

# Depression in elderly patients with Alzheimer dementia or vascular dementia and its influence on their quality of life

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## ABSTRACT

**Background:** Alzheimer dementia (AD) and vascular dementia (VD) are the most common causes of dementia in the elderly. Depression is an important co-morbid disorder in these diseases, which is often challenging to recognize. We investigated the prevalence of depression in patients with AD and VD and estimated the influence of depression on the health-related quality of life (HrQoL) in these patients. **Materials and Methods:** We evaluated prevalence of depression in consecutively recruited patients with AD or VD (n= 98). Depression was diagnosed according to criteria of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) and scored using the Geriatric Depression Scale. The EuroQol (EQ-5D and visual analogue scale) was applied to evaluate HrQoL. The severity of cognitive impairment was measured by the Mini-Mental State Examination (MMSE). Multiple regression analysis was used to identify factors predicting severity of depression. **Results:** The prevalence of depression in AD/VD was 87%. In comparison to the general population, HrQoL measured on the visual analogue scale was reduced by 54% in patients with AD/VD. In the dimension “anxiety/depression” of the EQ-5D, 81% of patients with AD/VD had moderate or severe problems. Depression showed significant association with reduced HrQoL ( $P < 0.01$ ). Independent predictors of more severe depression were older age, male gender, better MMSE scores and being not married. **Conclusions:** Depression is a prevalent psychiatric co-morbidity in patients with AD/VD, which is often under-diagnosed being masked by cognitive impairment. Depression is a predictor of reduced HrQoL in elder people with AD/VD. Therefore, they should be screened for presence of depressive symptoms and receive adequate antidepressant treatment.

**Key words:** Alzheimer dementia, depression, health-related quality of life, prevalence, vascular dementia

## Introduction

The ageing of the world population results in the increasing prevalence of neurodegenerative diseases in the elderly. Neurodegenerative diseases are among the major causes of disability and death in the elderly. Alzheimer’s disease is the most common neurodegenerative disorder and the most prevalent cause of dementia in the elderly followed by vascular

dementia. According to the World Alzheimer Report released by Alzheimer Disease International, the estimated number of people with dementia exceeded 35 million in 2010 and will double every 20 years to 65.7 million in 2030 and 115.4 million in 2050.<sup>[1]</sup>

Neurodegenerative diseases lead not only to impairment of cognitive and motor function but also to development of non-motor disorders, such as depression. Diagnosis of depression in neurodegenerative diseases that produce psychomotor impairment can be challenging and requires particular experience. The early diagnosis of depression is also important in the context of the health-related quality of life (HrQoL). Depression was identified in recent studies as an independent factor influencing HrQoL in a number of neurological diseases.<sup>[2-5]</sup> Health-related quality of life is a concept reflecting the self-perceived wellbeing that is related to health status.

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The objective was to investigate the prevalence of depression in patients with Alzheimer dementia and vascular dementia and estimate the influence of depression on the health-related quality of life in these diseases.

## Materials and Methods

### Study design

We recruited consecutive patients with Alzheimer dementia (AD) or vascular dementia (VD) (n= 98), which are the most prevalent types of dementia. Diagnosis of AD and VD was based on criteria proposed by the National Institute of Neurological and Communicative Disorders and Stroke and the Alzheimer's Disease and Related Disorders Association (NINCDS-ADRDA Alzheimer's Criteria).<sup>[6,7]</sup>

Patients were recruited in the Department of Psychiatry and Psychosomatics, Sklifosovski Research Institute, Moscow, Russia. The study design was approved by the local ethic committees and all patients gave informed consent for participation.

### Clinical evaluation

Patients with AD or VD received a complete medical and neurological examination performed by a specialist (study investigator) with at least five years experience in dementia.

All clinical and demographic data were documented in specially developed case report forms (CRFs). The CRF included the following parts:

1. Demographics and social data.
2. Clinical data (disease onset, duration of disease, time from first manifestation to diagnosis, severity scales and co-morbid disorders)
3. Depression scale (Geriatric Depression Scale)
4. Health-related quality of life measurements (EQ-5D).

