

Subjective and objective assessment of memory functions in endogenous depression

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The authors analyse the relations between self-evaluations of memory as well as of depression, and objective memory tests.

Key words: depression, memory functions, memory complaints

Introduction

Intellectual efficiency disturbances, including memory dysfunctions, constitute one of the most frequent syndromes in psychiatric, psychological and general medical practice. Disregarding physiological phenomena like fatigue, and dispersion of attention by excessive stimulation so common in the modern world, the basic causes of cognitive dysfunction are depression and dementia [3, 32]. In the epoch of ageing societies, these disorders will become a more and more frequent diagnostic and therapeutic problem. The development of psychopharmacology and other methods of effective treatment of depression is connected with the necessity of proper diagnosis of depression and distinguishing it from dementive syndromes and addictions. Different prognoses in depression and dementia as well as new methods of treatment [11] force the therapists to seek new diagnostic methods, among which neuropsychological examinations are more and more extensively applied. Most authors agree that subjective and objective indices of intellectual impairment in depression are improved together with the development of antidepressant treatment [4, 22]. It is with this fact that we can explain the astonishing cases of curing “dementia” and, maybe, this is also an explanation of the great popularity of antidepressant drugs with slight side-effects like fluoxetine, fluvoxamine, citalopram, venlafaxine or mianserine.

From clinical practice we know how often depressive patients complain about intellectual efficiency impairment. These complaints usually regard memory impairment, feeling of “empty brain”, decrease of general intellectual dynamics, fatigability,

aprosxia. What strikes the eye is the well-preserved criticism in these patients [3]. La Rue reports that the patients suffering from milder depression experience slight deterioration of intellectual efficiency while a significant deterioration of cognitive functions is scarce [18]. The patients with severe depression suffer from deterioration of cognitive functions more often, but usually their global intellectual efficiency is good. The factors influencing impairment of cognitive functions in depression are still discussed [5, 15, 17, 19, 24]. This impairment may be determined by two factors: Firstly, by the hypothetical cause of endogenous depression, the primary pathology of the three interdependent neuromediators - noradrenaline, serotonin and acetylcholine, the last of which is of essential importance for memory functioning [12].

Secondly, pathology of cognitive functions may be secondary to mood depression and low self evaluation, which lies at the base of pathology of motivational and impulsive processes, typical for depression.

Cognitive deficits in depression are more significant in elderly persons as compared with younger ones. They regard decreased ability to execute tasks requiring constant effort and concentration, cognitive fluency or flexibility, abstract thinking, precision and motivation [20]. Studies of various authors confirm the existence of memory deficits in elderly persons, especially those who also suffer from depression. In the research conducted by Chandler et al. on 206 hospitalised patients, 45% of patients older than 60 years and 29% of patients at the age below 60 reported memory disturbances [7]. In the patients older than 60 years, complaints concerning memory deficits were more frequent in the cases of depression than in the cases of dementia or amnesic syndrome (73% vs. 43%). On the other hand, in younger patients, the complaints about memory impairment were slightly more frequent in the cases of dementia and amnesic syndrome than in the cases of depression (57% vs. 41%). Intensity of complaints about memory dysfunctions turned out to be connected with the age of depressive patients. In other patients this correlation was not detected [7]. According to the data provided by Squire and Zouzounis, the subjective assessment of severity of memory dysfunction in depression is overestimated. In some disorders of the central nervous system (CNS), e.g., in Korsakov amnesic syndrome or in dementia, it is underestimated, that is, objectively the patients suffer from deeper memory impairment than they are inclined to admit [26, 27]. Kahn, Bolla, O'Connor [15, 5, 21] detected the existence of moderate correlation between the subjective and objective memory test ratings.

These studies do not allow for a definite recognition of the kind of correlation between memory questionnaires and neuropsychological tests used for memory assessment. Memory tests of semantically organised material (long term and immediate memory of stories) were moderately correlated with questionnaires for memory self-evaluation (Bolla, Kahn) [5,15].

