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Brief report

Detecting depression in Alzheimer's disease: evaluation of four different scales

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Abstract

Depression is a frequent condition in Alzheimer's disease (AD). The prevalence of depressive symptoms depends on the severity of dementia and the instruments used. Our aim was to assess the prevalence of depression dependent on the severity of dementia by four different scales: The 15-point Geriatric Depression Scale (GDS), the Montgomery and Åsperg Depression Scale (MADRS), the Cornell Scale for Depression in Dementia (CSDD) and the Nurses Observation Scale for Geriatric Patients (NOSGER). The study population consisted of 316 patients with Alzheimer's disease from a psychiatric out-patients memory-clinic, which was divided into two groups: mild AD (Mini-Mental Status Examination (MMSE) $\geq$ 18) and moderate to severe AD (MMSE $<$ 18). Additionally, internal consistency and correlation of these scales were calculated. Prevalence of depression ranged between 27.5 and 53.4% in mild AD and between 36.3 and 68.4% in moderate to severe AD. Internal consistency was good in all scales (Cronbach's alpha .63–.85). For MADRS and CSDD it was independent of the stage of AD, while in GDS and NOSGER internal consistency decreased with severity of dementia. Correlation between the scales was better in mild AD than moderate to severe AD; the best results were obtained for the correlation between CSDD and MADRS in both groups. We conclude that in our study population CSDD and MADRS were the most consistent tools for detecting depression in AD independently of the severity of dementia.

Keywords: Depression in Alzheimer's disease; GDS; MADRS; CSDD; NOSGER

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1. Introduction

Depression is one of the most frequent non-cognitive symptoms in Alzheimer's disease (AD, Morawetz, Stevens, & Wormstall, 1996). The prevalence of depressive symptoms and syndromal depression in AD depends on the severity of dementia (Burke, Roccaforte, & Wengel, 1991) and on the scales used for their detection. In most studies a prevalence of 20–30% is reported, ranging between 0 and 87% (Wragg & Jeste, 1989).

These huge differences reflect the difficulties in measuring depression in dementia. Symptoms that occur in both disorders as psychomotoric retardation or irritability can make it difficult to differentiate between AD and depressive disorders (Purandare, Burns, Craig, Faragher, & Scott, 2001). Nevertheless, the correct diagnosis of depression in AD patients is of great importance, because it can be treated successfully in most of the cases (Lyketsos & Olin, 2002). Additionally, a possible pathogenetic relation of AD and depression has been suggested. In a meta-analysis Jorm (2000) concluded that depression is associated with an increased risk of subsequent dementia in both case-control and prospective studies. It is still unclear whether depression is an early sign, a reaction to cognitive decline, a threshold lowering or possibly even a causal factor in AD. An accurate clinical detection of depression builds the basis to understand the exact role of depressive symptoms in AD.

The aim of this study was to assess the prevalence of depression in relation to the stage of AD using four different depression scales and to test their validity by calculating the internal consistency and correlation of these scales with each other.

2. Patients and methods

Patients, who were admitted to the Memory Clinic of the Department of Psychiatry of the University Hospital of Hamburg in an out-patient setting from November 1995 to November 2001, were examined by a psychiatrist, a neurologist and a neuropsychologist for memory complaints. Three hundred and sixteen cases with diagnoses of probable AD according to NINCDS-ADRDA criteria (McKhann, Drachman, Folstein, Katzman, Price, & Stadlan, 1984) were included for further investigation.

Severity of cognitive impairment was examined by Mini-Mental Status Examination (MMSE, Folstein, Folstein, & McHugh, 1975). Following the hypothesis, that cognitive impairment could influence the validity of depression scales used, the entire study population was divided in a mildly (MMSE $\geq$ 18) and a moderate to severely demented (MMSE $\leq$ 17) group.