Severity of cognitive impairment was evaluated using the Mini-Mental State Examination (MMSE), which

is a valid and most common tool for assessment of cognitive deficits in dementia.<sup>[8]</sup> Depression was diagnosed according to criteria of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) [Table 1]. Severity of depressive symptoms was measured using the Geriatric Depression Scale. The Geriatric Depression Scale (GDS) is a standardized and validated self-report questionnaire used to identify depression in the elderly. It is based on yes-or-no questions regarding mood over the previous week with higher scores on GDS indicating more severe depression.<sup>[9]</sup> The test allows 84% sensitivity and 95% specificity in detection of depression. The following cut-offs for GDS were used: score of 0–9 is considered normal; 10–19 indicates mild depression, and a score  $\geq 20$  indicates severe depression.

### Health-related quality of life

The evaluation of HrQoL was performed using EuroQoL. The EuroQoL is a valid standardized health state measure.<sup>[10]</sup> It consists of a self-classifier (EQ-5D) and a visual analogue scale (VAS). The self-classifier evaluates five dimensions of health: mobility, self-care, usual activities, pain/discomfort and anxiety/depression.<sup>[11,12]</sup> Each dimension is divided into three levels of severity (1=no problem, 2=moderate problem, 3=severe problem). The EQ-5D-index score was calculated according to the European recommendations.<sup>[13]</sup> The visual analogue scale is a thermometer type scale ranging from 0 (worst imaginable health state) to 100 (best imaginable health state).<sup>[14]</sup>

### Statistical analysis

Statistical analysis was performed using SPSS Version 15.0 (SPSS Inc., Chicago, IL, USA). All data are presented as mean, standard deviation (SD) and median. The Kolmogorov-Smirnov test was used to test the data for normal distribution. For group comparisons of data not following normal distribution, either the Mann-Whitney U test (two independent groups), the Kruskal Wallis test (more than two independent groups) or the Wilcoxon rank test (two dependent groups) were applied.

### Table 1: DSM-IV criteria for major depressive episode

Five (or more) of the following symptoms have been present during the same two-week period and represent a change from previous functioning. At least one of the symptoms is either (1) depressed mood or (2) loss of interest or pleasure.

- Depressed mood most of the day, nearly every day, as indicated by either subjective report or observation made by others
- Markedly diminished interest or pleasure in all, or almost all, activities most of the day, nearly every day
- Significant weight loss when not dieting or weight gain, or decrease or increase in appetite, nearly every day
- Early insomnia or hypersomnia, nearly every day
- Psychomotor agitation, nearly every day
- Feelings of worthlessness or excessive or inappropriate guilt, nearly every day
- Diminished ability to think or concentrate, or indecisiveness, nearly every day
- Recurrent thought of death, recurrent suicidal ideation without a specific plan, or a suicide attempt or specific plan for committing suicide

**Table 2: Demographics and clinical characteristics**

	N (%) / Mean±SD
No. of patients	98
Age	77.5±8.8
Gender	
Male	34 (34.7%)
Female	64 (65.3%)
Marital status	
Married	42 (42.8%)
Divorced	2 (2.0%)
Single	10 (10.2%)
Widowed	44 (44.0%)
Employment	
Employed	7 (7.1%)
Unemployed	91 (92.9%)
Severity scales	
MMSE ≥ 14	83 (84.7%)
MMSE < 14	15 (15.3%)

MMSE, Mini mental state examination

Significance level was set at 5%. Multiple regression analysis was used to identify factors predicting severity of depression. The R<sup>2</sup> method was used to explore the variability accounted for by predicting factors.<sup>[15]</sup>

## Results

### Sociodemographic and clinical data

The age of the study participants with AD or VD was 77.5±8.8 years. The proportion of female patients was 65.3%. Demographics and clinical data are shown in Table 2. More than 90% of patients were age retired. The proportion of widowed patients increased with growing age. Forty-four percent of patients (n=43) with AD or VD were widowed.

In study population, 84.7% (n=83) patients had moderate cognitive impairment (MMSE≥14) and 15.3% (n=15) had severe cognitive deficits (MMSE<14). Extrapyramidal symptoms had 73.5% (n=72) of patients. Behavioral disorders were present in 43.9% (n=43) patients.

### Depression and health-related quality of life

The prevalence of depressive symptoms in patients with AD or VD was 86.7% (n=85). Fifty-six percent (n=55) of patients had moderate depression and 36% (n=35) of patients had severe depression as measured on the GDS. The prevalence of other mental disorders in the study population was lower: 30.6% (n=30) of patients had psychotic symptoms, 43.9% (n=43) of patients had behavioral disorders, 9.2% (n=9) of patients had alcohol dependency. Only 40% of patients with manifest

depression were provided with adequate antidepressant treatment.

