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ORIGINAL PAPER

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Mood improvement reduces memory complaints in depressed patients

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Abstract *Background* The aim was to examine associations between memory complaints, cognitive performance and mood in 174 adult, clinically depressed, neurologically healthy patients at baseline and during six months of follow-up.

Methods Subjective memory disturbance was assessed using the Memory Complaint Questionnaire (MCQ). Levels of cognitive function, including memory, were assessed using a battery of neuropsychological tests. Mood and personality traits were assessed using rating scales, including the Beck Depression Inventory (BDI), Hamilton Depression Rating Scale (HDRS) and the 90-item Symptom Check List (SCL-90).

Results At baseline, patients complaining of memory disturbances had higher BDI and HDRS scores than patients not complaining of memory problems. They also did less well in objective memory performances but not in other cognitive functions. Complaints of memory problems decreased during the follow-up. This change was associated with mood improvement and with reductions in other mental symptoms but not with changes in cognitive performance. In logistic regression analysis factors independently associated with MCQ change were age (OR 0.96) and BDI change (OR 1.06).

Conclusions Subjective memory problems usually decline if depression is alleviated.

Key words Memory complaints · Depression · Cognition

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Introduction

Subjective memory disturbances or memory complaints have mostly been studied in the context of age-associated memory impairment (AAMI) (Crook et al. 1992). They have been considered as being related to organic changes in the central nervous system (CNS). However, self-perception of memory problems is common in adults. In a large postal survey, high prevalences of subjective perception of forgetfulness were found in young (29 %) and middle-aged (34 %) healthy Dutch subjects (Commissaris et al. 1998). In another study, 45 % of psychiatric in-patients over 60 years of age and 29 % of younger psychiatric in-patients had severe memory complaints (Chandler et al. 1988). In a memory clinic offering direct access, 53 % of cognitively normal subjects under 50 years of age but only 3 % of older subjects reported severe memory problems. Younger subjects also evaluated their problems as being of longer standing than older subjects (Derouesne et al. 1999).

In the context of suspected cognitive disorder, the validity of memory complaints is subject to debate (Derouesne et al. 1999, Riedel-Heller et al. 1999). Associations have been found between memory complaints and cognitive disorders related to CNS changes, e. g. subsequent dementia (Tobiansky et al. 1995) or the incidence of Alzheimer's disease (Geerlings et al. 1999). In cross-sectional studies in elderly adults, memory complaints were associated with depressive symptoms (Popkin et al. 1982, O'Hara et al. 1986, Chandler et al. 1988, Blazer et al. 1997), hypochondriasis or psychasthenia (Hänninen et al. 1994), individual affective status (Derouesne et al. 1999) and certain general health factors but not with the level of cognitive functioning or memory performance (Derouesne et al. 1999, Riedel-Heller et al. 1999, Hänninen et al. 1994). No association was found between baseline memory complaints and subsequent cognitive impairment in a longitudinal study (Blazer et al. 1997).

In clinical practice, memory problems can be re-

ported by adult, neurologically healthy patients. Such problems are often frightening and anxiety-provoking to patients, who may believe that they presage severe illness. In healthy Dutch adults the occurrence of dementia in a close relative appeared to be strongly associated with complaints of forgetfulness (Commissaris et al. 1998).

Studies of subjective memory disorders have so far related mainly to the elderly examined for suspected organic disorder. Possible associations between subjective memory disorder and mood and personality characteristics have not previously been studied among patients with clinical depression in a prospective study design.

Therefore, the aim of the prospective study reported here was to study 1) baseline and 2) follow-up associations between memory complaints, cognitive performance and mood in clinically depressed, neurologically healthy adult patients, and 3) to find factors independently associated with the change in memory complaints.

