Behavioral and psychological characteristics of patients with different types of dementia in Mansoura, Egypt

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Objective
This study aimed to describe the behavioral and psychological symptoms of patients with different types of dementia and to correlate these symptoms to demographic and clinical variables of dementia such as age, sex, and score of cognitive assessment scales.
Patients and methods
This study was carried out on 73 patients with dementia. Patients were classified into three groups: patients with Alzheimer dementia, patients with vascular dementia, and patients with mixed dementia. Cognitive evaluation of the three groups was performed by the Mini Mental State Examination and Clock Drawing Test. The neuropsychiatric inventory was used to assess behavioral and psychological symptoms. Daily activities were assessed using Activities of Daily Living and The Lawton Instrumental Activities of Daily Living.
Results
Apathy depression, and sleep disturbances were most prevalent in Alzheimer dementia, whereas depression, anxiety, and apathy were most prevalent in vascular dementia and in the miscellaneous group. There was a highly statistical difference between the three groups as regards depression and anxiety ($P \leq 0.0001$). Duration of illness correlated negatively with the scores of Mini Mental State Examination ($P < 0.001$), Clock Drawing Test ($P < 0.001$), Activity of the Daily Living ($P < 0.001$), and the Lawton Instrumental Activities of Daily Living scores ($P = 0.003$). Severity of the symptoms was higher in the miscellaneous group of dementia and lower in the Alzheimer group ($P < 0.001$).
Conclusion
Apathy, depression, anxiety, and sleep disturbances were the most prevalent psychiatric symptoms. The severity of the symptoms was lower in the Alzheimer group and worse in the miscellaneous group. There was a positive correlation between the cognitive function and the functionality of those patients.

Keywords:
Dementia, Alzheimer, vascular, cognition, daily living

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Introduction

People are living longer than ever before because of the improvement in health care and scientific development. In a comprehensive study of the elderly in Egypt in 2008, they suspected that in 2050 they will exceed 20% (Armstrong and Mitchell, 2008).

One of the major consequences of this growth is the increased prevalence of dementia worldwide (Ferri *et al.*, 2005). Dementia is defined as 'an acquired, generalized, and usually progressive impairment of cognitive function that affects the contents, not the level of consciousness' (Sadock and Sadock, 2007; Apostolova and Cummings, 2008). It is considered the main chronic disease leading to disability and dependence in older people worldwide (Prince *et al.*, 2013). The vast majority of patients with dementia, irrespective of its subtype, experience behavioral and psychological symptoms also known as neuropsychiatric symptoms (NPSs) (Lyketsos *et al.*, 2001). They include agitation, aberrant motor behavior, anxiety, elation, irritability, depression, apathy, disinhibition, delusions, hallucinations, and sleep or appetite changes (Lyketsos *et al.*, 2001; Lawlor 2002; Tascone Ldos *et al.*, 2008).

NPSs are significantly prevalent in approximately one-third of community-dwelling persons with dementia (Lyketsos *et al.*, 2000). This prevalence increases to 80% in persons with dementia residing in nursing

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facilities (Margallo-Lana *et al.*, 2001). They add significantly to the direct and indirect costs of care more than the cognitive deficits, and they are usually associated with poor outcomes (Murman and Colenda, 2005).

This study aimed to describe the behavioral and psychological symptoms of patients with different types of dementia and to correlate these symptoms to demographic and clinical variables of dementia such as age, sex, and score of cognitive assessment scales.

Patients and methods

This cross-sectional study was carried on 73 patients with dementia recruited from the psychiatry and neurology clinics, Mansoura University Hospitals, from February 2012 to September 2015. The study was approved by the Ethics committee of Mansoura University faculty of medicine. Signed informed consent was obtained from their caregivers who agreed to participate in the study. We excluded patients with severe speech, hearing, or visual problems. In addition, we did not enroll those with evident disturbance of consciousness.

The diagnosis of dementia was initially performed by the *Diagnostic and Statistical Manual of Mental Disorders*, 4th ed. text revision (DSM-IV-TR) criteria (, 2000), and then further confirmation was made by the National Institute of Neurological and Communicative Disorders and Stroke–Alzheimer Disease and Related Disorders Association criteria (McKhann *et al.*, 1984) for the diagnosis of Alzheimer dementia (AD), and National Institute of Neurological Diseases and Stroke – Association criteria for vascular dementia (VD) (Roman *et al.*, 1993) for the diagnosis of VD.

All patients were subjected to thorough clinical and laboratory investigations, as well as brain imaging studies (computed tomography and MRI). Patients were classified according to diagnostic criteria and investigations into three groups: patients with AD, patients with VD, and patients with miscellaneous dementia (other types of dementia).

