



Behavioural and Psychological Symptoms in Dementia (BPSD) and Its Impact on Caregiver Burden

Authors

Arshad Yahya¹, Kuljeet Singh Anand², B.K Bajaj³, Jyoti Garg⁴

Department of Neurology, postgraduate Institute of Medical Education and Research, Dr Ram Manohar Lohia Hospital, New Delhi, India-110001

Corresponding Author

Dr Arshad Yahya

Yahya Neurology Clinic, Raja Bazar, Patna, Bihar, 800014, India

Email: drarshadyahya@gmail.com

Abstract

Background: BPSD increases morbidity, worsen quality of life and are a major source of care giver burden. There is paucity of data on the spectrum of BPSD and their impact on caregiver. The present study was planned to estimate the frequency, type and severity of BPSD in patients with dementia and impact of BPSD severity and type on caregiver burden.

Material and Methods: Cross sectional descriptive study among hundred patients with primary dementias and vascular dementia (VaD) excluding all other secondary dementia. NPI-Q was used to rate BPS. Caregiver burden was assessed by both NPI-Q and Novak and Guest Inventory. Statistical analysis was performed by the SPSS program for Windows, version 17.0. Continuous variables were compared using ANOVA and Categorical variables were analysed using the chi square test. Pearson Correlation was also used among various variables.

Result: Alzheimer disease was the most common dementia. Apathy was the commonest BPSD among patients with AD and VaD. Patients with FTD, DLB and PDD had motor disturbance change in appetite, hallucination and aggression. Most severe BPSD in AD, VaD, FTD, PDD and DLB was apathy, night time behaviour, disinhibition, hallucination and hallucination and irritability respectively. Most troublesome BPSD to care giver were change in night time behaviour and irritability and least was elation or euphoria. Care giver burden was highest in DLB and least in PDD.

Conclusion: Spectrum and severity of Behavioural and psychological symptoms in each type of dementia are different and increases morbidity, worsen quality of life and are a major source of care giver burden. They should be managed accordingly to relive care giver stress.

Keywords: Dementia, BPSD, Alzheimer disease, DLB, FTD, VaD, PDD, Care giver burden, NPI.

Introduction

Dementia is characterized by a progressive, irreversible impairment of cerebral functioning. Patients with Dementia may have memory loss,

impaired social and occupational functioning, impaired executive function, speech deficits, personality changes, and behavioural and psychological disturbances. The behavioural and

psychological symptoms associated with dementia (BPSD), are known to be more troublesome to the caregivers and have the greatest impact on decisions to institutionalize patients. BPSD includes symptoms of disturbed perception, thought content, mood or behaviour that frequently occur in patients with dementia¹. Cognition and behaviour are independent dimensions of dementia closely influencing each other^{2,6}. BPSD is associated with a more rapid rate of cognitive decline and greater impairment in activities of daily living^{2,7}. In the present study, we estimated the frequency and spectrum of behaviour and psychological symptoms in patients with dementia. There are studies especially Indian studies to estimate the different types of BPSD but the studies only focused on a particular type of dementia^{3,4,5}. paucity of literature is still there regarding BPS in different types of dementia. We came across few published Indian study³ in literature studying the effect of behaviour and psychological symptoms on care giver. So in this study we determined the relation between BPSD and caregiver burden.

Methods

The study was conducted in the department of Neurology at our tertiary care institute. The patients were recruited from amongst those presenting to our department by convenient consecutive sampling method. The study was duly approved by the Institutional Review Board and Institutional Ethics Committee.

One hundred patients of dementia having one or more active symptoms of BPSD of new onset or with the symptoms that had changed since the onset of dementia were included. All the patients had the BPSD symptoms during 4 weeks prior to inclusion. Caregiver was defined as a person spending at least 4 hrs/day for at least 4 days/wk with the patient and who was knowledgeable about the patient's day time and night time behaviour. Patients with secondary causes of dementia except vascular dementia were excluded from the study. Mini Mental State Examination (MMSE) and Blessed Dementia Scale³¹ were used to assess cognitive

impairment and rate severity of dementia. MMSE Score of 23 or less was defined as cognitive impairment. Patients with Blessed Dementia Scale score of 0-5, 6-11 and 12-17 were rated as mild, moderate and severe dementia respectively. All the patients with dementia were screened for BPSD by administering neuropsychiatric inventory (NPI)-Q²⁹ to the caregiver in the absence of patients. NPI-Q was used to identify and rate severity of 12 symptoms as mild, moderate and severe. . Caregiver distress of individual symptom was analysed by NPI-Q. Novak and Guest inventory was administered to estimate care giver burden³⁰. Novak and guest care giver inventory identifies 24 symptoms in 5 major categories. Total score of Novak and Guest Inventory were 96. All of the scores on the 24-item scale were summed. Novak and Guest caregiver score more than 24 was used to define significant caregiver burden and score more than 36 was considered as very disabling for care giver.