Methods

Subjects

The initial subjects were 203 consecutive patients (84 men, 119 women) suspected of suffering from depression who had been referred for psychiatric outpatient care to the Department of Psychiatry, Kuopio University Hospital, Kuopio, Finland. The patient was assessed as eligible for inclusion in this study if the treating doctor clinically diagnosed him or her to be suffering from depression according to ICD-10 (WHO 1992) (F31.3–5, F32–F34, F41.2). Patients gave their written informed consent to participation in the study. Patients were excluded if they had CNS disease, other severe disease (recent myocardial infarction, recent stroke, etc.), were dependent on alcohol or drugs, were markedly deficient in cognitive capacity, or had any other serious mental disorder such as schizophrenia or other psychoses. Information from case records and interviews was used.

Ten patients (5 %) refused to participate at the outset and five patients (3 %) were excluded because of CNS disease (e. g. Alzheimer's disease). On follow-up six months later, 19 other patients declined to continue participation. The final sample therefore consisted of 169 patients (drop-out rate 17 %). There were no significant differences in sex ratio between the participants and drop-outs (men: 40 % vs. 50 %), or in mean age (45 years vs. 44 years). For more detailed information about the sample, see Viinamäki et al. (2000).

Altogether, 174 patients took part in psychological tests at baseline and 156 on follow-up. There were no statistically significant differences between those who took part in tests on follow-up and the 32 who did not with respect to their age, marital status, educational level, ability to work, subjective health status or duration of depressive symptoms.

At baseline, diagnosis of depressive disorder was confirmed by means of the Structured Clinical Interview for DSM–III–R (SCID I) (Spitzer et al. 1990, Spitzer et al. 1992). The 188 patients at baseline were diagnosed as suffering from major depression (n = 137), another depressive disorder (n = 32), e. g. dysthymia or adjustment disorder, and depressive symptoms not meeting the criteria for diagnosis of depressive disorder (n = 19). In this group of 19 patients the mean score at the BDI was 13.6 ± 9.2 and at HDRS 10.7 ± 3.8 at baseline.

Measurements

At baseline, patients completed questionnaires relating to their sociodemographic backgrounds and gave their own estimates regarding the duration of depressive symptoms, their financial situation and general health. Cognitive capacities were evaluated by a psychologist using a large battery of tests. Measurements were repeated six months later.

At baseline, all patients took part in tests relating to five subscales of the Wechsler Adult Intelligence Scale (WAIS-R) (Wechsler 1981), adapted for use in relation to the Finnish population. Verbal cognitive level (VIQ) was assessed using three scales (Similarities, Vocabulary, Digit span) and performance level (PIQ) using two scales (Digit symbol and Block design). On follow-up, tests relating to three scales (Digit span, Digit symbol and Block design) were performed by all subjects. To control for the learning effect on the follow-up the similarities and vocabulary scales were halved, and every other patient took part in tests relating to the scales thus formed.

Memory function was measured using the Logical Memory Subtest (Story recall) of the Wechsler Memory Scale (WMS) (Wechsler 1974), the List Learning Test (Lezak 1995, Äikiä et al. 1995) and the Rey Complex Figure Test: Recall Administration (CFT) (Lezak 1995). Executive function, flexibility, control and motor speed were measured using the Stroop Color and Word Test (Stroop) (Golden 1978) and Trail Making Test (TMT) (Reitan 1958).

Subjective memory disturbance was assessed using the Memory Complaint Questionnaire (MCQ) (Crook et al. 1992). In the MCQ, the subject is asked how his or her memory works now as compared with when the subject was young. The subject is asked to describe, using a Likert-type scale, his or her ability to perform common tasks involving memory (remembering persons, things, telephone numbers, news and items on shopping lists). Subjects were also asked to assess the overall memory decline experienced. The resulting memory complaint (MC) score can range from 7 to 35. The higher the score the greater the subjective memory impairment.

The Beck Depression Inventory (BDI) (Beck et al. 1988), Hamilton Depression Rating Scale (HDRS) (Hamilton 1960), Symptom Check List (SCL-90) (Derogatis 1973, Holi et al. 1998), and Toronto Alexithymia Scale (TAS-20) (Taylor 1994, Bagby et al. 1994, Joukamaa et al. in press) were also used at baseline and on follow-up. General social and occupational capacity were estimated using the SOFAS scale (Goldman et al. 1992). Patients assessed life satisfaction (LS) using a four-item scale (possible score range 4–20) (Koivumaa-Honkanen et al. 1999).

