

ASSESSMENT OF THE SUBJECTIVELY PERCEIVED  
COGNITIVE DEFICIT IN HOSPITALIZED ELDERLY  
PATIENTS WITH DEPRESSION AND THE RELATIONSHIP  
OF PERCEIVED DEFICIT QUESTIONNAIRE – PDQ-D5  
WITH THE SOCIO-DEMOGRAPHIC AND CLINICAL  
FACTORS

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**Abstract**

The aim of the current study was to assess subjective cognitive dysfunction in elderly depressed patients and the impact of socio-demographic and clinical factors on its presentation.

All patients aged  $\geq 65$  years, which were hospitalized in the Psychiatric Clinic of “Alexandrovska” University Hospital for a two-year period and met the ICD-10 criteria for depression, were included. They were evaluated by Hamilton Depression Rating Scale 24 items (HDRS<sub>24</sub>), its emotional-cognitive subscale (HDRS<sub>cog</sub>) and its suicidal item (HDRS<sub>suic</sub>), Geriatric Depression Scale 15 items (GDS<sub>15</sub>), its suicide subscale (GDS<sub>suic</sub>), Perceived Deficit Questionnaire – Depression 5 items (PDQ-D5) and University of California, Los Angeles Loneliness Scale (UCLA-LS). The PDQ-D5, UCLA-LS and GDS<sub>15</sub> were also applied to a control group of 50 healthy elderly. The data were processed with the IBM SPSS Statistics 25.0.

Out of 131 patients, 29 had late-onset depression (LOD), 80 had recurrent depressive disorder (RDD) and 22 had bipolar depression (BD). Patients with BD had more episodes than those with RDD, and higher PDQ-D5 and HDRS<sub>cog</sub> scores than those with LOD and RDD. The severity of PDQ-D5 correlated significantly with the severity of depression, loneliness, suicidal and HDRS<sub>cog</sub> scores. After applying multiple linear regression analysis ( $R^2 = 0.489$ ,  $p <$

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0.001) the UCLA-LS severity had the greatest impact on PDQ-D5, followed by  $HDRS_{cog}$  and depression severity, assessed by  $GDS_{15}$ . The diagnosis of BD had the least impact.

PDQ-D5 reflects the severity of the current late-life depression and correlates significantly with the loneliness, emotional-cognitive symptoms and self-assessment of depression.

**Key words:** late-life depression, cognition, PDQ-5D

**Introduction.** Depression is a global health problem and according to World Health Organization, in 2020, it will be a leading disease, associated with negative impact and burden on society [1]. On the other hand, population ageing is an indisputable fact that raises many health, social and ethical questions. By 2030, the population of people over 60 years old will increase 3.5 times faster than the general population [2]. A 2017 statistical survey of developed countries has shown that the percentage of elderly with depressive symptoms in the community is between 6 and 20% [3].

Affective disorders in late life are extremely challenging to investigate because of the diagnostic and therapeutic difficulties which they cause [4]. They play a triggering or exacerbating role in cognitive decline, lead to impaired quality of life for both the patients and their families, increased mortality (direct, by increasing the suicidal risk and indirect, by complicating vascular diseases in particular) and become chronic even in cases with subthreshold symptomatology [5]. Depression manifests with different types of cognitive impairments, which we call with the summarized term cognitive dysfunction [6] and this cognitive dysfunction can be assessed objectively by neurocognitive tests. However, there is also subjective assessment of these cognitive impairments that correlates more specifically with impaired daily functioning during depression and can also be objectified [7]. In many cases, reported subjective perception does not correlate with the objective assessment of cognitive impairment [8]. According to Beck's cognitive model of depression, negative thinking also plays an essential role in maintaining and worsening depression, and at a later age, there are numerous psychosocial factors that contribute to deepening negative thinking [9]. One of the validated tools for assessing perceived cognitive deficits is the 20-item Perceived Deficit Questionnaire and its short 5-item version (PDQ-D5) [7]. This questionnaire correlates with depression, anxiety, fatigue, and does not correlate with objectively measured cognitive impairment [8]. This tool can detect the subjective perception of cognitive performance and has the potential to identify very mild cognitive changes that are noticeable only to the patient [10], but are very essential for daily functioning. Literature data indicate that PDQ-D5 has greater temporal reliability and validity than objective cognitive tools, such as DSST, TMT-B during depression [11]. We believe that subjective cognitive dysfunction in late-life depression is as important as it is at young age. It is more related to psychosocial factors, the experience of loneliness and negative attitudes and expectations with regard

to daily life than with the type of depression. Identifying these factors would be helpful in determining the therapeutic behaviour and prognosis in the course of late life depression.

