

Mild depression levels alter self-perceptions of future but not the recall of verbal information in elderly inpatients

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Abstract

In order to determine the correlation of levels of symptoms of depression and rate of forgetting and perception of the future, a total of 68 elderly inpatients without Major Depression admitted to a general hospital were evaluated by: 1) the Montgomery-Asberg Depression Rating Scale (MADRS), 2) the Mini-Mental State Examination (MMSE), 3) a questionnaire on future self-perceptions (FSPQ), and 4) a test on the recall of verbal information to estimate the rate of forgetting. They were grouped according to the clinical prognosis of their disease (good, N = 48, 25 women, 23 men, age mean \pm SD, 68 ± 6.64 ; poor, N = 20, 10 women, 10 men, age mean \pm SD, 69 ± 6.68) which correlates with morbidity-mortality rates (low/high). There was no relationship between mild levels of signs and symptoms of depression and increased forgetting. However, levels of depression were negatively correlated to the score of future perceptions ($B = -0.18$, $\beta = -0.29$, $P = 0.032$). Patients with diseases with good prognosis did not present different levels of depression, rates of forgetting or future expectations from those of patients with poor prognosis (high mortality rates). However, individuals with negative FSPQ scores showed significantly higher MADRS scores, independent of the type of disease. These data suggest that the modifications in the processing of information related to the future are present in clinical patients without Major Depression but they occur within a small range of very mild signs and symptoms of depression.

Key words

- Cognition
- Depression
- Hopelessness
- Memory
- Aging

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Introduction

Clinical reports of cognitive abnormalities in depressive elderly patients have demonstrated that severe depression can produce memory impairment in old age (1-4). However, the effects of mild depression upon cognition in the elderly and the relationship

between the rate of depression and cognitive changes remain unclear (5). The definition of Major Depression without cognitive deficit may be difficult because most research suggests that depression in subjects over the age of 40 nearly always involves some cognitive disadvantage with respect to normal subjects on cognitive examination (6), alleg-

edly because of poor effort produced by loss of interest and concentration, which is one of the criteria for Major Depression in DSM-III R and IV (7,8).

Pathophysiologic mechanisms of depression can activate cognitive patterns that lead patients to regard themselves, their experiences and their future with a negative view (9). Some investigators suggest that these negativistic thoughts could play a role in the disruption of memory performance of depressed elderly subjects (5).

In healthy human volunteers, a negative comment about previously learned material could impair the recall of recently acquired information (10,11), or change normal subjects' perceptions about affective context of words (12). These findings support the hypothesis that post-event information (11) may be a relevant factor in memory deficits observed in depression.

Memory dysfunction observed in depressive syndromes has been explained by two main theories: 1) the mood congruence hypothesis assumes that information is easily stored and recalled when its affective content is the same as the subjects' mood (13,14); 2) the state dependence hypothesis postulates that memory encoding is influenced by mood during learning sessions and a similar mood state at retrieval tasks would produce better performances (15). The content of information is not so relevant, and mood acts as the relevant state or context (15,16). This hypothesis calls attention to other aspects (i.e., aggregation of a negativistic modulation as a post-event phenomenon) that may be related to impairment of memory in depression, and the need to clarify the sequence of cognitive changes following even mild levels of mood disturbances and the possibility of their early detection.

The purpose of the present study was to investigate the presence of memory impairment and/or changes in future self-perception related to: a) levels of signs and symptoms of depression, and b) different reality

and future perspectives, in a sample of elderly inpatients without previous or present diagnosis of Major Depression.

Patients and Methods

Sixty-eight subjects were inpatients in the Hospital de Clínicas de Porto Alegre, 35 women and 33 men. Age ranged from 60 to 83 years (mean \pm SD, 68 \pm 6). All gave informed consent to participate in the study. The sample was divided into 3 groups according to educational level: group 1, 1 to 4 years of schooling; group 2, 5 to 10 years; group 3, 11 or more years. Severity of clinical diseases was another grouping variable, and patients were divided into two groups. The first included 48 patients suffering from acute/good clinical prognosis diseases (low morbidity-mortality rate) and the second consisted of 20 chronic patients with neoplastic disease (high morbidity-mortality rate). The clinical diagnoses of the patients and distribution into groups on the basis of prognosis are reported in Table 1.

The possible bias of the duration of hospitalization was controlled because all patients were tested during the first 15 days after admission.