Statistical Analysis

Statistical analysis was performed by the SPSS program for Windows, version 17.0. Continuous variables were compared using ANOVA and Categorical variables were analysed using the chi square test. Pearson Correlation was also used among various variables. For all statistical tests, a p value less than 0.05 was taken to indicate significance.

Results

Alzheimer disease followed by vascular dementia were the two most common dementias observed in our study population

Table 1: Frequency of each dementia, age and gender profile

Types of dementia	Frequency %	Mean age	Male %	Female %
AD	50	69.98±8.28	58	42
DLB	1	55	100	0
FTD	11	62±5.89	90.9	9.1
PDD	2	75;73*	100	0
VaD	36	62.38±12.41	75	25

*only two patients of PDD were present in this study.

Age and gender profile of patients

The mean ages (\pm SD) of patients with AD, VaD and FTD were 69.98 years (\pm 8.28), 62.38 yrs (\pm 12.419) and 62 yrs (\pm 5.899) respectively. Two patients diagnosed as PDD were aged 73 and 75 years. There was only one 55 years old patient of DLB (Table 1). Our study population included 69 males. Eighty six percent of patients with AD had disease for less than 6 years with 40% of them presenting within 3 years of disease manifestations.. Most of the patients with VaD (77.8%) presented with in 3 years of clinical manifestation Only 8 patients had VaD for 3-6years. 36.4% FTD patients were in <3 years group and in 3-6 years group and (27.3%) patients were in >6 years group. All the patients of PDD and DLB presented with in 3 years of disease manifestations.

Types of BPSD, its severity and relation with caregiver burden (Table 2)

Apathy, irritability, change in appetite and eating pattern, night time behaviour changes, depression and dysphoria and motor disturbances were observed in more than half of the patients. .

Night time behaviour, irritability, apathy, disinhibition and delusions were observed to be the most distressing BPSD as determined with caregiver burden score. Least distressing BPSD were elation and euphoria (1.35 ± 0.86), hallucination (2 ± 1.02), depression or dysphoria (2 ± 1.06), change in appetite and eating (2.16 ± 0.99), motor disturbances (2.55 ± 1.39), anxiety (2.56 ± 0.99) and agitation and aggression (2.60 ± 0.93).

Time dependency items followed by Development items, Emotional Health and Physical Health items were the most affected domains of the Novak and Guest Care Giver Burden Inventory. Social Relationship item was the least affected domain of the caregiver burden score (Table 3)

Alzheimer Disease and BPSD

In AD, apathy (88%) followed by irritability (80%) were observed to be the most common BPSD. Elation and euphoria were detected in only 4% of patients with AD. Apathy followed by delusions was the most severe of all BPSD in patients with AD.

Table 2: BPSD frequency and care giver burden by NPI-Q

NPI-Q	Total(N)	Mean Freq	SD	Care giver burden freq	SD
Delusion	22	1.82	0.50	2.77	0.92
Hallucination	22	1.48	0.59	2.00	1.02
Agitation or Aggression	49	1.78	0.70	2.60	0.93
Depression	53	1.60	0.56	2.00	1.06
Anxiety	44	1.80	0.58	2.56	0.99
Elation or Euphoria	17	1.71	0.58	1.35	0.86
Apathy	88	2.20	0.69	2.80	1.18
Disinhibition	23	2.00	0.67	2.78	1.17
Irritability	66	1.96	0.68	2.82	1.07
Motor disturbance	52	1.98	0.66	2.55	1.39
Night time behavior	55	1.96	0.83	3.10	1.22
Appetite and eating	57	1.64	0.66	2.16	0.99

Table 3: Care giver burden in each domain of Novak and Guest Inventory

	Time Dependency Items	Development Items	Physical Health Items	Emotional Health Items	Social Relationship Items	Total Score
N	100	100	100	100	100	100
Mean	9.29	7.77	3.99	6.97	2.92	30.91
Std. Deviation	6.495	6.316	4.163	4.586	3.022	21.909
Minimum	0	0	0	1	0	2
Maximum	20	20	14	16	15	81

Vascular Dementia and BPSD

In VaD, the most common BPSD was apathy (86.1%), and least common was hallucination (8.3%). Night time behaviour accounted for the

maximum severity of BPSD. Interestingly delusions were not observed to be the most severe BPSD in patients with vascular dementia.

