

ADAS-cog (Alzheimer's Disease Assessment Scale — cognitive subscale) — validation of the Slovak version

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Abstract

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Bratisl Lek Listy 2000; 101 (11): 598–602

Background: ADAS was designed to measure the severity of the most important symptoms of Alzheimer's disease (AD). Its subscale ADAS-cog is the most popular cognitive testing instrument used in clinical trials of nootropics. It consists of 11 tasks measuring the disturbances of memory, language, praxis, attention and other cognitive abilities which are often referred to as the core symptoms of AD.

Aim: The aim of the study is to verify the Slovak adaptation of ADAS-cog and its ability to distinguish patients with AD from those with depressive disorders (DD).

Subjects and methods: The study sample consists of 29 psychiatric inpatients divided into 2 groups: the AD group of 14 patients (4 males, 10 females, mean age 73,9±7,3 yrs) fulfilling NINCDS-ADRDA criteria of probable AD and the DD group of 15 subjects (6 males, 9 females, mean age 74,3±6,5 yrs) without any cognitive impairment. In all patients the ADAS-cog and SMMSE were administered. We compared the groups in: total scores in both scales, task scores in the ADAS-cog and the scores of 3 ADAS-cog factors — memory, language and praxis.

Results: Both methods distinguished the patients with the AD from DD ($p<0.001$ for both scales). Also other variables (task and factor scores of ADAS-cog) reflect the worse results of the AD group. The most evident differences between the diagnostic groups were found in the orientation and constructive praxis. The education level did not affect the scores of the ADAS-cog in the AD patients but it did in SMMSE scores in the DD group ($p<0.05$).

Conclusions: The Slovak version of ADAS-cog has distinguished the patients with the AD from those with DD. The most evident differences between the groups were found in orientation and visuo-constructive praxis. In DD patients, the risk

Abstrakt

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Bratisl. lek. Listy, 101, 2000, č. 11, s. 598–602

Východiská: ADAS je stupnica určená na hodnotenie závažnosti najtypickejších symptómov Alzheimerovej demencie (AD). Jej podškála ADAS-cog sa často využíva na hodnotenie kognitívnych funkcií v rámci klinického skúšania nootropných látok. Tvorí ju 11 úloh zameraných na pamäť, rečové schopnosti, praxiu, pozornosť a ďalšie kognitívne funkcie, ktoré patria k základným príznakom AD.

Cieľ: Cieľom štúdie je overenie slovenskej jazykovej adaptácie ADAS-cog a jej schopnosti odlíšiť pacientov s AD od pacientov s depresívnymi poruchami (DD).

Materiál a metódy: Súbor 29 pacientov hospitalizovaných na Psychiatrickej klinike v Bratislave tvorila skupina 14 pacientov s AD (4 muži, 10 žien, priemerný vek 73,9±7,3 r.), ktorí spĺňali NINCDS-ADRDA kritériá pre pravdepodobnú AD a skupina 15 pacientov s DD (6 muži, 9 žien, priemerný vek 74,3±6,5 r.) bez kognitívnej poruchy. Pacienti boli vyšetrení škálami ADAS-cog, a SMMSE. Sledované skupiny sme porovnali: v hodnotách celkového skóre oboch škál, v skóre v jednotlivých úlohách ADAS-cog, ako aj v 3 faktoroch ADAS-cog (pamäť, rečové schopnosti a praxia).

Výsledky: Obe použité škály odlišili pacientov s AD od pacientov s DD ($p<0,001$ pre obe škály). Aj v ďalších hodnotených premenných (skóre jednotlivých úloh a faktorov ADAS-cog.) dosahovali pacienti s AD horšie výsledky. Najvýraznejšie rozdiely sa zistili v úlohách hodnotiacich orientáciu a konštrukčnú praxiu. Vplyv vzdelania na výsledné skóre ADAS-cog sme nezistili v skupine pacientov s AD. V skupine pacientov s DD tento vplyv sa zistil v SMMSE ($p<0,05$).