Patients with dementia, schizophrenia, major depressive episode, acute organic cerebral syndrome, mental retardation and drug abuse were excluded using the DSM-III R criteria for all above conditions (7). Patients with epilepsy, acute pain, acute benzodiazepine intake (6 h before the interview) and/or chronic use of benzodiazepines, and illiterates were also excluded from the study.

Patients were assessed by the Montgomery-Asberg Depression Rating Scale (MADRS) (17,18), the Mini-Mental State Examination (MMSE) (19,20) and a simple choice questionnaire on self-perceptions of their future (FSPQ) based on Beck's Hopelessness Scale (21).

The FSPQ consisted of ten questions addressed to patient's perceptions of his fu-

ture and individual scores varied from -2 to +2. The final score is the sum of values from the ten questions (range, -20 to 20). Therefore, a final negative score refers to a negative future perception, and a positive final score to an optimistic answer (cutoff of zero).

After the FSPQ test, the patients read a 100-word account modified from the Wechsler Memory Scale (22). Immediately after being exposed to the text and 24 h later, patients were asked ten questions about the 100-word text. The Rate of Forgetting score (RF) was the difference between the scores of the first and second days divided by the score of the first day. This differential form of scoring was chosen rather than individual scores because it proved to be more sensitive to memory impairment when demented, depressed and cognitively normal patients were compared (23).

Symptoms of depression, cognitive impairment and future self-perceptions were analyzed independently for the entire sample. Levels of signs and symptoms of depression were determined by the Montgomery-Asberg Depression Rating Scale because this scale contains fewer physical items than other tests and evaluates depressive symptoms separately from symptoms produced by the physical illness, with a cutoff point of 20 (24). The low cutoff point of 20 was selected to separate patients with mild signs and symptoms of depression from those virtually free from depressive symptoms. Since the purpose of the study was not the diagnosis of depression, the DSM-III R check-list for Major Depression was used as the exclusion criterion.

Cognitive function was assessed by the MMSE test and a cutoff point of 24 (20,25) was used to detect literate patients with cognitive impairments. Future expectations were assessed by the FSPQ test and patients were separated using the method explained above.

Data were analyzed statistically by multiple regression to determine dependence between variables (26). MANOVA was ap-

Table 1 - Clinical diagnosis and prognosis of the patient sample.

Diagnosis	No.	%
Acute/good prognosis (48)		
Urinary infection	7	14.5
Acute pancreatitis	3	6.2
Urolithiasis	3	6.2
Bone fracture	5	10.4
Coledocholithiasis	6	12.5
Prolapse of the uterus	3	6.2
Pneumonia	6	12.5
Hiatal hernia	2	4.1
Cataract	6	12.5
Skin burns	1	2.0
Prostatic hyperplasia	5	10.4
Foreign body in hypopharynx	1	2.0
Chronic/neoplastic (20)		
Lung cancer	4	20
Rectum cancer	2	10
Pancreatic cancer	1	5
Prostatic cancer	6	30
Sigmoid cancer	2	10
Stomach cancer	2	10
Breast cancer	3	15

plied to control the potential effects of educational level, diagnostic group and age on MMSE, RF, MADRS and FSPQ scores when testing differences between groups (27).

Results

The mean scores obtained for the sample are presented in Table 2.

Multiple regression showed a significant dependence relationship between: 1) Montgomery-Asberg scores (independent) and Future Self-Perceptions (dependent), 2) Mini-Mental scores (independent) and RF (dependent), 3) age, educational level (independents) and Mini-Mental score (dependent) (Table 3). Higher MADRS scores are correlated to lower FSPQ scores ($B = -0.18$, $\beta = -0.29$, $P = 0.032$).

Better cognitive performance, measured by the Mini-Mental State Examination, is correlated to lower difference between first and second recall of the memory test (lower rate of forgetting) ($\beta = -0.16$, $B = -0.02$, P

Table 2 - Mean and standard deviation (SD) of the age and test scores of the 68 patients studied.

MADRS, Montgomery-Asberg Depression Rating Scale; MMSE, Mini-Mental State Examination; RF, Rate of Forgetting; FSPQ, Future Self-Perceptions Questionnaire.

Variable	Mean	SD
Age (years)	68.5	6.65
MADRS score	10.00	9.08
MMSE score	26.48	2.52
RF score	0.31	0.28
FSPQ score	6.57	5.89

= 0.016).