FTD and BPSD

Motor disturbances, change in appetite and eating, and apathy were observed in all the patients with FTD. Hallucinations were observed in 27% of patients only. Disinhibition was detected to be the most severe BPSD and hallucinations the least severe.

PDD and BPSD

In PDD both the patients had hallucination and apathy. In PDD group, BPSD severity score was more for hallucination and less for apathy or indifferences.

DLB and BPSD

There was only one patient of DLB with hallucination, agitation, motor disturbances, irritability, anxiety, night time behaviour and change in appetite and eating. Most severe symptoms of BPSD found in DLB were hallucination, irritability and change in appetite and eating. Other symptoms were followed by change in night time behaviour, motor disturbances, anxiety and agitation and aggression (Table 4).

Table 4: BPSD Severity score and care giver stress in different types of dementia by NPI-Q

Diagnosis		Delusion	Hallucination	Agitation Or Aggression	Depression Or Dysphoria	Anxiety	Elation Or Euphoria	Apathy	Disinhibition	Irritability	Motor Disturbances	Night Time Behavior	Appetite And Eating
AD	MEAN SEVERITY OF BPSD±SD	2.00±0.00	1.38±0.50	1.72±0.67	1.61±0.49	1.89±0.57	1.00±0.00	2.18±0.69	1.90±0.31	1.90±0.74	1.93±0.73	1.80±0.80	1.56±0.57
AD	MEAN CARE GIVER SCORE±SD	2.75±0.86	1.91±0.99	2.72±0.73	2.17±0.98	2.74±0.98	0.50±0.70	2.93±1.16	2.30±0.67	2.74±1.18	2.33±1.44	3.00±1.38	1.90±0.68
DLB	MEAN SEVERITY OF BPSD±SD	-	3.00±0.00	2.00±0.00	-	2.00±0.00	-	-	-	3.00±0.00	2.00±0.00	2.00±0.00	3.00±0.00
DLB	MEAN CARE GIVER SCORE±SD	-	4.00±0.00	3.00±0.00	-	3.00±0.00	-	-	-	4.00±0.00	3.00±0.00	3.00±0.00	4.00±0.00
FTD	MEAN SEVERITY OF BPSD±SD	2.20±0.44	1.33±0.57	2.33±0.51	1.75±0.50	2.00±0.00	1.71±0.75	2.27±0.64	2.50±0.75	2.00±0.57	1.91±0.53	1.44±0.72	1.64±0.67
FTD	MEAN CARE GIVER SCORE±SD	3.60±0.89	1.66±1.15	3.00±1.26	2.25±0.95	3.00±0.00	1.42±1.13	2.72±1.10	3.87±0.99	3.00±1.15	2.63±1.43	2.75±0.95	2.75±1.28
PDD	MEAN SEVERITY OF BPSD±SD	-	2.00±0.00	-	-	-	-	2.00±0.00	-	-	-	-	-
PDD	MEAN CARE GIVER SCORE±SD	-	3.00±0.00	-	-	-	-	1.00±0.00	-	-	-	-	-
VaD	MEAN SEVERITY OF BPSD±SD	1.00±0.00	1.30±0.58	1.71±0.72	1.58±0.64	1.58±0.64	1.88±0.35	2.29±0.69	1.40±0.54	2.06±0.53	2.23±0.59	2.60±0.63	1.67±0.68
VaD	MEAN CARE GIVER SCORE±SD	2.00±0.00	1.67±0.57	2.29±1.05	1.81±1.13	1.92±0.96	1.50±0.53	2.74±1.18	2.00±1.00	2.89±0.76	3.00±1.30	3.40±0.98	2.11±1.02

Overall severity of BPSD on the basis of average of individual symptom mean (score±SD) were maximum in DLB followed by FTD, VaD, AD (1.7391±0.51) in decreasing order and least in PDD. Overall care giver stress on the basis of average of individual symptom mean stress (scores±SD) by NPI-Q were maximum in DLB (3.428±0) followed

by FTD (2.723±1.027), AD (2.334±0.984), VaD (2.25±0.878) and least in PDD (2±0).