Záver: Slovenská jazyková verzia ADAS-cog odlišila pacientov s AD od pacientov s DD. Najvýraznejšie rozdiely sa zistili v úlohách zameraných na orientáciu a konštrukčnú praxiu. U pa-

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of false positive findings in subjects with lower education is higher than in the AD patients. In comparison with the SMMSE, ADAS-cog seems to be more helpful in early diagnostics of AD. (Tab. 6, Fig. 3, Ref. 14.)

Key words: ADAS-cog, SMMSE, Alzheimer's disease, depressive disorders in elderly people.

The importance of early and reliable diagnosis of the Alzheimer's disease increases along with its developing pharmacotherapy. One of the most frequently used clinical quantification scales assessing Alzheimer's disease is the ADAS (Alzheimer's Disease Assessment Scale) (Mohs et al., 1983; Mohs and Cohen, 1988; Mohs, 1994). The subscale assessing cognitive functions (ADAS-cog) is also used in multicentric studies focused on studying the intensity of main symptoms of dementia as well as assessing the effect of the treatment. Participation in international studies is conditioned by the existence of validated national language versions of this scale. In terms of the process recommended by Mohs (1994), the national language versions appeared in several European countries (e.g., German version: Weyer et al., 1997, Spanish version: Peña-Casanova, 1997). In the course of the preparation of the Slovak version of the ADAS-cog a group of patients with clinical diagnosis of the Alzheimer's disease was examined (Kolibáš et al., 2000). In this study we present the results achieved using the ADAS-cog in two patient groups — in patients with the Alzheimer's disease and patients with depressive disorders. This work is a part of the validity verification of the Slovak version of the ADAS-cog in clinical studies and in diagnostic practice.

Subjects and methods

Twenty-nine inpatients consecutively admitted to the Psychiatric department of University hospital in Bratislava were included into study. The patients were selected under several criteria: age of 65+ years, clinical diagnosis of the Alzheimer's disease (AD) with mild and moderate degree of dementia, or diagnosis of mood disorders — moderate depressive episode — according to ICD-10 Diagnostic criteria for research (WHO 1993). The patients with the Alzheimer's disease were also selected according to the NINCDS-ADRDA diagnostic criteria of probable AD (McKhann et al., 1984) and the score of Hachinski index lower than 5 points (Hachinski et al., 1975) and by the absence of clinically significant depressive symptomatology. The inclusion criteria for the patients with the depressive disorders (except for clinical diagnosis) consist in the absence of cognitive disorder found by clinical examination (including standard neuropsychologic tests).

In the groups studied, we compared the total scores of the ADAS-cog, the task scores and the scores for the following factors: memory, language (naming and comprehension) and praxis (Talwalker, 1996). The data concerning the ADAS-cog structure are presented in Table 1. For the assessment of cognitive functions the standardized version of the Mini-Mental State Examination — SMMSE was used (Folstein et al., 1975; Molloy and Standish, 1997). We have compared the results (total scores) in the ADAS-cog with the results of assessment of cognitive functions by SMMSE. More severe cognitive impairment is reflected in higher total score in the ADAS-cog and lower total score in the SMMSE.

cientov s depresiou je v prípade nižšieho vzdelania väčšie riziko falošne pozitívnych nálezov (kognitívnej poruchy) ako u pacientov s AD. V porovnaní s SMMSE sa ADAS-cog zdá vhodnejšia pre včasnú diagnostiku AD. (Tab. 6, obr. 3, lit. 14.)

Kľúčové slová: ADAS-cog, SMMSE, Alzheimerova choroba, depresívne poruchy u starých ľudí.

Results

The sample consists of 19 women and 10 men aged 65—88 years (mean age 74.11 yrs.). Depressive disorder was diagnosed in 15 patients and Alzheimer's disease in 14 patients. The basic data about the sample are presented in Table 2.

As expected, the group of patients with the AD achieved worse test scores than the group of patients with depressive disorders in both tests used. Figure 1 displays the comparison of the total mean scores in the ADAS-cog and the SMMSE in the group of

Tab. 1. Structure of ADAS-cog scale.
Tab. 1. Štruktúra škály ADAS-cog.

