Neuropsychological assessment of subjective memory complaints in patients referred to the consultation-liaison psychiatry

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SUMMARY

Objective: The aim of this study is to examine the cognitive functions of patients referred to the Consultation-Liaison Psychiatry (CLP) Department due to mental health issues from different medical specialties, who report subjective forgetfulness during psychiatric evaluation.

Method: The study sample recruited patients aged between 40 to 65, who were referred for mental health evaluation to the CLP Department of the Department of Psychiatry at Istanbul University Faculty of Medicine from all medical treatment units of the Faculty over the last 10 years (between 2014 and 2024). Cognitive assessments were conducted at the Clinical Psychology Laboratory of the Department of Psychiatry. In this retrospective study, all accessible data of the neuropsychological test (NPT) results were included to analyses (n=71). The results were compared with those of a matched healthy control group (n=23).

Results: Among patients reporting subjective forgetfulness, those referred from neurology had worse performance on forward digit span (p=0.03), semantic fluency (p<0.001), and Stroop Test error count (p=0.02), as well as memory encoding (p=0.03) and retrieval (p=0.02) scores compared to control group. Additionally, memory encoding (p=0.02) and retrieval (p<0.001) scores were worse in these patients than in those referred from other medical units.

Discussion: Our findings highlight differences in the NPT results of patients referred to the CLP department, offering important insights for understanding and clinical approaches to subjective forgetfulness. It should be considered that; subjective forgetfulness may not primarily be associated with psychological distress but underlying medical conditions may also play a significant role in cognitive dysfunction.

Key Words: Neuropsychological test, consultation liaison psychiatry, subjective memory complaint, neurocognitive functions

INTRODUCTION

Various departments in medical facilities encounter patients who declare concerns about memory in addition to their primary medical problems (1, 2). In further examinations, some of these patients may have memory losses due to dementia, while others have normal memory test performances. Thus, in clinical studies, it is not uncommon to report differences between subjective memory complaints and objective memory test performances (3, 4).

Mild Cognitive Impairment (MCI) and subjective cognitive decline (SCD) are two separate symptom classifications that define objective and subjective cognitive dissonance. Among these, amnestic MCI is characterized by a decline in the objective evaluation of memory according to age and education status along with the person's complaint of forgetfulness (5), while no objective cognitive decline is observed in individuals with SCD. The complaint of forgetfulness in individuals suffering from subjective memory complaint is more frequently associated with more psychological distress and poor

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quality of life (6).

Forgetfulness is a source of concern for individuals both in a psychological and social context; individuals may be affected by the negative consequences of forgetful behavior and may experience difficulties in their work, and family relations (7). Approximately 60% of individuals aged 45-65 who experience forgetfulness stated that their forgetfulness highly interferes with their daily living activities and approximately 70% of them stated that they are significantly 'worried' about their forgetfulness (8). Apparently, perceived forgetfulness can negatively affect individuals' daily routines and therefore their quality of life. Mol and colleagues showed in their 9-year follow-up study that perceived forgetfulness is associated with lower quality of life (9). However, the prominent finding of that study was about age ranges; the relationship between perceived forgetfulness and life satisfaction was stronger in middle-aged participants (54-69 years) than in older participants (70-91 years). Therefore, forgetfulness complaints of individuals in middle-aged group were found to be important to be the focus of research. The aim was to better understand the patients who are actively involved in both work and family life, but are also at an age where health issues may begin to emerge including risk of dementia.

Most of the physical illnesses are accompanied by psychological conditions or disorders (10). Therefore, each patient should be considered within the holistic interaction of biological, psychological and social factors. CLP, a division of general psychiatry, is a branch of science in which patients referred by other medical professionals are evaluated with a biopsychosocial approach (11). Patients followed in the CLP are not the ones that individually applied for psychiatric help, but are referred for psychiatric examination due to mental symptoms that have emerged or have been noticed by the treatment team during examination and treatment of their primary medical condition. Probable explanations may be related to an individual's awareness of their psychological distress, their ability to access institutions, and their willingness to seek psychological treatment. Above all, stigmatizing attitudes pose significant obstacles to seeking psychological help. In addition, some medical disorders inherently lead to psychological issues during the treatment process, and treatment methods or agents may cause psychological side effects. In neurological groups, cognitive complaints are often attributed to existing neurological conditions and psychiatric referrals are relatively rare unless there is a behavioral disorder. In other clinical departments, psychiatric conditions accompanying diseases are often neglected and in fact, these psychiatric conditions can present as cognitive difficulties (12–14) that may lead to distress in the person's life. These, in turn, can create difficulties in treatment adherence, lead to treatment rejection, and cause communication and relationship problems with the treatment team, which ultimately become the reasons why the primary treatment team refers patients to psychiatry. In this context, in the need of a comprehensive psychiatric evaluation of patients in CLP, psychometric tests are conducted in addition to the information gathered from the primary treatment team, the patient's caregivers, and the medical history. Among these tests, neuropsychological assessment can play a decisive role in the differential diagnosis, determining the frequency of follow-ups, and guiding decisions on pharmacotherapy, psychotherapy, or interventional treatment methods.