Cognitive evaluation of the three groups was performed by the Mini Mental State Examination (MMSE) (Folstein *et al.*, 1975) and Clock Drawing Test (CDT) (Royall *et al.*, 1998). The neuropsychiatric inventory (NPI) (Cummings, 1997) was used to assess behavioral and psychological symptoms. Daily activities were assessed using Activities of Daily Living (ADLs) (Lawton and Brody, 1969) and The Lawton Instrumental Activities of Daily Living (Cummings *et al.*, 1994).

Mini Mental State Examination

It is designed to test a range of everyday mental skills. The maximum score is 30 points. A score of 25–30 is within the normal range. A score of 20–24 suggests mild impairment, 13–19 suggests moderate impairment, and 12 or less indicates severe impairment (Folstein *et al.*, 1975).

Clock Drawing Test

CDT has been designed by Royall *et al.* (1998). The patient must be able to initiate and maintain his concentration to complete the clock (Manos and Wu, 1994; Berit, 1998; Royall *et al.*, 1998). Assessment of CDT was performed on a scale of 0–6 (Shua-Haim *et al.*, 1996).

Neuropsychiatric inventory

The NPI originally consisted of 12 items (NPI-12): delusions, hallucinations, depression/dysphoria, anxiety, agitation/aggression, euphoria, disinhibition, irritability/lability, apathy, aberrant motor activity, sleep disturbances, and appetite changes (Cummings *et al.*, 1994). Individual symptoms are rated as presenters not during the last 4 weeks; subsequently, the frequency (1–4) and the severity (1–3) of the symptoms are rated. The frequency score and the severity score are multiplied into a subscore (0–12 points). The total score was obtained by adding up the scores for each symptom. The global score ranged from 0 (no symptoms) to 144 points.

Activities of Daily Living

It measures independence in ratings from 0 to 3. A score of 0 represents complete independence (no impairment), whereas a score of 3 represents complete dependence (impairment). Scoring is based on how an individual usually performs a task (Lawton and Brody, 1969).

The Lawton Instrumental Activities of Daily Living

It contains eight items, with a summary score from 0 (low function) to 8 (high function); the higher the score, the greater the person's abilities (Cromwell *et al.*, 2003).

Statistical analysis

Statistical analysis was carried out using SPSS statistical package, version 22 (SPSS Inc., Chicago, Illinois, USA). Wilcoxin test was used for the paired nonparametric sample, one-way analysis of variance was used for comparison of the parametric samples of the three types of dementia, and χ^2 was also used.

Table 1 Demographic characteristics of the participants

Demographic	AD	VD	MD	*P*
n (%)	40 (54.79)	18 (24.66)	15 (2.55)	
Age of onset	66.93±4.61	62.28±3.64	68.67±5.91	0.000**
Age	71.75±5.969	69.83±5.159	71.53±4.658	0.466
Sex (male/female)	26/14	14/4	12/3	0.428
Marital status (single/married)	10/30	6/12	5/10	0.736
Education (noneducated/educated)	28/2	18/0	15/0	0.428
Living (alone/with others) arrangements	2/38	0/18	1/14	0.577
Income (unsatisfactory/satisfactory)	19/21	12/6	6/9	0.261
Mini Mental State Examination (mean±SD)	18.33±4.779	16.17±5.393	17.07±5.007	0.293
Clock Drawing Test (mean±SD)	1.40±0.632	1.22±0.647	1.13±0.640	0.326
Activities of Daily Living (mean±SD)	4.83±1.412	4.56±1.542	4.47±1.457	0.655
The Lawton Instrumental Activities of Daily Living (mean±SD)	5.95±2.050	5.56±2.332	5.27±2.282	0.550
NPI (mean±SD)	13.78±8.499	16.83±8.284	25.87±11.154	0.000**

AD, Alzheimer dementia; MD, miscellaneous dementia; VD, patients with vascular dementia. **Means $P \leq 0.001$.

Table 2 Prevalence of psychiatric symptoms in different types of dementias

NPI	AD [*n* (%)]	VD [*n* (%)]	MD [*n* (%)]	*P*
Delusion	5 (12.5)	2 (11.11)	2 (11.11)	0.981
Hallucinations	7 (17.5)	5 (27.77)	5 (27.77)	0.417
Agitations	9 (22.5)	6 (33.33)	6 (33.33)	0.403
Depression	13 (32.5)	13 (72.22)	13 (72.22)	0.000**
Anxiety	12 (30)	13 (72.22)	13 (72.22)	0.000**
Euphoria	1 (2.5)	2 (11.11)	2 (11.11)	0.269
Apathy	30 (75)	7 (38.88)	7 (38.88)	0.015*
Disinhibition	3 (7.5)	3 (16.66)	3 (16.66)	0.380
Irritability	10 (25)	5 (27.77)	5 (27.77)	0.832
AMA	5 (12.5)	5 (27.77)	5 (27.77)	0.165
Appetite	9 (22.5)	5 (27.77)	5 (27.77)	0.713
Sleep	14 (35)	5 (27.77)	5 (27.77)	0.868

AMA, aberrant motor activity; AD, Alzheimer dementia; MD, miscellaneous dementia; NPI, neuropsychiatric inventory; VD, vascular dementia. *$P \leq 0.05$ significant. **$P \leq 0.001$.