No.	Task	Characteristics	Score
1	Word recall	The recall task of frequent, easily to imagine words	0-10 p.
2	Naming	Naming of 12 presented objects and fingers on a hand	0-5 p.
3	Commands	Task of understanding and fulfilling 1-5 step commands	0-5 p.
4	Constructional praxis	Drawing 4 geometric forms using a pattern	0-5 p.
5	Ideational praxis	The task of ability to perform a familiar but complex sequence of actions	0-5 p.
6	Orientation	Assessment of time and space orientation	0-8 p.
7	Word recognition	The task of discriminating new words from the already presented ones	0-12 p.
8	Instructions remembering	Ability to remember instructions from the previous recognition task	0-5 p.
9	Spoken language ability	Assessment of the quality of patient's speech	0-5 p.
10	Word-finding difficulty	Assessment of patient's ability to communicate verbally	0-5 p.
11	Comprehension	The patient's ability to understand the spoken speech	0-5 p.

Tab. 2. Subjects characteristics.
Tab. 2. Charakteristiky súboru.

Diagnosis	N	Age (y.)	Men/Women	Education lower/higher	SMMSE	ADAS-cog.
AD	14	73.9	4/10	6/8	17.6±5.1*	37.5±14.7*
Depress.	15	74.3	6/9	5/10	26.7±2.6*	13.2± 5.2*

*The differences in the mean total test scores between the groups of AD and depressive disorders are statistically significant ($p < 0.001$) in both tests.

*Rozdiely v priemerných hodnotách celkového skóre medzi skupinou AD a depresívnych porúch sú štatisticky významné ($p < 0.001$) v oboch testoch.

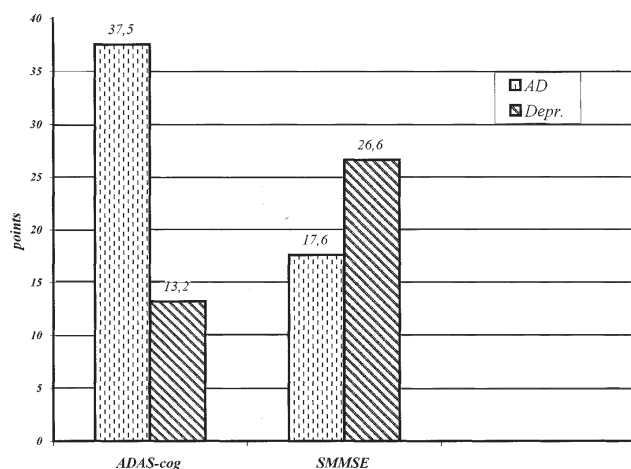


Fig. 1. The mean total scores in ADAS- cog and SMMSE.
Obr. 1. Priemerné celkové skóre v ADAS- cog a SMMSE.

AD and in the group of depressions. The differences in the test scores between the groups of patients were statistically significant ($p < 0.001$ for both tests).

The mean task scores in the ADAS-cog found for the individual tasks in both groups are presented in Figure 2 and Table 3. The figure shows that scores in all tasks are higher in patients with the AD compared to the ones with depressive disorders.