In the research conducted by O'Connor, correlation was detected between subjective and objective memory assessment in patients with slight and moderate dementia. No correlation of this kind was observed in healthy controls or in depressive persons [21]. Small et al. (1994) detected correlation between certain indices of mood depression, subjective assessment of memory functioning and indices of glucose metabolism in frontal lobes in patients with AAMI – age associated memory impairment [28]. The

authors suggest that memory self evaluation may be a sensitive indicator of frontal lobes functioning impairment, and follow-up studies could decide whether metabolism examinations may help predict the development of Alzheimer's disease.

The available literature indicates (cf. La Rue, Watts, Bolla) that negative assessment of memory efficiency is influenced by affective disorders, especially by depression [18, 30, 5]. Mood depression is often a better predictor of subjective complaints concerning memory functioning than the results of objective memory tests. The above thesis is confirmed by examinations of patients with depression [18] and with multifocal brain injury in elderly persons [5]. The influence of depressed mood on the conviction about memory impairment is determined by numerous factors [1 b]. Between the subjective and objective instruments for memory assessment there occur several interdependencies whose recognition requires further study. Interesting data were provided by Cippoli et al. (1990), who found impairment of executive functions, memory, recalling and delayed memory in elderly patients and in those with higher intensity of depression [10]. The intensity of complaints about memory impairment was connected with the levels of memorisation, recalling and with delayed memory. In males, both age and intensity of depression influenced the levels of memorisation, recalling and functioning of delayed memory. In females, on the other hand, it was only the degree of depression that influenced the level of memorisation and recalling, while age influenced functioning of delayed memory.

Most of the hitherto conducted studies indicate that psychomotor sluggishness, decrease of the general life dynamics, mood depression, negative perception of oneself and of the world, lowered self-evaluation as well as other symptoms of depressive disorders generate a conviction about memory dysfunction. Thus, in the present paper, we adopt the hypothesis that subjective feeling of memory dysfunction is connected, first of all, with self-estimation of the intensity of depressive symptoms and, secondly, with the results achieved in memory tests. The aim of this study was to answer the following questions:

1. Is the subjective sense of memory deficit confirmed in the objective memory tests?
2. Does self-estimation of the intensity of depressive symptoms influence the self-estimation of memory functioning?

Examined persons

The examinations covered 56 patients (21 males and 35 females) hospitalised in the 1st and 2nd Psychiatry Departments of the Medical University in Gdańsk. Mean age was 47.1 years (SD = ±15.3); mean duration of illness – 21 months (SD = ±3.7), mean duration of school education – 12.3 years (SD = ±3.2). In Beck's Depression Inventory the patients scored, on the average, 20 points (SD = ±9), which indicates moderate intensity of depressive symptoms. In the Mini Mental State examination (MMSE) mean result was 29 points (SD = ±0.89). The patients with the diagnosis of endogenous depression fulfilled the diagnostic criteria of "major depression" deter-

mined by the DSM-IV.

The selection was determined by the intensity of depressive symptoms and not by duration of treatment or hospitalisation. The patients who had ever received electroconvulsive therapy were excluded due to the possibility of occurrence of organic reaction during the therapy.

Method

Neuropsychological examinations were performed before the start of antidepressive treatment. The following research instruments were applied:

1. Hold tests: Vocabulary, Information, Comprehension of Wechsler Adult Intelligence Scale for assessment of the premorbid intelligence quotient [6].
2. Mini Mental State Examination (MMSE) – to examine orientation, memory and language factor [13].
3. Beck Depression Inventory used for subjective evaluation of intensity of affective, motivational, behavioural, cognitive and somatic symptoms of depression [1].
4. Squire's Memory Questionnaire used for self-assessment of memory functioning [26, 27].
5. Benton Visual Retention Test – for evaluation of direct visual memory, perception process and visuomotorial factor [2].
6. Digit Span of Wechsler Adult Intelligence Scale – to assess attention and immediate auditory memory of semantically non-organised material [6].
7. Long-term Memory – a subscale of Choynowski's Memory Rating Scale – to assess delayed verbal memory of semantically organised material [8].
8. Rey – Osterrieh's Complex Figure Test (CFT) to assess delayed memory of visuo-motorial material, level of perceptive structuration, visuomotorial coordination [29].
9. Rey's Auditory Verbal Learning Test (AVLT) – to analyse the process of learning verbal material, ability to memorise and recall [25, 9].
10. DCS Weidlich Test – to analyse the process of learning non-verbal material [31].