Multiple regression indicated a significant effect of age and education on MMSE scores (beta = -0.33 and 0.46, P = 0.001 and 0.000, respectively).

There was no significant difference between the acute/good prognosis and chronic/neoplastic groups for depression levels, MMSE, FSPQ, RF scores and age by MANOVA (P>0.1).

The following analyses were carried out with the acute/good prognosis and chronic/neoplastic groups taken together and the cutoff of MADRS, MMSE and FSPQ was used one at a time and independently. The comparison of MMSE, RF scores and age between the groups obtained by the use of the MADRS cutoff to the entire sample did not indicate significant difference. FSPQ scores differed significantly between groups (P<0.001). Mildly depressed patients presented a significant worse future impression than non-depressed patients (Table 4).

The cognitively impaired group (MMSE scores of 24 or less) presented a higher mean age than the non-impaired group (P<0.001). There were no significant differences between MADRS, FSPQ and RF scores according to cognitive performance.

The negative pattern group (FSPQ of zero or less) presented higher MADRS scores (P<0.05) than the positive group (FSPQ

greater than zero) whereas age, RF and MMSE did not differ significantly between groups (Table 5).

Data analysis by MANOVA, controlling for age, diagnostic group and Montgomery-Asberg scores, showed a significant difference (P<0.01) in MMSE scores between patients of lower (mean ± SD = 25.4 ± 2.3) and medium (mean ± SD = 27.2 ± 2.4) and higher (mean ± SD = 29.0 ± 1.0) educational levels. However, no differences were observed (P>0.05) between groups of medium and higher educational level.

Educational level had no effect on performance in the Montgomery-Asberg Depression Rating Scale, Rate of Forgetting or Future Self-Perceptions as determined by MANOVA.

Discussion

The Future Self-Perceptions Questionnaire, as well as the Hopelessness Scale, were developed to provide an objective measure of the cognitive pattern established by depression (21). From the three major components described by Beck (the negativistic perceptions of self, current experiences and future perceptions), we have chosen to use the individual future perceptions in the present study because their relations with internal stimuli (28) are presumably stronger than their connections with reality. In fact, comparing future perceptions of acute/good prognosis inpatients with those of chronic/neoplastic patients, we found no differences. In contrast, mild levels of signs and symptoms of depression were sufficient to modify the patients' future expectations regardless of real future probabilities of disability and/or mortality. Depressive patients with cognitive dysfunctions presented higher scores for items assessing "intrapsychic" symptoms of depression such as hopelessness (29).

Further studies of the use of the Future Self-Perceptions Questionnaire and the Hopelessness Scale of Beck (21) are needed

to determine a more adequate cutoff point and a better understanding of our results.

Our results are relevant to the understanding of memory deficits in the depressed elderly. The capacity to make up action plans and to program goal-directed behavior depends on the ability of the central nervous system to deal with the future (30). Thus, changes in the ability to perceive the future may be associated with memory deficits in depression. The idea that the integrity of future perception is necessary for cognitive function is actually very old. Dante Alighieri (1265-1321) in "La Divina Commedia" stated that "after closing the doors of the future cognition will fail" (31).

Prior to a well-established memory disruption, the presence of mild symptoms of depression may activate a type of "agnosic" behavior pattern (recognition is the main impaired function) in which the subject loses the ability to recognize his/her own capacities and future. Mild depression rates measured by the Montgomery-Asberg Depression Rating Scale were not associated with increased forgetting. However, rates of forgetting correlated with Mini-Mental State scores. This is a causative relation, since the MMSE estimates global mental function (19,32). Memory is a higher brain cortical function which is specially assessed with this instrument. The presence of cognitively impaired brain functioning can be used as an evidence of memory disturbances, regardless of depression levels.

The present results suggest that cognitive changes observed in depressive elderly patients may be related to higher levels of symptoms of depression. According to Folstein and McHugh (33), this is a type of organic but "reversible" cognitive dysfunction, possibly due to factors associated with the pathology of mood disorders, such as brainstem neuronal dysfunction or biogenic amine deficiency.

Cultural background complicates the interpretation of data for Brazilian samples

Table 3 - Statistical analysis of test scores.