Treatment during follow-up

Data relating to treatment during follow-up were collected from patient case records and by interview of all patients. Antidepressive medication was considered adequate if length of treatment exceeded 3 months and if daily dose was within the range assessed as effective (daily dose: tricyclics ≥ 150 mg, citalopram ≥ 20 mg, fluoxetine ≥ 20 mg and paroxotine ≥ 20 mg) (Tollefson et al. 1998, Sorvaniemi et al. 1998). Benzodiazepine medication was recorded as having been taken if a patient had taken any benzodiazepine during follow-up, regardless of the duration of medication or daily dose. Eleven per cent (N=17) of patients had received adequate doses of tricyclic antidepressants (TCA) and 37 % (N=58) so-called modern antidepressants, e. g. selective serotonin reuptake inhibitor (SSRI) or reversible inhibitors of monoamine oxidase (RIMA) drugs during follow-up. In addition, twelve patients had taken TCAs and three patients modern antidepressants at doses below the adequate level. Twenty per cent had taken benzodiazepines. Patients were recorded as having received psychotherapy if the sessions were planned and if they had occurred at least three times a month, in each case lasting for at least 45 minutes. Twenty-six per cent of patients had received psychotherapy. Fourteen per cent had been under psychiatric hospital care during follow-up.

Statistical methods

The sample was divided into two groups at baseline using the median MCQ scale score: those complaining of memory problems (MCQ-scale score ≥ 29 points) and those not complaining MCQ-scale score

≤ 28 points). Change during follow-up was investigated by dividing the sample into two groups: those in whom memory complaints had declined (decrease in MCQ-scale score by at least one point) and those in whom memory complaints were unchanged or had increased (others). The significance of differences between groups was assessed using the Pearson Chi-square test for categorical variables and the t-test for independent and paired samples in relation to continuous variables. Logistic regression analysis was used to identify independent factors associated with the change in MCQ scores.

Results

Those complaining of memory problems were older than those not complaining (Table 1). However, there was no difference in the estimates of time since the first depressive symptoms occurred. There were also no differences in sex ratio, marital status, basic education, financial situation or the prevalence of previous attempts at suicide. Individuals complaining of memory disorders were more often on sick leave or had retired than the others, and their rating of their health status was poorer than that of the others. The above-mentioned associations persisted after adjustment for age (data not reported here).

At baseline, cognitive capacities of all subjects corresponded (Wechsler 1974) to the Finnish average (VIQ mean 99.6, SD ± 13.5; PIQ 100.5 ± 15.6). Those complaining of memory problems did not differ from those not complaining in their general cognitive capacity (Table 2) (Similarities, Vocabulary, VIQ, PIQ) but performed less well than the others in most test items involving memory (Digit span, Logical memory, List learning). There were no differences between those complaining of memory problems and those not complaining as regards visual recall (CFT) or executive function, flexibility, control and motor speed (TMT, Stroop).

Those complaining of memory problems suffered more often than those not complaining from depressive symptoms (BDI, HDRS) (Table 2) and most of the mental symptoms assessed using SCL-90 (only total score used here). Psychosocial functioning (SOFAS) of those complaining of memory problems was poorer than of those not complaining of memory problems.

On follow-up, depressive patients were found to have improved in their motor speed and accuracy (Digit symbol, 45.1 ± 13.8 points at baseline vs. 47.9 ± 14.3 on follow-up, $t = -5.84$, $df = 153$, $p < 0.001$), visual perception (Block design, 30.0 ± 9.7 vs. 31.4 ± 9.8, $t = -3.42$, $df = 151$, $p = 0.001$), logical memory (recall, 9.4 ± 3.5 vs. 10.7 ± 3.6, $t = -5.82$, $df = 153$, $p < 0.001$, delayed recall, 7.6 ± 3.8 vs. 9.1 ± 3.8, $t = -6.39$, $df = 152$, $p < 0.001$), delayed recall of visual material (CFT, 16.1 ± 7.1 vs. 19.2 ± 6.8, $t = -8.04$, $df = 152$, $p < 0.001$), and flexibility and control (Stroop, 27.5 ± 16.0 vs. 23.7 ± 13.8, $t = 4.98$, $df = 152$, $p < 0.001$). In relation to other measures of performance, including Similarities and Vocabulary, there were no significant changes from baseline levels.