Results and discussion

As the results presented in table 1 indicate, the present efficiency of cognitive functions assessed on the MMSE Scale was significantly correlated with nearly all memory indices to a moderate or large extent. Higher results on the MMSE scale were favourable for learning verbal material (AVLT) and non-verbal material (DCS Weidlich test). They were also correlated with the tasks examining immediate memory of non-verbal material, perception and attention (Benton's test and a copy of Rey's Complex Figure). Besides, the global state of cognitive functions was connected with the level of execution of the tests involving the processes of immediate and delayed memory of verbal material. The analysis of interdependencies between objective measures

of memory showed [23] that the strongest correlation occurred between verbal and non-verbal learning ($r = 0.72$; $p < 0.001$). This may indicate a uniform influence of depression on learning, independently of the kind of presented material.

The estimated premorbid IQ was less strongly correlated with the results of memory tests than the estimated present efficiency of cognitive functions. Higher IQ was connected with higher indices of immediate memory of verbal material (the calculated result of digit repetition and digit contrariwise repetition), and non-verbal material (Benton's test). There also occurred a moderate correlation with the delayed memory of non-verbal material (reproduction of Rey's Figure) and with learning of geometric patterns (DCS Weidlich test). Premorbid IQ was less significantly correlated

Table 1

Analysis of correlation between global indices of cognitive functions and memory tests

Memory tests	Analysis of correlations of global indices of cognitive functions - Pearson's correlations	
	MMSE	IQ
Benton Visual Retention Test	-0.66***	-0.44**
Digits straight	0.26*	0.36***
Digits backwards	0.50***	0.44**
Digits calculated	0.42***	0.45***
Memory of narrative	0.64***	0.39
Rey's Figure (a copy)	0.73***	0.35***
Rey's Figure (a reproduction)	0.44***	0.47**
Rey's Figure (copy-reproduction)	0.24*	-0.33**
AVLT	0.45***	0.16
DCS Weidlich	0.64***	0.37*

* $p < 0.05$; ** $p < 0.01$ *** $p < 0.001$

with delayed memory of verbal material (Long-term Memory of Choynowski's Memory Scale, that is to say, memory of narrative), and it was not correlated with verbal material learning (AVLT).

A more complete statistical interpretation was made with the use of analysis of multiple regression. The first distinguished dependent variable was the result in Beck Depression Inventory, while all memory measures constituted independent variables. The following variables composed the equation of regression: language test

of the MMSE, calculated results of the copy of Rey's Complex Figure and calculated results of the reproduction of Rey's Complex Figure [table 2]. This suggests that self-estimation of severity of depression symptoms is most strongly influenced by the delayed and immediate visuo-motorial memory, perceptual structuring and language factor. These results confirm the data obtained by other authors, indicating that it is visuo-motorial memory that is most seriously impaired in depression [14]. Due to the prevalence of visuo-motorial dysfunction over language disturbances, some researchers tend to indicate similarity between the picture of cognitive disturbances in depression and subcortical dementive processes.