The aim of the current study (part of a larger study on clinical typifying of late-life depression requiring inpatient treatment) was to assess subjective cognitive dysfunction in this cohort of patients and the extent to which some of the main socio-demographic and clinical factors (severity and diagnosis) impact its clinical presentation. This study is pilot for the PDQ-D5 self-assessment tool in Bulgaria.

**Materials and methods.** The study had a naturalistic, cross-sectional design. All patients aged  $\geq 65$  years, hospitalized in the Psychiatric Clinic of “Alexandrovska” University Hospital for a two-year period (November 2015 – November 2017), meeting the ICD-10 diagnostic criteria for unipolar or bipolar depression and first depressive episode, were investigated. The patients were assigned into three diagnostic groups involving subjects with late onset depression (LOD), these with recurrent depressive disorder/unipolar depression (RDD/UD), and subjects with bipolar depression (BD).

Exclusion criteria: All other diagnostic categories differing from depressive episode (first, recurrent, unipolar or bipolar) at the time of investigation and/or in the past, presented serious somatic and/or neurologic disease, clinical data of dementia and/or other F0 diagnostic category.

A control group was recruited among attendees of a retirement club and investigated outside the hospital. The inclusion criteria for the control group were no psychiatric history or a present psychiatric disease, to be at the age  $\geq 65$  years and have no serious somatic and/or neurological disease. The study was approved by the ethical commission of Medical University of Sofia.

The clinical assessment was made by using several widely adopted scales for evaluating elderly patients with depression: the 24-item version of Hamilton Depression Rating Scale (HDRS<sub>24</sub>) [12], which includes the so-called cognitive triad – items 22, 23 and 24 (HDRS<sub>cog</sub>), helplessness, hopelessness and worthlessness [9], with scores varying from 0 to 12; the 15-item version of Geriatric Depression scale (GDS<sub>15</sub>) [13], a specific self-assessment scale for depression in late life, with scores varying from 0 to 15. The objectively measured suicidal risk was assessed with item 3 of HDRS<sub>24</sub> (HDRS<sub>suic</sub>), with scores varying from 0 to 4 and the subjectively reported, by items 3, 7, 11, 12, 14 of the suicidal subscale of GDS<sub>15</sub> (GDS<sub>suic</sub>), with scores varying from 0 to 5. The University of California, Los Angeles Loneliness Scale (UCLA-LS) [14] for self-assessment of loneliness was also applied, with scores varying from 0 to 60. Objective support and suicidal risk were assessed as dichotomous values – presence or lack of objective support (effective contacts outside the family) and existence or non-existence of a current and/or past suicide attempt. Furthermore, the PDQ-D5<sup>1</sup> (Perceived Deficits Questionnaire-Depression 5 item),

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<sup>1</sup>PDQ-D5 is used with the permission of Mapi Reserch Trust

a scale evaluating subjective cognitive dysfunction, was administered. The PDQ-D5 is a short version of the 20-item scale (PDQ-20), introduced by SULLIVAN [7]. This scale is one of the few validated self-assessment tools for evaluating cognitive symptoms associated with the patient's subjective perception of coping with daily life. It has 4 subscales: planning and organization (executive functions) – items 1 and 5; attention and concentration – item 2; prospective memory – item 3; and retrospective memory – item 4. The clinical assessment was based on a 5-points Likert scale, with scores varying from 0 to 4 (never, rarely, sometimes, often and very often). The final result varies from 0 to 20 scores, as results above 10 scores show serious cognitive impairment.