To the best of our knowledge, no studies have yet examined the neurocognitive profiles of patients with subjective memory complaints referred to CLP. The aim of this study was to investigate whether cognitive characteristics differ among patients with subjective memory complaints, depending on the medical specialties from which they are referred and followed. Our hypothesis is that, patients referred to the CLP with subjective complaints of forgetfulness will exhibit specific deficits in cognitive functions such as memory, attention, and executive functioning, which may be linked to their underlying psychiatric conditions.

METHOD

Sample

The sample of our study consisted of patients who were followed up by the CLP division of Istanbul University Faculty of Medicine between 2014 and

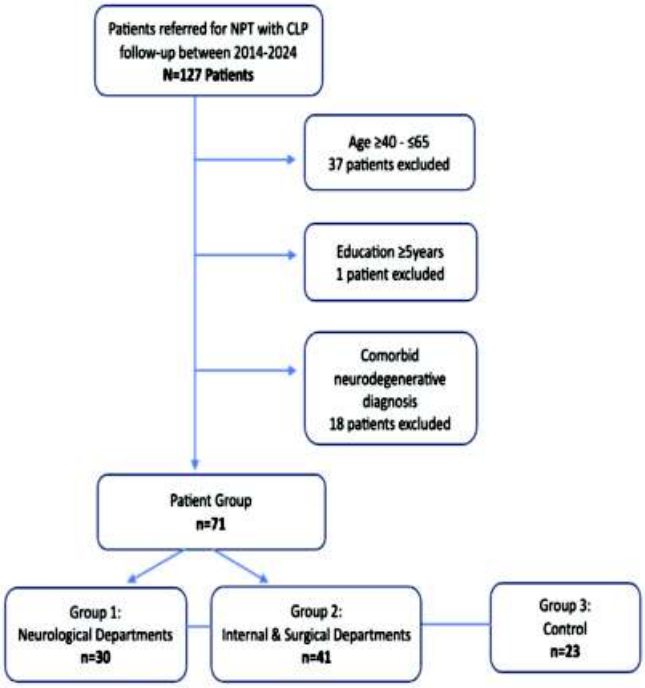


Figure 1. Chart flow of sample recruitment process

2024. These patients were referred to the Clinical Psychology Laboratory of the Istanbul University Faculty of Medicine Psychiatry Department for neuropsychological assessment tests (NPT) due to subjective memory complaints (SMC). All participants were aged 40-65 and had at least a primary school education. Individuals with a diagnosis of dementia, stroke, head trauma history with loss of consciousness, meningitis/encephalitis, brain tumor in their past medical records, mental retardation, psychotic disorders, alcohol/substance use disorder comorbidities, sensory losses that could restrict the performance of cognitive tests (advanced hearing or vision loss) and individuals who had never received formal education were excluded as each condition has its characteristic impact on cognitive skills. Patients were divided into two groups based on whether they were referred from neurological departments or other specialties, and then analyzed (Figure 1). Participants in the control group were invited through written announcements posted on the bulletin boards around our clinic. The exclusion criteria applied to the patient group were also valid for the control group.

Procedure

The data of the patient group with available NPT results were examined retrospectively. In addition to the electronic records from the Hospital Information Management System of Istanbul University Faculty of Medicine patient records from the CLP archive were also reviewed. The sociodemographic characteristics and medical histories of the patients followed during the specified study period were thoroughly evaluated. Patients whose medical records had more than 5% missing data for the variables studied were excluded from the analysis. Approval was obtained from the Istanbul University Clinical Research Ethics Committee (data: 22.03.2024, no: 06).

Sociodemographic and clinical information inventory: This inventory, prepared specifically for the study topic by the researchers, includes information on the sociodemographic characteristics of the cases such as age, education, economic status, living conditions, etc., as well as physical and psychiatric diseases, treatments applied, and clinician observations.