The decline in complaints of memory problems over the follow-up period (Table 3) was associated with an improvement in mood (BDI, HDRS), the alleviation of other psychic symptoms (SCL–90), a decrease in alexithymic features (TAS–20), an increase in life satisfaction and an improvement in psychosocial capacity (SOFAS). Changes in self-perception of memory were not associated with changes in memory or in cognitive performance with the exception of performance assessed by Block design.

The cognitive performances of patients having received adequate amounts of TCAs (N=17) were compared to the performances of all other patients. In relation to the cognitive functions shown in Table 3 the only significant changes were in List learning (–2.8 ± 5.4 vs. 0.7 ± 6.4, $t = -2.13$, $df = 152$, $p = 0.035$) and in delayed recall of List learning (–0.8 ± 2.0 vs. 0.5 ± 2.3, $t = -2.24$, $df = 152$, $p = 0.027$). However, there was no difference between those whose memory complaints decreased and those whose memory complaints increased or remained

Tab. 1 Background variables in depressive patients complaining of memory problems and in those with subjectively normal memory

Variable	Complaint of memory problems (n = 79)	No complaint of memory problems (n = 95)	p value χ^2 (df = 1)
Age, years (mean ± SD)	47.6 ± 8.1	41.4 ± 10.1	< 0.001
Women, %	58	60	NS
Married or cohabiting, %	71	60	NS
Time since first depressive symptoms, patient's estimate, years (mean ± SD)	10.0 ± 10.4	9.8 ± 10.4	NS
Education			
Secondary school-leaving examination, %	18	28	NS
Employment status at baseline			
On sick leave, retired, %	70	47	0.003
Subjective financial situation			
Poor or fairly poor, %	65	57	NS
Previous attempts at suicide, %	12	7	NS
Subjective health status			
Poor or fairly poor, %	80	56	0.001

Tab. 2 Comparison of cognitive performance, mood, psychic symptoms and psychosocial capacity between those complaining of memory problems and others, at baseline

	Complaint of memory problems (n = 79)	No complaint of memory problems (n = 94)	p value
General cognition (scores, mean ± SD)			
WAIS-R, similarities	26.2 ± 3.8	26.0 ± 4.8	NS
WAIS-R, vocabulary	43.5 ± 10.1	44.8 ± 10.8	NS
WAIS-R, digit span	11.4 ± 3.5	12.5 ± 3.6	0.041
WAIS-R, digit symbol	41.6 ± 13.2	47.8 ± 14.1	0.003
WAIS-R, block design	28.4 ± 8.4	31.0 ± 11.1	NS
WAIS-R, VIQ-estimate	98.9 ± 12.6	100.3 ± 14.1	NS
WAIS-R, PIQ-estimate	98.2 ± 14.5	102.2 ± 15.9	NS
Memory (scores, mean ± SD)			
WMS-logical memory, story recall	8.8 ± 3.2	9.9 ± 3.7	0.047
WMS-logical memory, delayed recall	6.8 ± 3.6	8.1 ± 3.9	0.024
List learning, total	33.4 ± 6.8	36.2 ± 7.1	0.009
List learning, delayed recall	7.2 ± 3.1	8.3 ± 3.0	0.022
Rey	34.6 ± 2.0	34.7 ± 3.3	NS
Rey, delayed reproduction	15.3 ± 6.3	16.3 ± 8.0	NS
Executive function, flexibility, control and motor speed (mean ± SD)			
TMT, difference in speed of performance in parts B and A (time in seconds)	44.9 ± 31.2	37.5 ± 30.2	NS
Stroop, difference in speed of performance in parts B and A (time in seconds)	29.8 ± 18.6	25.7 ± 11.6	NS
Depression (scores, mean ± SD)			
BDI	21.8 ± 9.1	18.4 ± 9.1	0.014
HDRS	19.0 ± 6.3	15.5 ± 6.5	< 0.001
Mental symptoms (scores, mean ± SD)			
TAS-20	56.5 ± 12.5	53.5 ± 11.2	NS
SCL-90, total	2.6 ± 0.6	2.3 ± 0.6	0.003
Psychosocial capacity (scores, mean ± SD)			
Life satisfaction	14.3 ± 3.3	13.4 ± 3.2	NS
SOFAS	59.9 ± 9.1	64.6 ± 9.9	0.001