**Statistical methods.** Data were entered and processed with the IBM SPSS Statistics 25.0 statistical package. The significance level, at which the null hypothesis was rejected, was determined at  $p < 0.05$ . The following methods were used: descriptive analysis, comparison of proportions, exact test of Fisher and  $\chi^2$ , one-sample test of Kolmogorov–Smirnov or Shapiro–Wilk, one-way ANOVA, independent samples T-test, test for several independent samples Kruskal–Wallis H, two independent samples test of Mann–Whitney U, multiple linear regression.

**Results.** Out of 168 hospitalized elderly patients, 132 were eligible for participation in the study. The study included 131 patients (one declined to participate), assigned into three diagnostic groups: 29 patients with LOD; 80 patients with RDD and 22 patients with BD. In addition, 50 individuals were assigned in a control group. The distribution by groups, socio-demographic and clinical characteristics is presented in Table 1.

The more important socio-demographic factors, the diagnosis and the categorical variables objective support and suicidal risk, and their relationship with the PDQ-D5 scores were investigated. The results are presented in Table 2. A correlation analysis was applied to evaluate which of the analyzed quantitative variables influence the subjectively perceived cognitive deficits. The results are presented in Table 3.

The combined impact of the already proven factors (HDRS<sub>24</sub>, HDRS<sub>suic</sub>, HDRS<sub>cog</sub>, GDS<sub>15</sub>, GDS<sub>suic</sub>, UCLA-LS, and Marital status, Objective support, Diagnosis) affecting the subjective cognitive dysfunction (Tables 1–3) was assessed. Multiple linear regression analysis was applied, as a result of which, most of the initially included variables were dropped (due to collinearity or lack of statistical significance of the regression coefficients). In the seventh step of the Backward procedure, the following regression equation was obtained (Table 4) (adjusted  $R^2 = 0.489$ ,  $p < 0.001$ ):

$$\text{PDQ} = 0.217 + 0.092 * \text{UCLA-LS} + 0.333 * \text{HDRS}_{\text{cog}} + 0.342 * \text{GDS}_{15} + 2.148 * \text{Diagnosis (BD)}.$$

The coefficient preceding Diagnosis (BD) was considered to be zero if the diagnosis was not BD. The so found equation gave us information that the PDQ-D5 was