For assessing depression the following scales were used:

- The 15-point Geriatric Depression Scale (GDS, Sheikh & Yesavage, 1986), a short form of a 30-point scale, which is a self-rating scale that is widely established in geriatric settings. Answers are given dichotomously as 'yes' and 'no'. The cut-off score for depression is 6 points.
- The Montgomery and Åsperg Depression Scale (MADRS, Montgomery & Åsberg, 1979) consists of 10 items, which can be scored from 0 to 6 after an interview. It is well established in psychogeriatric studies (Leentjens, Verhey, Lousberg, Spitsbergen, & Wilmink,

2000; Müller, Szegedi, Wetzel, & Benkert, 2000). The advantage of this scale is that no somatic symptoms are asked (Baker & Miller, 1991). The authors suggest a cut-off value of 13 points for mild depression.

- The Nurses Observation Scale for Geriatric Patients (NOSGER, Spiegel, 1992) is performed by the caregiver and consists of 30 items and six sub-scales with five items each. Answers are scored from 1 to 5. One sub-scale represents mood (NOSGER-mood). The suggested cut-off for depressed mood is 10 points.
- The Cornell Scale for Depression in Dementia (CSDD, Alexopoulos, Abrams, Young, & Shamoian, 1988) is a 19-item scale that measures depression after interviews with the patient and the caregiver. Items are 'mood and related signs', 'behavioural disturbance', 'cyclic function and ideational disturbance' and 'physical signs'. Items are measured on a 3-point continuum: 'absent', 'mild or intermittent' and 'severe'. Nine or more points indicate a depressive disorder.

All depression scales were performed by independent raters: As part of the baseline interview, CSDD was performed by a physician, GDS was used as self-rating scale, NOSGER-mood was filled in by the caregiver and MADRS was assessed by a neuropsychologist. Not all scales were performed in every patient for the following reasons: no relatives were available, patients or relatives did not fill in the scale completely or patients were too demented to understand the tasks. Additionally, the CSDD was added to the study only in the last year.

Data were analysed by SPSS for Windows 9.0®. For nominal scaled data, a Pearson's chi-square test and for univariant analyses ANOVA were performed. Correlations were calculated according to Pearson–Bravais. Internal consistency was estimated by Cronbach's alpha.

3. Results

3.1. Study population

Distribution of gender, age and cognitive status measured by MMSE of both groups is shown in Table 1. The mean age between the mild AD and moderate to severe AD group did not differ, while the proportion of women was significantly higher in the latter group.

Table 1
Overview of patient groups

	MMSE < 18	MMSE ≥ 18	Significance
N	159	157	
% women	74.2	64.9	Chi-square $= 15.34$; $P < .001$
Age (S.D.)	72.6 (9.0)	72.7 (8.7)	ANOVA, n.s.
MMSE (S.D.)	11.6 (4.4)	22.3 (2.8)	ANOVA, $P < .0001$

n.s.: non-significant.

Table 2
Means, Cronbach's alpha and measured frequency of depression

Instrument	MMSE	*N*	Mean	S.D.	*P*	Cronbach's alpha	Cut-off	Depression (%)
GDS	<18	101	4.55	2.62	n.s.	.74	6	36.6
	≥18	140	4.45	3.30		.83	6	32.9
MADRS	<18	76	12.76	8.78	<.1	.85	13	40.8
	≥18	120	10.06	6.66		.78	13	27.5
NOSGER-mood	<18	95	11.46	3.39	<.001	.63	10	68.4
	≥18	88	10.36	3.54		.78	10	53.4
CSDD	<18	16	8.13	5.10	n.s.	.81	9	43.8
	≥18	31	6.71	4.99		.82	9	32.5

3.2. Depression scales

Means, internal consistency and the prevalence of depression in AD were calculated for both groups and all scales separately (Table 2). The moderate to severe AD group had higher scores in all scales than the mild AD group. However, this difference was significant in NOSGER-mood only. Internal consistency was satisfying in all scales. In the GDS and NOSGER-mood, the internal consistency decreased with increased cognitive impairment. The prevalence of depression ranged widely in both groups depending on the scale used.