P value less than or equal to 0.05 was considered statistically significant.

Results

The majority of patients in our sample were diagnosed with Alzheimer's disease (54.79%), followed by VD (24.66%) and then the miscellaneous group (2.55%). There was a highly statistically significant difference between the three groups as regards the age of onset (P=0.000). There was no statistically significant difference as regards age, sex, marital status, education, living arrangement, or income (Table 1).

With regard to prevalence of psychiatric symptoms in each group, apathy, depression, and sleep disturbances were most prevalent in AD, whereas depression, anxiety, and apathy were most prevalent in VD and in the miscellaneous group (Table 2). There was a highly statistical difference between the three groups as regards depression and anxiety ($P \leq 0.0001$).

There was a positive correlation between the age of the patient and the age of onset (P<0.001) and the duration of the illness (P=0.008). There was a correlation between female sex and prolonged duration of illness (P=0.021). There was a negative correlation between the age of onset and education (P=0.031) and a positive correlation with income (P<0.001). Living with others correlated with older age of onset (P=0.031). Duration of illness correlated negatively with the scores of MMSE (P<0.001), CDT (P<0.001), Activity of the Daily Living (P<0.001), and the Lawton Instrumental Activities of Daily Living scores (P=0.003). Severity of the symptoms was more in the miscellaneous group of dementia and lower in the Alzheimer group (P<0.001) (Table 3).

Discussion

In our study, the prevalence of NPS in patients with dementia differed according to the type of dementia. The most prevalent symptoms were apathy, depression, anxiety, and sleep disturbances. This resembles previous results obtained from samples in the Eastern Region, Saudi Arabia (Amr *et al.*, 2014).

Prevalence rates of depression in our sample ranged from 32.5% in the Alzheimer group to 72.22% in the other two groups, which is slightly higher than that found in other studies (Bergh and Selbæk, 2012), in which the prevalence rates for depression ranged from 22 to 38% (median 28%). The prevalence rate of anxiety in our sample ranged from 30% in the Alzheimer group to 72.22% in the other two groups, which is also higher than other studies in which prevalence rates for anxiety ranged from 17 to 25% (median 22.5%) (Bergh and Selbæk, 2012). Mega *et al.* (1996) found that increased severity of depression and anxiety was associated with increasing dementia severity.

Table 3 Correlation between different demographic variables, cognitive function, and severity of the symptoms

	Age of onset	Duration	MMSE	Clock Drawing Test	Activities of Daily Living	The Lawton Instrumental Activities of Daily Living	NPI
Age							
r	0.832**	0.309**	−0.130	−0.199	−0.196	−0.165	−0.069
P	0.000	0.008	0.273	0.091	0.097	0.162	0.559
Sex							
r	0.062	0.270*	−0.182	−0.175	−0.098	−0.057	0.013
P	0.603	0.021	0.124	0.138	0.412	0.631	0.913
Marital							
r	0.050	−0.202	0.035	0.118	0.117	−0.022	0.012
P	0.672	0.086	0.766	0.321	0.322	0.852	0.922
Education							
r	−0.252*	0.174	−0.018	−0.080	−0.080	0.023	−0.009
P	0.031	0.141	0.879	0.502	0.500	0.850	0.942
Income							
r	0.690**	0.144	0.011	−0.046	−0.069	−0.031	−0.121
P	0.000	0.223	0.926	0.701	0.562	0.796	0.309
Living arrangement							
r	0.252*	−0.174	0.018	0.080	0.080	−0.023	0.009
P	0.031	0.141	0.879	0.502	0.500	0.850	0.942
Age of onset							
r		−0.238*	0.091	0.054	0.062	0.034	0.005
P		0.043	0.446	0.650	0.603	0.778	0.968
Duration							
r	−0.238*		−0.401**	−0.453**	−0.459**	−0.345**	−0.091
P	0.043		0.000	0.000	0.000	0.003	0.445
Diagnosis (1=Alzheimer, 2=vascular, 3=miscellaneous)							
r	0.035	0.108	−0.134	−0.175	−0.106	−0.130	0.450**
P	0.772	0.365	0.259	0.138	0.370	0.274	0.000
MMSE							
r	0.091	−0.401**		0.932**	0.872**	0.791**	−0.015
P	0.446	0.000		0.000	0.000	0.000	0.901
Clock Drawing Test							
P	0.054	−0.453**	0.932**		0.919**	0.820**	−0.046
r	0.650	0.000	0.000		0.000	0.000	0.700
Activities of Daily Living							
r	0.062	−0.459**	0.872**	0.919**		0.881**	−0.053
P	0.603	0.000	0.000	0.000		0.000	0.655

MMSE, Mini Mental State Examination; NPI, neuropsychiatric inventory. *$P \leq 0.05$ (significant), **$P \leq 0.001$.