T a b l e 1

Socio-demographic and clinical characteristics of the study participants

Dg	LOD ( $n = 29$ )	RDD ( $n = 80$ )	BD ( $n = 22$ )	Controls ( $n = 50$ )
Age (SD)	71.90 (4.63) <sup>a</sup>	71.33 (5.25) <sup>a</sup>	69.55 (4.58) <sup>a</sup>	73.40 (7.25) <sup>a</sup>
Gender ( $n\%$ )				
Male	9 (22.0) <sup>a</sup>	12 (29.2) <sup>a</sup>	5 (12.2) <sup>a</sup>	15 (36.6) <sup>a</sup>
Female	20 (14.3) <sup>a</sup>	68 (48.6) <sup>a</sup>	17 (12.1) <sup>a</sup>	35 (25.0) <sup>a</sup>
Education ( $n\%$ )				
Without	1 (3.4) <sup>a</sup>	9 (11.3) <sup>a</sup>	2 (9.1) <sup>a</sup>	3 (6.0) <sup>a</sup>
Secondary	14 (48.3) <sup>ac</sup>	41 (51.3) <sup>ac</sup>	14 (63.6) <sup>bc</sup>	18 (36.0) <sup>a</sup>
Higher	14 (48.3) <sup>ac</sup>	30 (37.4) <sup>a</sup>	6 (27.3) <sup>a</sup>	29 (58.0) <sup>bc</sup>
Marital status ( $n\%$ )				
Unmarried	1 (3.4) <sup>ac</sup>	6 (7.5) <sup>bc</sup>	1 (4.5) <sup>ac</sup>	0 (0) <sup>a</sup>
Married	15 (51.7) <sup>a</sup>	40 (50.0) <sup>a</sup>	10 (45.5) <sup>a</sup>	27 (54.0) <sup>a</sup>
Widowed	10 (34.5) <sup>a</sup>	23 (28.8) <sup>a</sup>	7 (31.8) <sup>a</sup>	20 (40.0) <sup>a</sup>
Separated/Divorced	3 (10.3) <sup>a</sup>	11 (13.8) <sup>a</sup>	4 (18.2) <sup>a</sup>	3 (6.0) <sup>a</sup>
Objective support ( $n\%$ )				
Yes	26 (89.7) <sup>ac</sup>	63 (78.8) <sup>bc</sup>	17 (77.3) <sup>bc</sup>	50 (100) <sup>a</sup>
No	3 (10.3) <sup>ac</sup>	17 (21.2) <sup>bc</sup>	5 (22.7) <sup>bc</sup>	0 (0) <sup>a</sup>
Clinical scales (SD)				
UCLA-LS	24.86 (17.65) <sup>a</sup>	21.39 (16.35) <sup>a</sup>	25.27 (14.28) <sup>a</sup>	13.44 (11.27) <sup>b</sup>
GDS <sub>15</sub>	10.62 (2.96) <sup>a</sup>	10.83 (2.82) <sup>a</sup>	10.82 (3.03) <sup>a</sup>	3.48 (3.04) <sup>b</sup>
GDS <sub>suic</sub>	2.93 (1.62) <sup>a</sup>	3.06 (1.44) <sup>a</sup>	3.32 (1.43) <sup>a</sup>	0.50 (0.93) <sup>b</sup>
PDQ-5D	7.86 (4.51) <sup>a</sup>	7.54 (4.53) <sup>a</sup>	10.41 (3.78) <sup>b</sup>	2.68 (3.19) <sup>c</sup>
HDRS <sub>24</sub>	28.21 (8.33) <sup>a</sup>	29.00 (10.26) <sup>a</sup>	30.27 (10.25) <sup>a</sup>	—
HDRS <sub>suic</sub>	0.93 (1.53) <sup>a</sup>	0.83 (1.13) <sup>a</sup>	1.00 (1.27) <sup>a</sup>	—
HDRS <sub>cog</sub>	4.48 (3.02) <sup>a</sup>	5.19 (3.23) <sup>ab</sup>	6.05 (3.51) <sup>b</sup>	—
Suicidal risk ( $n\%$ )				
Yes	5 (17.2) <sup>a</sup>	13 (16.3) <sup>a</sup>	6 (27.3) <sup>a</sup>	—
No	24 (82.8) <sup>a</sup>	67 (83.7) <sup>a</sup>	16 (72.7) <sup>a</sup>	—
Clinical course (SD)				
Onset age of illness*	69.66 (4.54)	43.91 (12.39) <sup>a</sup>	45.50 (15.61) <sup>a</sup>	—
Illness duration*	2.31 (2.05)	27.43 (14.38) <sup>a</sup>	24.05 (15.84) <sup>a</sup>	—
Number of episodes*	1.62 (1.05)	5.20 (3.69) <sup>a</sup>	6.05 (2.63) <sup>b</sup>	—

The same letters in the horizontal lines indicate a lack of significant difference and the different letters mean a presence of significant difference ( $p < 0.05$ ).

Only RDD and BD were compared.

increasing on average: by 0.092 if UCLA-LS increased with 1; by 0.333 if HDRS<sub>cog</sub> increased with 1; by 0.342 if GDS<sub>15</sub> increased with 1; by 2.148 if the diagnosis was BD.

From Table 4, it is clear that according to the Beta standardized coefficients, the UCLA-LS score had the greatest impact on PDQ-D5, followed by HDRS<sub>cog</sub> and depression severity assessed with GDS<sub>15</sub>. BD had the least impact. Unstandardized and standardized coefficients of the multiple linear equations between PDQ-D5 and UCLA-LS, HDRS<sub>cog</sub>, GDS<sub>15</sub> and Diagnosis are presented in Table 4.