In our study highest care giver burden by Novak and Guest Inventory calculated by total(score±SD) was found highest in DLB (67±0), followed by FTD (51±15.72), VaD (32.14±21.84), AD (25.88±20.19) and least in PDD (5.5±0.7) (Table 5)

Table 5: Care giver stress in different types of Dementia by Novak and Guest Inventory

Diagnosis		Time Dependancy Items	Development Items	Physical Health Items	Emotional Health Items	Social Relationship Items	Total Score
AD	N	50	50	50	50	50	50
	Mean	7.42	6.74	3.4	6.08	2.3	25.88
	Std. Deviation	5.901	6.087	4.399	4.135	2.501	20.197
DLB	N	1	1	1	1	1	1
	Mean	14	20	13	15	8	67
	Std. Deviation	-	-	-	-	-	-
FTD	N	11	11	11	11	11	11
	Mean	15	12.91	6.36	11.27	5.36	51
	Std. Deviation	3.578	3.78	3.472	4.777	3.472	15.729
PDD	N	2	2	2	2	2	2
	Mean	4.5	0	0	1	0	5.5
	Std. Deviation	0.707	-	-	-	-	0.707
VAD	N	36	36	36	36	36	36
	Mean	10.24	7.73	4.05	7	3.05	32.14
	Std. Deviation	6.97	6.275	3.621	4.275	3.153	21.848

Severity of each symptom of BPSD was significantly positively correlated ($P < 0.05$) with its Care giver burden score assessed by NPI-Q. Severity of symptoms of BPSD and severity of cognitive involvement on the basis of total MMSE and Blessed dementia score of each patient were also analysed. MMSE shows negative correlation with subscale of NPI-Q including change in appetite and eating, night time behaviour, disinhibition, apathy, elation or euphoria, depression, hallucination and delusion but only significantly with anxiety ($r = 0.317, p = 0.049$). Blessed dementia score shows significant positive correlation with hallucination ($r = 0.435, p = 0.043$) depression ($r = 0.545, p < 0.001$), apathy ($r = 0.504, p < 0.001$), irritability ($r = 0.0243, p = 0.049$), motor disturbance ($r = 0.407, p = 0.003$), night time behaviour ($r = 0.502, p < 0.001$). In the study, Total BPSD score was significantly correlated with total care giver burden score by NPI-Q ($p < 0.001$) and Novak and Guest Inventory care giver score ($p < 0.001$). Total BPSD score was also significantly correlated with Blessed Dementia score (Figure 22) ($p < 0.001$), duration of illness ($p = 0.005$) (Figure 23). Total care giver burden score by NPI-Q was also significantly correlated with Blessed Dementia score ($p < 0.001$), duration of illness ($p < 0.001$), total care giver score by Novak and Guest Inventory ($p < 0.001$). Total care giver burden score was also significantly correlated with above discussed domain but not with MMSE.

Discussion

Although Behavior and psychological symptoms are not included as core features in the definition of the dementia syndrome, about two-thirds of people with dementia experience some BPSD at any one time point⁸. BPSD can impact patient functioning, and may lead to premature transition to structured living environments and institutionalization⁹. There are marked regional and cultural variations in the type and frequency of the BPSD.

The caregivers have to bear the brunt of the dementia patients and BPSD is the most important factor predicting the caregiver burden in dementia.

In India, the majorities of the caregivers are women in 70% of cases, and are mostly wife, daughter, and daughter-in-law.

Recognition of BPSD is the first and most important step in devising a management plan. Deteriorating cognition is associated with variation in BPSD.

The characteristics of the behaviour or symptoms together with the frequency, severity and impact on the patient and caregiver must be identified before formulating a tailored and targeted plan of action which is likely to involve pharmacological and non-pharmacological interventions.

In this study AD was the most common dementia (50%) followed by VaD (36%) and FTD (11%). DLB and PDD constitute only 1% and 2% respectively. These findings were consistent with findings published in literature. Less number of DLB cases might be either due predominant behavioural symptom's reporting to psychiatry or due to ethnic and geographical differences in the prevalence of DLB. Few earlier studies with less prevalence of DLB also supported the idea¹⁰. Patients of DLB, VaD, and PDD presented to us early as compared to patients of AD and FTD who presented equally in all stages in term of onset of symptoms. The difference in presentation is due to the diversity of symptoms in different types of dementia. In the present study by using NPI-Q most common BPSD found was apathy (88%), followed by irritability (66%), appetite and change in eating pattern (57%). The findings are consistent with the studies performed earlier^{11,12}. In our study night time behaviour changes i.e. night time awakening, inability to sleep in night with frequent wandering and early morning awakening were also common. These are in consonance with earlier studies¹³⁻¹⁶.

In our study, in AD, most common BPSD was apathy (88%), followed by irritability (80%), night time behaviour (60%), motor disturbances (54%), change in appetite and eating (54%), anxiety (54%), agitation and aggression (50%). These findings are comparable to previous study reports. Boyles PA et al reported that apathy affects over 70% of individuals with AD in the mild to moderate stages and over 90% of patients in the later stages; and is

one of the most common neuropsychiatric symptom¹⁷.