As these symptoms tend to fluctuate over the course of dementia, this can help in explaining the wide range in the prevalence of these psychological symptoms.

The prevalence rates of delusion vary across the different studies, with a range of 9–26% (median 16%) (Bergh and Selbæk, 2012; Steinberg *et al.*, 2014). Psychotic symptoms (delusion and hallucination) were less prevalent in our sample, especially in the Alzheimer group, which resembles the results found in the study by Ballard *et al.* (1997). The Cache County study of aging showed that delusions were common in AD than in VD patients (Steinberg *et al.*, 2008).

Apathy is a frequent symptom in persons with dementia, ranging from 19 to 34%, with a median of 26% (Bergh and Selbæk, 2012). Apathy showed high prevalence in our Alzheimer group (75%), whereas it was less in the other two groups (38.88%), which was slightly higher than that found in other studies. However, our results are in accordance with the finding that studies including only patients with Alzheimer's disease report higher prevalence rates of depression, anxiety, and apathy compared with studies that include patients independently of etiological dementia diagnosis (Bergh and Selbæk, 2012).

Prevalence rates of agitation/aggression ranged from 20 to 35%, with a median of 27%, followed by irritability (range 20–27%; median 25%), aberrant motor behavior (range 10–32%; median 15%), and disinhibition (range 8–17%; median 15%) (Bergh and Selbæk, 2012), which to a great extent matches our results.

This study reveals that severity of the symptoms was lower in the Alzheimer group and worse in the miscellaneous group, which is in accordance with the study by Andersen *et al.* (2004). There was no other significant correlation between age, sex, marital status, education, or income with the NPI scores, which resembles what Fernndez Martinez *et al.* found (Fernández Martínez *et al.*, 2008; Selbaek *et al.*, 2007) which was similar to the results in the study by Fernández Martínez *et al.* (2008).

The diagnosis of dementia not only depends on the cognitive decline but also on the effect of this decline on the person's work, usual social activities, or relationships with others (APA, 2000). We found a strong negative correlation between the duration of the illness and the cognitive function (the longer the duration, the worse the scores on MMSE and CDT). There was also a strong negative correlation between the duration of the illness and the daily activities of the patients.

There was a positive correlation between cognitive function and daily activities (the better the cognitive function, the better the functionality of the patients). Deterioration in cognitive functions affects patients' functionality and, in most cases, may lead to institutionalization, which is linked to an increased need for caregiver assistance (Bullock and Hammond, 2003).

Female sex showed prolonged duration of illness, which supports the finding of Mölsä *et al.* (1995) that men carried a less favorable survival prognosis than women, both in AD and in multi-infarct dementia, and that the relative risk of dying for women was half that for men in both diseases.

The interpretation of the association between education and dementia remains controversial. Correlations revealed that noneducated patients in our sample showed a later age of onset compared with educated patients, which seemed strange, but this may be explained by the higher number of noneducated patients in our sample. In a study conducted by Cobb *et al.* (1995), they concluded that low educational level was not a significant risk factor for the incidence of dementia generally or of AD, whereas Katzman (1993) proposed that education could postpone the clinical expression of dementia by increasing the neocortical synaptic density (the 'brain reserve' hypothesis).

Stern *et al.* (1994, 1995) suggested that higher educational and occupational attainment could cope with advanced pathologic changes of the disease more effectively by maintaining the function longer (the 'cognitive reserve' hypothesis). Others (Del et al., 1999) have argued that persons with greater educational attainment and associated higher socio-economic status may have generally healthier lifestyle that may spare the brain from lesions contributing to dementing disorders (the 'brain battering' hypothesis).

Limitations

The small sample size is a major limitation. In addition, the sample was collected only from patients attending Mansoura University Hospitals, and this does not represent the whole Egyptian community. In addition, the sampling method was purposive because of the limited number of patients.

Conclusion

There is a clinical difference in the prevalence of some individual symptoms in certain types of dementia. Apathy, depression, anxiety, and sleep disturbances were the most prevalent ones. The severity of the symptoms was lower in the Alzheimer group and worse in the miscellaneous group. There was a positive correlation between cognitive function and functionality of those patients.

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Conflicts of interest

There are no conflicts of interest.

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