The results of Squire's Memory Questionnaire were the second distinguished dependent variable, while all objective memory indices as well as the results of Beck Depression Inventory constituted independent variables. The equation of regression included the following variables [table 2]: the results of Beck Depression Inventory,

Table 2

Regression analyses of the influence of Beck Depression Inventory and Squire's Memory Questionnaire interaction on all objective memory indices

Dependent variable	Objective memory indices	Multivariate regression analyses		
		Beta	T	P
Beck Depression Inventory	MMSE(language test)	0.262	1.994	0.05
	Rey's figure - copy	-0.262	-1.987	0.05
	Rey's figure - reproduction	-0.337	-2.603	0.01
Squire's Memory Questionnaire	Beck Depression Inventory	0.416	3.359	0.001
	Narrative memorization	-0.379	-2.985	0.004
	Digits straight	-0.282	-2.14	0.037
	Digits backwards	0.28	2.131	0.038
	Digit repetition	-0.365	-1.885	0.065
	AVLT	-0.23	-1.74	0.08
	Rey's figure - copy	-0.344	-2.67	0.01
	Rey's figure - reproduction	-0.394	-3.12	0.003

the result of memory of narrative, digits straight, digits backwards, calculated result of digit repetition, the result of AVLT test, calculated results of Rey's Figure copy, calculated results of Rey's Figure reproduction.

This indicates that self-estimation of memory deficits is most strongly influenced by: self-estimation of mood and of other symptoms of depression, delayed and immediate visuo-motorial memory, delayed verbal memory and verbal learning. Besides, estimation of memory functions is influenced by difficulties in performing the tasks

involving immediate auditory memory, persistence and range of attention. The results reflect the importance that the patients with depression ascribe to the subjectively perceived memory deficits. Thus, deterioration of cognitive functions may be secondary to mood depression that lies at the base of the pathology of motivational processes characteristic of depression. It was only the level of immediate visual memory and visuo-motorial learning that did not influence self-evaluation of memory functioning.

The results of the present study also confirm the data obtained by other authors [7,10, 20], suggesting that older patients with depression manifest a more negative self-evaluation of memory functioning (r-Pearson's coefficient of correlation between age and the result of Squire's Memory Questionnaire; $r = 0.29$), and a higher intensity of depressive symptoms (r-Pearson's coefficient of correlation between age and the result of Beck Depression Inventory; $r=0.31$).

Thus, neuropsychological methods create another possibility of assessing the influence of depression on cognitive functions [15, 16, 19, 20, 21, 23, 32]. They are a valuable addition to multi-axial diagnostics [4] in psychiatry and – more and more frequently – in psychology. Application of the newest methods of central nervous system imaging, including computer tomography (CT), magnetic resonance (MRI) and positron emission tomography (PET) cannot clarify all diagnostic doubts. The simple reason for it is that it is not known yet to what extent organic injury of central nervous system (CNS) is an etiological or pathoplastic factor of depression. Besides, the concept of organics, identified in the past with irreversible injury to CNS, is now more and more often connected with the dynamic, neuro-physiological and neuro-biochemical approach. The problem can be reduced, in fact, to the dependence (or rather its absence) between structure and function. Detection of “organic” changes, according to the past division, for instance of atrophic changes in the CNS, does not exclude depression. It must be accepted that endogenous depression in the course of affective disorder is biologically, that is, in a broader sense, “organically” conditioned. This justifies the necessity of further research in this area, and searching for interdependencies between neuropsychological and neuro-biochemical examinations with special stress on acetylcholine transformation and its influence on memory functions. Introduction of new drugs improving cognitive functions in the initial phase of dementia (e.g., donepezil, rivastigmine) as well as possibility of improving these functions in depression by appropriate pharmacotherapy may change the opinions about prognoses in “memory impairment” suffered by millions of people all over the world.

As can be seen, the clinical and discriminative value of neuropsychological examinations – as non-invasive ones – is high and confirms the importance of holistic and humanistic approach to the patient. This evokes optimism in the age of de-humanisation of medicine.

Conclusions

1. Elderly patients with depression were characterised by higher intensity of depressive complaints and a more negative self-assessment of memory functioning.
2. Self-evaluation of memory functioning was most strongly influenced by self-

evaluation of the intensity of depressive symptoms and, secondly, by all examined memory components except immediate visual memory and visuo-motorial learning.

3. The level of efficiency of cognitive processes in patients with depression proved to be determined by all examined memory components.
4. Self-estimation of the intensity of depressive symptoms was influenced by the levels of delayed and immediate visuo-motorial memory.

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