
20. Goud, S.S. *et al*. "Association of caregiver distress with behavioural and psychological symptoms of dementia: A cross-sectional correlational study from south India." *Journal of Indian Academy of Geriatrics*, vol. 17, no. 2, 2021, pp. 56.
21. Majer, R. *et al*. "Behavioural and psychological symptoms in neurocognitive disorders: specific patterns in dementia subtypes." *Open Medicine (Wars),* vol. 14, no. 1, 2019, pp. 307–316.
22. Thasleem, S.K. *et al*. "Association between behavioural psychological symptoms of dementia and caregiver burden in a south indian rural community." *Medical and Legal Update*, vol. 21, no. 2, 2021.
23. Poletti, M. *et al*. "Behavioural and psychological symptoms of dementia: factor analysis and relationship with cognitive impairment." *European Neurology,* vol. 69, no. 2, 2013, pp. 76–82.
24. Anor, C.J. *et al*. "The longitudinal assessment of neuropsychiatric symptoms in mild cognitive impairment and Alzheimer's disease and their association with white matter hyperintensities in the national Alzheimer's coordinating center's uniform data set." *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*, vol. 6, no. 1, January 2021, pp. 70–78.
25. Altomari, N. *et al*. "A comparison of behavioural and psychological symptoms of dementia (bpsd) and bpsd sub-syndromes in early-onset and late-ons*et al*zheimer's disease." *Journal of Alzheimer's Disease*, vol. 85, no. 2, 2022, pp. 691–699.
26. Kwon, C.Y. and B. Lee. "Prevalence of behavioural and psychological symptoms of dementia in community-dwelling dementia patients: A systematic review." *Frontiers in Psychiatry,* vol. 12, 2021, pp. 1809.
27. Zhao, Q.F. *et al*. "The prevalence of neuropsychiatric symptoms in alzheimer's disease: systematic review and meta-analysis." *Journal of Affective Disorders*, vol. 190, 2016, pp. 264–271.
28. Burns, A. *et al*. "Psychiatric phenomena in Alzheimer's disease. I: Disorders of thought content." *British Journal of Psychiatry,* vol. 157, no. 1, 1990, pp. 72–76.
29. Ahluwalia, I. *et al*. "Behavioural and psychological symptoms of dementia in alzheimer's dementia: the neuroimaging correlates." *Indian Journal of Private Psychiatry*, vol. 13, no. 2, 2019, pp. 48–51.
30. Leentjens, A.F. *et al*. "Apathy and anhedonia rating scales in Parkinson's disease: Critique and recommendations." *Movement Disorders,* vol. 23, no. 14, 2008, pp. 2004–2014.
31. Mega, M.S. *et al*. "Dementia with lewy bodies: Reliability and validity of clinical and pathologic criteria." *Neurology*, vol. 47, no. 6, 1996, pp. 1403–1409.
32. Kumar, S. *et al*. "The pattern of behavioural and psychological symptoms in patients with major neurocognitive disorder attending psychogeriatric OPD in a tertiary care teaching hospital." *Indian Journal of Social Psychiatry*, vol. 35, no. 4, 2019, pp. 296–302.
33. Gauthier, S. *et al*. "Management of behavioural problems in Alzheimer's disease." *International Psychogeriatrics*, vol. 22, no. 3, 2010, pp. 346–372.
34. Baiyewu, O. *et al*. "Behavioural symptoms in community-dwelling elderly nigerians with dementia, mild cognitive impairment and normal cognition." *International Journal of Geriatric Psychiatry*, vol. 27, no. 9, 2012, pp. 931–939.
35. Ballard, C. and M. Walker. "Neuropsychiatric aspects of Alzheimer's disease." *Current Psychiatry Reports*, vol. 1, no. 1, 1999, pp. 49–60.
36. Hessler, J.B. *et al*. "Behavioural and psychological symptoms in general hospital patients with dementia, distress for nursing staff and complications in care: Results of the general hospital study." *Epidemiology and Psychiatric Sciences*, vol. 27, no. 3, 2018, pp. 278–287.