T a b l e 2

Analysis of the relationship between PDQ-D5  
and the studied categorical variable

Variables	PDQ-D5		
	<i>N</i>	*	SD
Gender			
Male	26	7.58 <sup>a</sup>	3.94
Female	105	8.22 <sup>a</sup>	4.64
Education			
Without	12	9.08 <sup>a</sup>	4.81
Secondary	69	8.12 <sup>a</sup>	4.87
Higher	50	7.82 <sup>a</sup>	3.92
Marital status			
Unmarried	8	11.13 <sup>a</sup>	4.52
Married	65	7.69 <sup>bc</sup>	4.55
Widowed	40	7.65 <sup>ac</sup>	4.53
Separated/Divorced	18	9.17 <sup>ac</sup>	3.85
Objective support			
Yes	106	7.64 <sup>a</sup>	4.45
No	25	10.00 <sup>b</sup>	4.29
Diagnosis			
LOD	29	7.86 <sup>a</sup>	4.51
RDD	80	7.54 <sup>a</sup>	4.53
BD	22	10.41 <sup>b</sup>	3.78
Suicidal risk			
Yes	24	8.88 <sup>a</sup>	4.23
No	107	7.92 <sup>a</sup>	4.56

The same letters in the vertical lines indicate a lack of significant difference and the different letters mean a presence of significant difference ( $p < 0.05$ ).

T a b l e 3

Correlation coefficients between PDQ-D5  
and the quantitative variables (\*\*\*)  $p < 0.001$

Variables	PDQ-5D
Age	-0.096
HDRS <sub>24</sub>	0.516***
GDS <sub>15</sub>	0.554***
GDS <sub>suic</sub>	0.511***
UCLA-LS	0.515***
HDRS <sub>suic</sub>	0.381***
HDRS <sub>cog</sub>	0.574***
Number of episodes	0.089
Illness duration	-0.009

T a b l e 4

Coefficients (Dependent variable: PDQ-5D)

Model	Unstandardized coefficients		Standardized coefficients	t	Sig.
	B	Std. error	Beta		
(Constant)	0.217	1.179		0.184	0.854
UCLA-LS	0.092	0.021	0.334	4.312	< 0.001
HDRS <sub>cog</sub>	0.333	0.127	0.240	2.622	0.010
GDS <sub>15</sub>	0.342	0.140	0.218	2.439	0.016
Diagnosis (BD)	2.148	0.762	0.179	2.818	0.006

No statistically significant difference by gender and age was found between the diagnostic groups and the control group. The educational status was analyzed, supposing that it has a potential impact on cognitive functioning. The largest number of patients with secondary education was in the BD group, which distinguished it only from the control group. Those with higher education were significantly more in the control than in the BD and RDD groups, but not as compared to the LOD group. Speculatively it can be said that affective disorder, which has occurred in younger age, regardless of its onset and polarity, impacts the academic performance, before its clinical manifestation [15].

Regarding marital status, the only significant difference was observed in the RDD group, where the number of unmarried was significantly higher than that in the control group, but not in the other groups. Objective support (effective social contacts outside the family) was observed in significantly fewer patients with RDD and BD, but this distinguished these groups only from the control group and not from the LOD group, which did not differ significantly from the control group.

In our clinical cohort of patients with late-life depression, the most common diagnosis was RDD. Surprisingly, the onset and duration of illness in the RDD and BD groups did not differ significantly. What distinguished the bipolar course in our sample, however, appeared to be the higher number of episodes, which is also confirmed in the literature [16].

The three diagnostic groups were analyzed by comparing the psychometric characteristics and no significant differences in the severity of depression were found (evaluated subjectively by GDS<sub>15</sub> and objectively by HDRS<sub>24</sub>), UCLA-LS scores, and suicidal ideations (GDS<sub>suic</sub> and HDRS<sub>suic</sub>). However, there were differences in the scores of HDRS<sub>cog</sub> and PDQ-D5, with the highest scores in the BD group and thus distinguished it significantly from the RDD and LOD groups.