In VaD most common BPSD found in our study was also apathy (86.1%), followed by depression (72.2%), irritability (50%), change in Appetite and eating (50%), agitation and aggression (47.2%), night time behaviour (41.6%). Study conducted by Salka et al¹⁸ and Meena gupta et al⁴ and others¹⁹ also reported similar finding

In FTD most common BPSD found in our study was motor disturbances (100%), change in appetite and eating (100%), apathy (100%), night time behaviour (81%), disinhibition (72.72%), elation or euphoria and irritability (63.63%), agitation and aggression (54.54%), delusion (45.45%).. Changes in appetite and eating and motor disturbances were common features of study conducted by Ikeda et al and Fernandez Martinez et al¹⁹ respectively. Regarding hallucination and delusion, studies were in favour of less hallucinatory and delusionary behaviour in FTD especially in the early part of illness. In our study there were significant number of patients with these behaviours and explanation to these might be the late presentation of FTD patients. Patient of DLB presented with hallucination, agitation, motor disturbances, irritability, anxiety, change in night time behaviour, appetite and eating behaviour reflecting the similar finding of the earlier study²¹. We have only one patient of DLB to analyse, so we can't generalize our finding.

Aarsland et al²¹ noted depression, apathy, anxiety and hallucinations as the most common symptoms in PDD quite similar to the results of this study.

Night time behaviour, irritability, apathy and delusion were the most distressing and elation or euphoria, hallucination and depression or dysphoria was least distressing BPSD quite similar to finding of K S Shaji et al Huang SS et al²² and others²³. In this study night time behaviour in the form of wandering here and there and trying to disturb family members, was the most disturbing to care giver. Care givers rated it high because of their strong impact on physical and economical status and were also reported by multiple studies²⁴⁻⁶.

In present study care giver burden assessed by Novak and Guest Inventory affect more severely to Time Dependency Items, followed by Developmental, Emotional and Physical Items. Least affect was found on Social Relationship Item. Time Dependency Items, Developmental and Physical Items were also affected badly in a study by Lily Dongxia Xiao et al²⁷.

Overall severity of BPSD, on the basis of averages of mean score of severity of different BPSD symptoms were maximum in DLB followed by FTD, VaD, AD and least in PDD were found in our study. Overall care giver stress on the basis of average of individual symptom mean care giver scores assessed by NPI-Q were maximum in DLB followed by FTD, and least in PDD which also matches with the burden score by Novak and Guest Inventory. Care giver burden score was more for AD than VaD by NPI-Q and less for AD by Novak and Guest Inventory but the difference was insignificant. These results of our study are every much similar to previous study by Ming- Jang Chiu et al by which highest total score of BPSD and Caregiver burden were highest in DLB. Previous reports suggest that caregiver burden differs by type of dementia and disease progression. In a study by Vetter et al²⁸, patients with early stage VaD imposed a greater burden on caregivers than did patients with AD. As time progresses, this relationship reverses, and caregivers of patients with AD report greater burden than do caregivers of patients with VaD. In our study, more patients of AD presents to us late than patients of VaD, but patients of VaD scores poorly than AD on Blessed dementia Scale. Amalgamation of these characteristics might be the reason of above mentioned findings regarding the difference of care giver burden of patients of AD and VaD. As expected, and reported by previous study²⁷ severity of each symptom of BPSD was significantly correlated ($P < 0.05$) with its care giver burden score assessed by NPI-Q. MMSE shows significant negative correlation with subscale of NPI-Q including anxiety. Blessed dementia score shows significant positive correlation with hallucination, depression, apathy, irritability, motor

disturbances, night time behaviour .These finding were suggestive of patients with more physical inactivity were more apathetic and depressed; they were hallucinating with more night time behaviour abnormalities along with irritable personality. In our study Total BPSD score was significantly correlated with total care giver burden score by NPI-Q and Novak and Guest Inventory care giver score. Previous studies²⁷ also shows a strong positive correlation between the severity of BPSD and caregiver distress in both cohorts of Chinese and Australian study population.

Limitation of the Study

Subscales of BPSD were not provided in NPI-Q, so assessment of types of delusion, hallucination, character of night time behaviour and motor disturbances were not possible.

Conclusion

Care giver burden assessed by both NPI-Q and Novak and Guest Inventory directly correlates with the spectrum and severity of BPSD. Recognition of BPSD early and treat them appropriately will reduce the burden on caregiver.

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