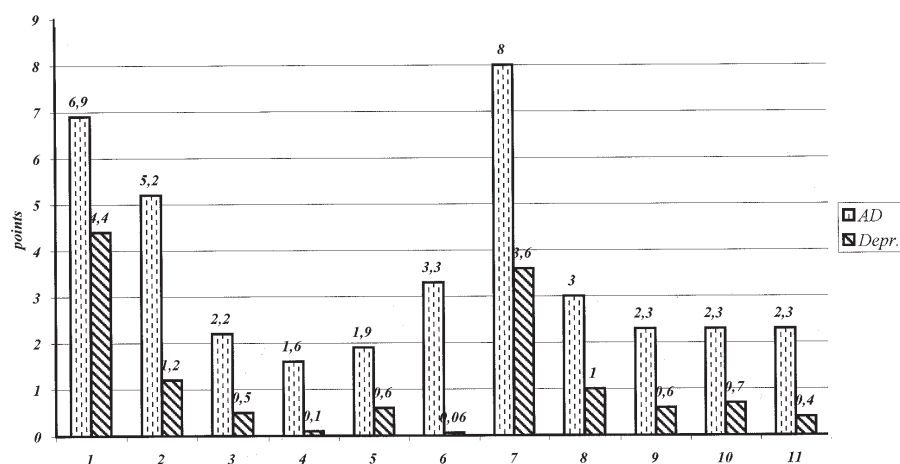


Fig. 2. The mean task scores in ADAS-cog
Obr. 2. Priemerné skóre v úlohách ADAS-cog

We compared the mean scores for the factors mentioned above. The factor "memory" is created by the tasks 1, 6, 7 and 8, the factor "language" consists of the tasks 2, 3, 9, 10 and 11, and the factor "praxis" consists of the tasks 4 and 5. Figure 3 and Table 4 present the factor scores in the compared groups. We found diffe-

Tab. 3. Comparison of mean task scores of ADAS-cog in the diagnostic groups.

Tab. 3. Porovnanie priemerných hodnôt skóre v úlohách ADAS-cog v diagnostických skupinách.

Task	AD		Depressive disorders	
	Mean	SD	Mean	SD
1	6.93	1.85	4.40	1.40
2	5.21	4.11	1.20	1.32
3	2.21	0.89	0.53	0.91
4	1.64	1.15	0.13	0.35
5	1.93	1.54	0.60	1.12
6	3.29	2.12	0.06	0.25
7	8.07	3.05	3.60	2.41
8	3.0	1.30	1.0	1.06
9	2.36	1.21	0.6	0.73
10	2.36	1.27	0.73	0.59
11	2.36	1.08	0.40	0.63

rences in all factors, however the most evident differences were found in the factors "praxis" and "orientation".

The effect of education on the performance in the cognitive function tests is discussed for a long time (McLean, 1987; Jorm and Korten, 1988). From the point of view of the education level, we compared the mean scores in both tests administered. Results presented in tables 5 and 6 show that the patients with high-school or university education performed better in both scales compared

to the patients with the lower level of education. In patients with dementia the education level does not influence the results in both scales, but its influence is evident in the patients with depressive disorders. The education level affects the results achieved in the SMMSE more distinctly than those in the ADAS-cog (Tab. 6).

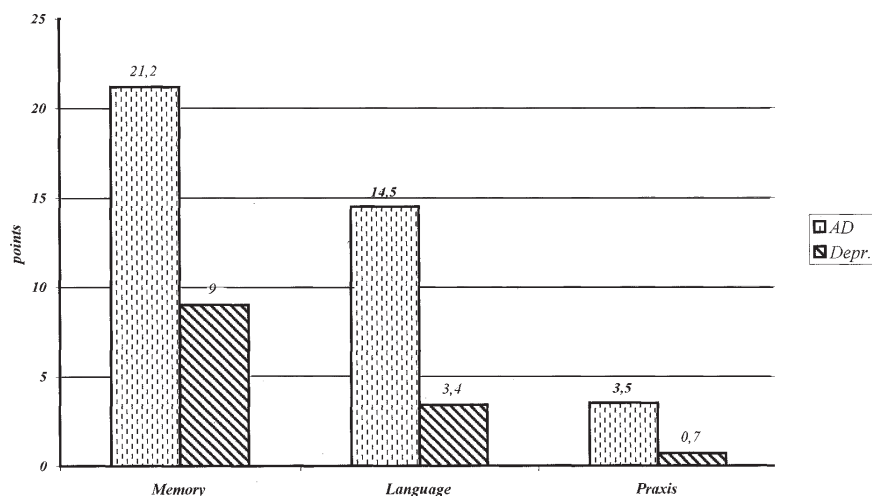


Fig. 3. The mean factor scores in ADAS-cog.
Obr. 3. Priemerné faktorocvé skóre v ADAS-cog.