Cognitive impairment in depression is qualitatively different and because of that, subjective self-perception and self-assessment are much more important and are significantly more affected by the intensity of the depressive state [17]. It is also possible that the PDQ-D5 is much more influenced by the current clinical manifestation and the severity of the clinical picture (state – marker). Literature data indicate that during depression, subjective impairment prevails over objective

impairment of the cognition [18]. To the best of our knowledge, this is the first study to use PDQ-D5 in elderly depressed patients, as well as in patients with BD. We have chosen the short version, because of its easier administration to elderly patients. Most studies have analyzed subjective cognitive dysfunction in relation to occupational and social functioning, as well as quality of life, but only in RDD [18,19]. We used this tool in elderly patients, knowing that there are studies that have found no impact of age on PDQ scores [19]. The objectively measured cognitive deficits have been shown to be proportional to the incidence of depressive episodes and illness duration and have been also observed during remission [6]. However, in our study, PDQ-D5 scores did not correlate with the duration of illness and number of episodes. Again, we can conclude that subjective impairment in cognitive functioning is more state-dependent and does not correlate with the clinical course of the affective disorder. This is another reason this instrument to be applied to all types of depression. Regarding socio-demographic factors, it can be seen that PDQ-D5 scores are independent of age, gender and education. It is clear from the literature that PDQ-D5 scores correlate with the severity of depression and not with the age or other cognitive impairment [19]. Marital status, however, appears to be a factor that has an impact, and the highest PDQ-D5 scores were observed in the group of unmarried patients, thus distinguishing it significantly only from the group of married ones. Significantly more pronounced PDQ-D5 scores were found in the patient group with lack of objective support. Therefore, PDQ-D5 scores depend significantly on social functioning (long term lack of family and present lack of objective support/social contacts).

PDQ-D5 did not correlate with suicidal risk (past and/or present suicide attempts) and the scores of this scale did not differ between the two groups with or without suicide attempts, respectively. In our sample PDQ-D5 correlated significantly with the suicidal ideations during the current depressive episode, assessed with  $GDS_{suic}$  and to a lesser extent with  $HDRS_{suic}$ . The  $GDS_{suic}$  subscale includes five statements – emptiness, worthlessness, hopelessness, happiness and the feeling that life is worth it, with the last two being obversely assessed. These statements largely overlap with Beck's Cognitive Triad ( $HDRS_{cog}$ ), which is well-known to predict long-term suicidal risk [9]. Obviously, the PDQ-D5 correlates more with suicidal ideations, such as cognitive attitudes, than with attempting and realization of suicide in late age. More research in this regard is extremely justified.

A significant correlation was found between PDQ-D5 and clinical severity (assessed by  $HDRS_{24}$  and  $GDS_{15}$ ), self-assessment of loneliness (UCLA-LS), and emotionally motivated cognitive impairment ( $HDRS_{cog}$  – helplessness, hopelessness, and worthlessness). After applying multiple linear regression analysis, was seen that the factors UCLA-LS,  $HDRS_{cog}$ ,  $GDS_{15}$  and the presence of the diagnosis BD remained significant and strongly correlated with the subjectively perceived cognitive deficits.



Loneliness is a complex category, described as a subjective experience of negative emotion, arising from unmet need for communication [14] and in this sense loneliness has a social, emotional and cognitive component. The relation between depression, loneliness and cognitive functioning in the elderly is even more complicated [20]. The lack of family and social support undoubtedly enhances loneliness at a later age, but the presence of depression further affects this feeling and blocks cognitive functioning even more. In our study, the more pronounced loneliness was, the higher was the score of PDQ-D5. Therefore, loneliness can be observed as a social category defined by various objective socio-demographic factors, as an emotional category related to depression and as a cognitive-evaluative category leading to subjective dysfunction, assessed with PDQ-D5. A study conducted during remission will be appropriate to distinguish these components.

The administration of GDS<sub>15</sub> has several advantages: it avoids somatic and sexual symptoms, uses dichotomous yes/no answers and thus reduces the cognitive load in the elderly [13]. The severity of depression, evaluated through this scale correlates significantly with the perceived cognitive deficit assessed with PDQ-D5. The diagnosis of BD also significantly determines the higher PDQ-D5 scores. In our patient sample, we can consider BD as more severe depression than LOD and RDD, especially regarding the cognitive-affective domain (the higher HDRS<sub>cog</sub> scores), and this explains its significant impact on subjective cognitive dysfunction.

It can be concluded that PDQ-D5 depends on emotional and psychosocial functioning, but rather reflects the current depressive state and correlates significantly with the subjective experience of loneliness, the emotional-cognitive symptoms of depression and the GDS<sub>15</sub> self-assessment tool.

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