The health-related quality of life was considerably reduced in our patients with AD or VD. In dimensions of “mobility”, “self-care”, “usual activities”, “pain/discomfort” and “anxiety/depression” of the EQ-5D, severe problems were found in 25.5%, 32.7%, 36.7%, 14.3% and 20.4% of patients, respectively. The mean EQ-5D index score was 36.7±18.5. The mean score on the EQ-VAS was significantly decreased in comparison to the general population (34.0±13.8 versus 77.0±20.8,  $P<0.01$ ).<sup>[16]</sup> The association between HrQoL and age is shown in Table 3. The values on the EQ-VAS and EQ-5D index decreased with increasing age. No associations between gender and HrQoL were revealed.

In the dimension “anxiety/depression” of the EQ-5D, 81% of patients with AD or VD had moderate or severe problems. Depression showed a strong association with reduced HrQoL [Table 3]. The presence of depression reduced the HrQoL in patients with AD or VD by 14% ( $P<0.01$ ).

Multiple regression analysis identified age, gender, MMSE and marital status to be independent predictors of depression severity in AD or VD [Table 4]. All together, these four variables could explain 33.5% of variability in scores on the GDS. Older age and male gender were associated with more severe depression. Married patients had lower prevalence of depression. Employment status was not associated with depression. Interestingly, the severity of depression had a reverse association with severity of cognitive impairment [Table 4 and Figure 1].

## Discussion

In this study, we investigated the prevalence of depression in the most common types of dementia in elderly patients and its influence on their HrQoL. Depression was found to be the most prevalent psychiatric co-morbidity in AD or VD. Depressive symptoms were found in up to 87% of patients depending on the severity of cognitive impairment.

Depression in the elderly is a challenging condition being associated with an increased rate of morbidity and reduced life expectancy.<sup>[17-19]</sup> Depending on the country and study design (urban versus rural, outpatients versus inpatients), prevalence rates reported in the literature range from 1–40%.<sup>[17,20]</sup> In the meta-analysis by Barua *et al.*, mean prevalence of depression in the

**Table 3: Association of quality of life scores with age, gender and depression**

	Alzheimer or vascular dementia			
	EQ-VAS		EQ-5D Index	
	Mean±SD	P value	Mean±SD	P value
Age groups		0.025		<0.01
<65	40.56±14.23		0.46±0.14	
65-75	33.84±11.87		0.40±0.18	
>75	31.40±14.57		0.30±0.18	
Gender		0.477		0.922
Male	34.76±12.90		0.36±0.18	
Female	33.59±14.35		0.37±0.19	
Depression				
No	46.54±17.82	<0.01	0.48±0.18	<0.01
Yes	32.08±12.00		0.35±0.18	

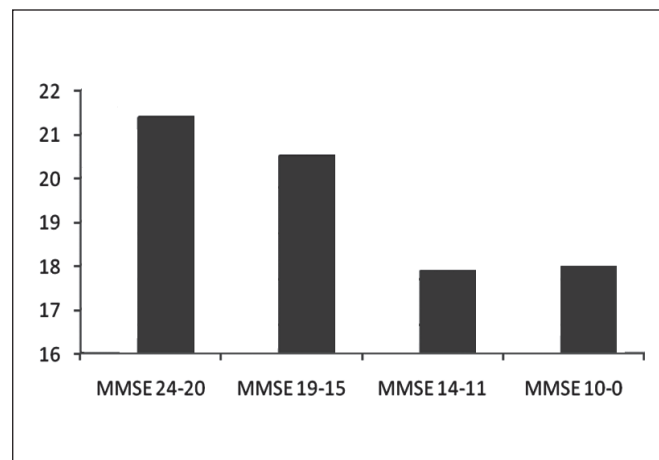
**Table 4: Multiple regression analysis of factors predicting severity of depression**

	Geriatric depression scale		
	B	95% CI	P value
Female gender	-1.54	-3.46; 0.37	0.04
Age	0.07	-0.05; 0.18	0.04
MMSE	-0.22	-0.47; 0.04	0.02
Marital status*	-2.16	-4.08; -0.24	0.03
Employment**	1.21	-2.47; 4.91	0.51
Adjusted R2		0.335	