Discussion

Our results indicate that both scales used clearly discriminate the patients with the Alzheimer's disease from those with the depressive disorders. The differences in mean total scores are significant in both scales. These differences are valid only for the given sample and in each group there can be patients who — according to the test results — are more like patients with the other diagnoses. There are several reasons for this results "overlapping", e.g. age, the education level and the intensity of depression in the depressive disorders group. The compared groups did not differ in mean age and age structure, and, in the present study, we did not focus on the relation between test results and the intensity of depression (all patients in this group had moderate degree of depression). On the other hand, we found that the education level affected the examination results in our sample. It is interesting that while the effect of education on the test results in the patients with depressive disorders is statistically significant in both tests, and more pronounced in the SMMSE, in those with the AD this effect was not found. So, the ADAS-cog seems to be a more useful met-

hod for examining patients with mild and moderate Alzheimer's dementia and not divided according to the education level. However, we have to point out — based on our results — that in the differential diagnostics between depressions and the AD there is a risk of false positive findings of cognitive functions disturbance in patients with depressive disorders and lower education level. The presented differences between the ADAS-cog and the SMMSE in the extent to which they are affected by the education level are probably caused by greater praxis and orientation impairment in patients with the AD, as seen in the task analysis and factor scores comparison (Table 3 and 4).

Tab. 5. The mean total scores in ADAS-cog and level of education.
Tab. 5. Priemerné celkové skóre v ADAS-cog a úroveň vzdelania.

Education	AD		Depressions	
	Mean	SD	Mean	SD
Lower	37.83	5.41	15.6	3.57
Higher	37.25	19.56	12.0	5.61

Tab. 4. Comparison of mean factor scores of ADAS-cog in the diagnostic groups.

Tab. 4. Porovnanie priemerných hodnôt faktorového skóre ADAS-cog v diagnostických skupinách.

ADAS-cog	AD		Depressions	
	Mean	SD	Mean	SD
Factors				
Memory	21.28	7.50	9.07*	3.59
Language	14.50	7.45	3.46*	2.23
Praxis	3.57	2.17	0.73*	1.10

*The differences in the mean factor scores between the groups of AD and depressive disorders are statistically significant ($p < 0.001$).

*Rozdiely v priemerných hodnotách faktorového skóre medzi skupinami AD a depresívnymi poruchami sú štatisticky významné ($p < 0.001$).

Tab. 6. The mean total scores in SMMSE and level of education.
Tab. 6. Priemerné celkové skóre v SMMSE a úroveň vzdelania.

Education	AD		Depressions	
	Mean	SD	Mean	SD
Lower	16.66	2.06	24.8	2.16
Higher	18.37	6.58	27.6*	2.41

*The difference in the mean total test scores between the patients with lower and with higher education level in the group of depressive disorders is statistically significant ($p < 0.05$).

*Rozdiel v priemerných hodnotách celkového skóre medzi pacientmi s nižším a vyšším vzdelaním v skupine depresívných porúch je štatisticky významný ($p < 0.05$).

We would like to point to some differences between both groups which are not displayed by numeric results, but which could be important diagnostically. In patients with the depressive disorders we registered more frequent feelings of uncertainty manifested e.g. by demands to confirm instructions which they remembered already, or dissatisfaction with their own results which — in fact — were relatively good, and self-depreciation. In the AD patients we did not find such types of behavior nor did we register the “catastrophic” reactions mentioned in literature dealing with test examination in dementia (Lezak, 1995).

Conclusions

The Slovak version of the ADAS-cog is, according to our experience, sensitive enough and it reliably discriminates the group of patients with the AD from the one with depressions. The most evident differences between the groups compared were found in the orientation and visuo-constructive praxis.

In the group with dementia, the education level does not affect the ADAS-cog results. However, this is not true in the group with depressive disorders and we point out the risk of false positive findings in patients with lower education level.

Although the ADAS-cog scale needs more time and better cooperation of patients than the SMMSE, it seems to be more helpful in early diagnostics and assessment of the AD.

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Received October 18, 2000.
Accepted November 17, 2000.