Tab. 3 Comparison of changes (mean ± SD) in cognition, mood and psychosocial capacity between patients in whom memory complaints decreased and those in whom they increased or remained unchanged after six months of follow-up

	Memory complaints decreased (n = 73)	Change[1] in %	Memory complaints unchanged or increased (n = 81)	Change[1] in %	p value
General cognition, changes					
WAIS-R, similarities (n=71)	–0.1 ± 1.6	0.8	0.2 ± 2.1	1.5	NS
WAIS-R, vocabulary (n=71)	–0.0 ± 3.2	0.0	0.7 ± 3.8	3.0	NS
WAIS-R, digit span	0.1 ± 2.1	0.8	0.5 ± 2.1	4.1	NS
WAIS-R, digit symbol	3.3 ± 4.6	28.0	2.2 ± 6.6	18.3	NS
WAIS-R, block design	2.3 ± 4.7	7.3	0.6 ± 5.2	2.1	0.046
Memory changes					
WMS-logical memory, story recall	1.6 ± 2.7	17.0	0.9 ± 2.6	9.5	NS
WMS-logical memory, delayed recall	1.8 ± 2.8	24.0	1.2 ± 2.9	15.8	NS
List learning, total	0.7 ± 6.2	2.0	–0.1 ± 6.5	0.3	NS
List learning, delayed recall	0.5 ± 2.4	6.2	0.2 ± 2.2	2.6	NS
Rey	–0.4 ± 2.6	1.1	–0.2 ± 3.2	0.6	NS
Rey, delayed reproduction	3.5 ± 4.9	22.2	2.8 ± 4.8	17.4	NS
Executive function, flexibility, control and motor speed, changes					
TMT, difference in speed of performance in parts B and A (time in seconds)	–0.3 ± 23.8	0.8	–2.0 ± 34.4	4.4	NS
Stroop, difference in speed of performance in parts B and A (time in seconds)	–3.6 ± 9.0	13.3	–4.0 ± 10.1	14.3	NS
Depression, mental symptoms, psychosocial and capacity at work, changes					
BDI	–9.7 ± 9.1	47.3	–4.4 ± 8.6	22.9	< 0.001
HDRS	–8.1 ± 7.7	46.6	–4.2 ± 6.1	25.1	0.001
SCL-90, Total	–0.6 ± 0.6	25.0	–0.3 ± 0.5	12.5	< 0.001
Tas-20	–8.0 ± 9.6	14.4	–3.4 ± 8.7	6.2	0.002
Life satisfaction	–3.4 ± 3.7	25.0	–1.9 ± 3.9	13.6	0.014
SOFAS	6.8 ± 10.8	10.9	1.0 ± 8.7	1.6	< 0.001

[1]Change in % in relation to the baseline value

Tab. 4 Association between MCQ change and antidepressant and benzodiazepine drug treatment during six months of follow-up

Variable	Memory complaints decreased (n = 73) %	Memory complaints unchanged or increased (n= 81) %	p χ^2 (df = 1)
Antidepressants			
Tricyclic antidepressant at an adequate level	10	12	NS[a]
Modern antidepressant at on adequate level	42	32	
Tricyclic antidepressant below adequate level	10	5	
Modern antidepressant below adequate level	1	3	
No antidepressant drug in use	37	48	
Benzodiazepines			
Received benzodiazepines	75	83	NS[b]
No benzodiazepines	25	17	

[a] patients who received TCAs on adequate level vs. all others
[b] received benzodiatzepines vs. no benzodiazepines in use

unchanged as regards the quality of antidepressant drug treatment or the use of benzodiazepines (Table 4).