In the mild AD group, a correlation coefficient of $r > .60$ was found for CSDD/GDS ($r = .70$; $P < .0001$), CSDD/MADRS ($r = .93$; $P < .0001$) and CSDD/NOSGER-mood ($r = .72$; $P < .0001$). In the more severely impaired group, $r > .60$ was found only for MADRS/CSDD ($r = .74$; $P < .0001$).

4. Discussion

The detection of depression in AD remains an important clinical issue because its treatment improves the quality of life for patients and their care-giving relatives. Until now, there is no gold standard for making a proper diagnosis of depression in demented patients. Since elderly patients often do not have depressed mood even when they have a depression, the diagnostic manuals (DSM IV-R in US and ICD-10 in Europe) underestimate depression in this population and especially in demented patients. In this study we aimed to compare four different approaches to detect depression in AD, the MADRS, GDS, CSDD and NOSGER scale, by testing their internal consistency and comparing the prevalence of depression in AD indicated by them in different stages of the disease (mild versus moderate to severe AD). We also made ICD-10 diagnoses for depression (F32 or F33) but took out the results for further analysis since they were not made by a blinded rater but in a consensus conference of all involved raters. By this depression rates were 15.7% in the moderate to severe demented and 26.8% in the mild demented group.

Using the cut-offs suggested by the authors of the different scales the prevalence of depression in AD patients varied widely depending on the scales used, but was in accordance with earlier studies (Wragg & Jeste, 1989; Lee & Lyketsos, 2003). In the GDS (Sheikh & Yesavage, 1986), the prevalence of depression in AD was about 35% when a cut-off of 6 was used for detection of depression as it has been suggested in several geriatric studies before (Müller-Thomsen, Mittermeier, &, Ganzer 2002; Whooley, Kip, Cauley, Ensrud, Nevitt, & Browner, 1999). In line with previous studies showing that cognitive decline might affect the results of the GDS (Burke et al., 1991; Zarb, 1996), we found a marked decrease of internal consistency in the moderate to severe AD group. We therefore conclude that the GDS is not an adequate tool for detecting depression in AD, especially not in the later stages of the disease.

Using the NOSGER-mood scale, in which relatives give information on the mood of the patients, the depression rate was markedly higher than the depression rates observed with the other scales. However, like in the other used scales, the depression rate was higher in moderate to severe AD than in mild AD. The relative high prevalence of depression when using NOSGER-mood might be caused by different reasons: (1) The personal burden of the caregivers caused by the disorder of their relatives could influence the answers concerning depression (Lee & Lyketsos, 2003). (2) The cut-off is too low or (3) using subscales of NOSGER is not meaningful as already mentioned by its author (Spiegel, 1992), who suggests using NOSGER only as entire scale. The fact that internal consistency of NOSGER-mood was the worst of all assessed scales and there was a poor correlation with the results of the other scales underlines this opinion of Spiegel.

In the MADRS as well as in the CSDD, around 40% of the moderate to severe AD patients were classified as depressed, but only 30% of the patients in the mild AD patient-group. Internal consistency was good in both scales for both diagnostic subgroups. We observed a significant positive correlation between MADRS and CDSS, which might be due to the fact that there are some items that overlap between both scales.

The finding that the prevalence of depression was higher in moderate to severe AD patients than in mild AD with all of the examined scales reflects that the progressing neurodegeneration caused by AD is making increasing symptoms, which then are leading to an increasing diagnosis of depression. Whether this reflects a biological process should by investigated in further studies.

Since there is not yet a gold standard for making a diagnosis of depression in patients with AD, our results remain somewhat hermeneutic. But in this relative new and difficult field this reflects in our opinion the stage of erkenntnis—theoretical process we are in right now.

Beside this, the good internal consistency and a similar prevalence of depression in MADRS and CSDD seem to make these two scales to useful tools for detecting depression and describing depressive symptoms in our out-patient population. Whether these results can be transferred to other populations in different settings needs to be verified in further studies.

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