The data are reported for correlation matrix (CM), regression coefficient (B), and standard regression coefficient (Beta) obtained by multiple regression analysis of the sample as a whole. MADRS, Montgomery-Asberg Depression Rating Scale; MMSE, Mini-Mental State Examination; RF, Rate of Forgetting; FSPQ, Future Self-Perceptions Questionnaire score; Group, diseases with good or poor prognosis. Data are for 68 patients.

Variable		CM	B	Beta	P value
Dependent	Independent				
FSPQ	MADRS	-0.30	-0.18	-0.29	0.032
	MMSE	0.06	-0.12	-0.05	0.744
	Rs	-0.13	-1.75	-0.08	0.507
	Schooling (years)	0.10	1.03	0.12	0.397
	Group	-0.06	-0.35	-0.03	0.824
RF	Age (years)	0.08	0.06	0.07	0.588
	MADRS	0.15	-0.06	-0.02	0.688
	MMSE	-0.24	-0.02	-0.16	0.016
	Schooling (years)	0.52	0.03	0.07	0.230
	Group	0.06	0.03	0.06	0.238
MMSE	Age (years)	-0.38	0.07	-0.18	0.002
	MADRS	-0.20	-0.05	-0.19	0.053
	Schooling (years)	-0.38	1.67	0.46	0.000
	Group	-0.09	0.24	0.04	0.653
	Age (years)	0.52	-0.13	-0.33	0.001

Table 4 - Comparison of mean test scores with patients separated by MADRS cutoff level.

The cutoff level was 20 and MANOVA was used for the comparison. MADRS, Montgomery-Asberg Depression Rating Scale; MMSE, Mini-Mental State Examination; FSPQ, Future Self-Perceptions Questionnaire; RF, Rate of Forgetting.

Variable	MADRS≤20 (N = 55)	MADRS>20 (N = 13)	F	P value
MADRS	6.78 ± 5.16	28.16 ± 6.80	150.65	0.000
MMSE	26.62 ± 2.49	25.78 ± 2.54	3.13	0.081
FSPQ	7.28 ± 5.44	1.57 ± 5.94	9.94	0.002
RF	0.3 ± 0.29	0.4 ± 0.29	0.61	0.437
Age (years)	68.78 ± 6.76	64.3 ± 6.26	0.18	0.670

Table 5 - Comparison of mean test scores with patients selected by the FSPQ cutoff level (positive and negative pattern groups).

The cutoff level was zero and MANOVA was used for the comparison. FSPQ, Future Self-Perceptions Questionnaire; MADRS, Montgomery-Asberg Depression Rating Scale; MMSE, Mini-Mental State Examination; RF, Rate of Forgetting.

	Positive pattern (FSPQ \geq 0)(N = 59)	Negative pattern (FSPQ<0)(N = 9)	F	P value
FSPQ	8.16 \pm 4.40	-3.89 \pm 2.93	62.80	0.000
MADRS	8.47 \pm 7.61	20.00 \pm 11.88	10.80	0.002
MMSE	26.55 \pm 2.45	26.00 \pm 3.08	0.38	0.540
RF	0.31 \pm 0.27	0.33 \pm 0.30	0.05	0.815
Age (years)	68.89 \pm 6.76	65.88 \pm 5.48	1.61	0.209

more than it does for other national samples because the economic situation creates several different social groups. Self-report of completed years of schooling has been accepted as an estimate of sociocultural background, but it does not indicate actual reading ability (34). The impact of schooling on performance in various cognitive tasks has been demonstrated by Ardilla and co-workers (35). Age, as well as education, is another factor that may interfere with cognitive performance. In the present study, MMSE scores were influenced by age and education, as also shown by others (19,25,36,37).

Studying healthy volunteers, Izquierdo and Chaves (10) found that a negative comment about previously learned material may impair the recall of the acquired information. On the basis of these findings, they proposed that negative patterns of depression may play a role in the memory impairment observed in depressive illness.

The present study focused on ranges of signs and symptoms of depression assessed by the Montgomery-Asberg Depression Rating Scale (17) which was not used as a diagnostic category. The early changes identified in the small range of signs and symptoms of depression presented by the patients were a negative pattern of cognitive processes, regardless of reality (presence of good/bad prognosis diseases). The relevance of the results of the present study concerns the application of the Hopelessness and Depression Rating Scales in clinical settings to identify older individuals at major risk to develop mood disorders and cognitive deficits. Further investigation including that of younger adults, outpatients, subjects with higher levels of depression and depression as a diagnostic category and their follow-up may indicate where the memory impairment appears.

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