Logistic regression analysis was used to identify independent variables associated with the change in MCQ scores and to control confounding factors. The model included the following variables: age, sex, MCQ score and List learning score at baseline, BDI change and WMS-Logical memory change. The analysis revealed that only age (OR 0.96, 95 % CI 0.92–0.99, $p < 0.05$) and BDI change (OR 1.06, 95 % CI 1.02–1.11, $p < 0.01$) were independently associated with the change in MC scores. The interactions of age and sex with other independent factors were analysed. None of them were significant.

Discussion

According to our cross-sectional baseline findings depressed patients complaining of memory problems were more depressed and did less well in memory tests than those not complaining. However, the groups did not differ in relation to other cognitive functions, or general cognitive capacity. Memory complaints were associated with some psychosocial factors, e. g. work disability and subjective poor health. This association was not eliminated after age-adjustment, even if depressive patients complaining of memory problems were older than others.

On follow-up, memory complaints in depressive patients had mostly declined and cognitive performance improved in many respects. Our main findings were that a change in MCQ scale score at follow-up was consistently associated with a change in mood, alexithymic features and psychosocial capacity but not in cognitive performance, e. g. memory functions. The results of logistic regression analysis showed that age and change in the BDI score were the only factors independently associated with changes in memory complaints.

The small decline in memory performances in those patients who received TCAs is consistent with the well-known finding that TCAs possess – possibly due to their anticholinergic properties – the potential to decrease cognitive performance (e. g. McElroy et al. 1995, Settle 1998). However, the changes in memory complaints and the quality of drug treatment received during follow-up seemed not to be statistically related.

Although subjective memory disturbances and concerns about memory loss are common, previous studies have focused almost exclusively on the elderly and few follow-up studies have been conducted. We used a prospective study design in young and middle-aged patients suffering from depression. Memory performance and cognitive function in addition to mood, personality traits and psychosocial capacity were monitored using an extensive, versatile battery of tests. Our approach was naturalistic and the results therefore accurately describe factors associated with recovery from depression. Nineteen patients in our sample were not diagnosed with depression according to SCID. However, the BDI and HDRS scores indicated depression also in this group. According to the literature, clinically significant depression is indicated by a BDI score of 10 or more (Beck et al. 1988) and by a HDRS score of 8 or more (Hamilton 1960).

Since the cognitive capacities (IQs) of patients in the sample corresponded on average to those of the general population there would seem to have been no bias as regards how depressive patients sought or were referred to treatment. Results of studies on depression and cognitive performance have been conflicting. Marked impairment of performance was observed in some studies (e. g. Veièl 1997) while no impairment was found in others (Lezak 1995).

In some cross-sectional studies, memory complaints have been found to be associated with changes in cognitive function (Tobiansky et al. 1995, Geerlings et al. 1999) while in others, they have been found to be associated with mood and personality traits (Popkin et al. 1982, O'Hara et al. 1986, Chandler et al. 1988, Blazer et al. 1997, Hänninen et al. 1994, Derouesne 1999). Our baseline results gave some support to both of these hypotheses in adult depressed patients. However, findings at follow-up clearly showed that memory complaints were associated with mood and personality traits but not with cognitive performance. Our results, relating to adults, differed from the findings of Crook et al. (1992) in elderly subjects. Crook et al. (1992) reported that memory-test scores were related to MC-scale scores but not to Hamilton Depression Scale scores.

Our results suggest that subjective memory problems usually decline if depression is alleviated. This finding could be used in motivating depressed patients to undergo treatment.

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