\*Married=1, not married (single/divorced/widowed)=0, \*\*Unemployed=1, Employed=0, MMSE, Mini Mental State Examination; B, regression coefficient

elderly population worldwide was 10.3%.<sup>[17]</sup> In rural communities, the prevalence of depression is often higher.<sup>[21]</sup> Our patients were recruited in Russia, where accessibility and quality of healthcare is reduced in comparison to Western European countries. Although there is a mandatory health insurance in Russia, it covers only essential medical services.<sup>[22]</sup> Lower accessibility and quality of healthcare is associated with higher prevalence of depression in elderly Russian population compared to population of the Western European countries. Correspondingly, elderly Russian patients with dementia in our study have higher prevalence of depression than it was shown in patients with dementia living in the Western Europe.<sup>[23,24]</sup>

The prevalence of depressive symptoms in people with chronic illnesses or disability is increased.<sup>[19]</sup> In particular, prevalence rates of depression in the elderly with neurodegenerative diseases are strikingly high. For example, prevalence rates of depression in Parkinson’s disease and AD reported in a recent review were 75% and 87%, respectively.<sup>[25]</sup> However, diagnosis of depression in neurological disorders is challenging due to overlapping of motor deficits and cognitive impairment.<sup>[26]</sup> Neuropsychiatric symptoms are prevalent



**Figure 1:** Measures on the geriatric depression scale depending on severity of dementia

in patients with AD or VD. In a recent prospective study from the Netherlands, they were found in 97% residents of 14 dementia special care units.<sup>[27]</sup> In our study, 86.7% of patients with AD or VD had depressive symptoms. Dementia was identified as a risk factor for depression in the elderly in a recent meta-analysis.<sup>[28]</sup> Compared to the elderly without dementia, elderly people with dementia had higher prevalence rates of depression (OR: 3.92, 95% CI: 1.93-7.99, respectively). Unfortunately, depression is often under-diagnosed in AD and VD. Depressive symptoms can be overlooked not only by physicians and nurses but also by caregivers providing daily care to demented patients. For example, loss of interest and apathy can be mistaken for symptoms of cognitive impairment. The results of a study by Watson *et al.*, show that one-third of cases with manifest depression in patients with dementia were not identified by their caregivers.<sup>[29]</sup> The sensitivity of caregivers’ accuracy in recognizing depression was 0.65 (95% CI: 0.55, 0.75). The specificity was 0.58 (95% CI: 0.50, 0.66). Caregivers also experienced depression related to caregiving. It was

diagnosed in 12% of caregivers. However, the presence of a caregiver from family members can probably reduce the occurrence of depressive symptoms. In our study, being married was associated with lower prevalence of depression.

Depression in elderly people with neurodegenerative diseases is associated with decreased HRQoL. Corresponding with the results of studies by Banerjee *et al.*, and Wetzels *et al.*, depression was a predictor of reduced HRQoL in the elderly with AD or VD.<sup>[30,31]</sup>

### Our study has some limitations

Referral-based design was used for recruitment. An epidemiological study with door-to-door data collection would provide more precise data. We cannot exclude a selection bias towards more severe disease stages in our sample. Patients with minimal cognitive deficits (MCI) or those in early stages of dementia less often consult general practitioners, neurologists or psychiatrists. We applied a generic HRQoL instrument (EuroQol), which is less sensitive to disease-specific changes of health-related quality of life. However, we sought to evaluate the general HRQoL and provide data suitable for a comparison between these patients and the general population. Mini Mental State Examination is a less specific tool for assessment of cognitive deficits in AD than ADAS-Cog and is also less specific than VADAS-Cog in VD. However, MMSE is a valid and well-known measure for estimation of cognitive impairment in different types of dementia. We included patients with two different types of dementia and applied one standardized instrument (MMSE) instead of two disease-specific measures in order to collect homogenous neuropsychological data. The cross-sectional design of our study does not provide any information on changes in depression severity and HRQoL over time.

### Conclusion

Depression is a prevalent psychiatric co-morbidity in the elderly with Alzheimer dementia or vascular dementia. Unfortunately, depressive symptoms are often under-recognized in these diseases being masked by cognitive impairment. Depression is a predictor of reduced HrQoL in elderly people with dementia, therefore, they should be screened for presence of depressive symptoms and receive adequate antidepressant therapy.

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