Cognitive domains and neuropsychological tests: The neuropsychological tests used in the study are presented separately according to each cognitive domain. Among these, the Wechsler Memory Scale's forward digit span (15,16) was used to assess attention skills. Wechsler Memory Scale's backwards digit span, word fluency (17),(18), the Stroop Test (19,20), and the Clock Drawing Test (21) as well as the Wechsler Adult Intelligence Scale (WAIS-R, 1987) abstract thinking (comprehension and similarities) subscale scores were used to assess executive functions. In clinical neuropsychological applications, word fluency test is applied with semantic (animal names) and phonemic categories (words starting with letters K, A, S), each lasting one minute. Planning skill from executive functions is assessed with Clock Drawing Test (CDT). In this study, CDT scores based on 5-point Likert-type Shulman scoring system (22) were included in the analysis. Visual-spatial perception was assessed with Benton Face Recognition Test (BFRT) scores (20,23). For memory assessment, scores from 15-word Öktem Verbal Learning Processes Test (24) that evaluates immediate recall, learning ability, delayed free recall and recognition processes were used. Confrontational naming skill was also assessed with Boston Naming Test (BNT) scores (25).

Table 1. Sociodemographic variables of groups

	Group 1 (n=30)		Group 2 (n=41)		Group 3 (n=23)				
	M	SD	M	SD	Ort	SS	F	p	n^2
Age	56.60	8.97	55.24	7.88	60.13	6.75	2.775	0.07	0.06
Education (years)	8.58	4.17	6.85	3.18	8.30	3.69	2.243	0.11	0.05
	n	%	n	%	n	%			
Gender (F)	22	73.33	35	85.37	15	65.22			

Abbreviations: M: Mean; SD: Standard deviation; F: ANOVA value; n^2 : partial eta square; F: Female.

Statistical analyses

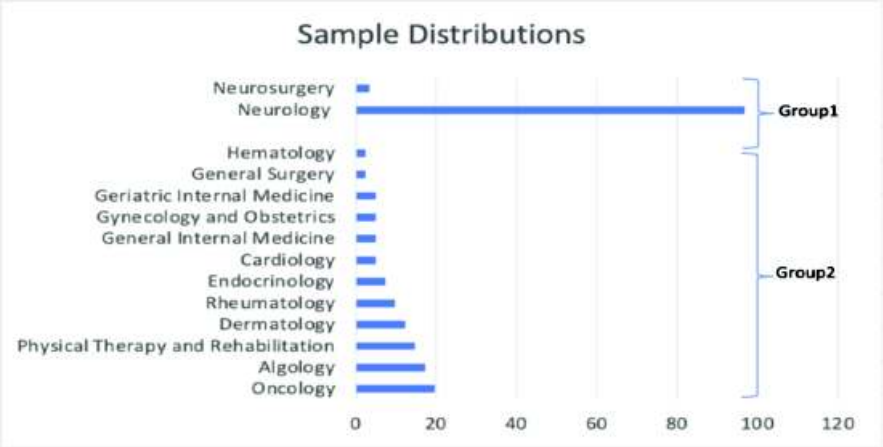
The normality of the measurements was assessed using the Shapiro-Wilk test, based on the sample size. One-way analysis of variance (ANOVA) was performed to examine differences in cognitive measurements between groups, while the t-test was used for pairwise comparisons of independent groups. Post hoc analyses were conducted to determine the direction of the significant findings in the ANOVA. The proportions of categorical variables within the sample were reported as percentages.

As the study design was retrospective, some test scores were converted to t-scores for inclusion in the analysis. Depending on the patients' level of cooperation, educational background, and referral questions, the number of proverbs and binary similarities used in the neuropsychological tests to assess abstraction skills, the number of items in the Boston Naming Test and the number of words used in verbal memory tests, were converted to t-scores. This was done to avoid errors in the analysis caused by variations in the number of words used in the verbal memory tests. All other test scores were included based on raw scores. The significance level for all analyses was set at 0.05.

RESULTS

The study sample consisted of 71 patients and 23 matched controls. Patients were divided into neurology (Group 1; n=30) and other (Group 2; n=41) according to the clinics to which they were referred. The distribution according to clinics is given in Graph 1. Among those three groups there were no significant difference in terms of educational status (F (2,91)=2.243; p=0.11) and average age (F(2,91)=2.775; p=0.07). The sociodemographic characteristics of the sample and the medical branches from which they were referred to CLP are shown in Table 1.

The forward digit span of the three groups constituting our sample are significantly different from each other (F (2,91)=3.26; p=0.04; Table 2). This variance revealed to have mild to moderate effect size (η2=0.07). According to post hoc analyses, after Bonferroni correction, forward digit span of patients referred from neurology departments (Group 1; 4.57±0.9) and other clinics (Group 2; 4.59±0.77) was significantly lower than age and education matched controls (Group 3; 5.09±0.81) (p=0.03; p=0.03, respectively); attention skills of patients referred from neurology clinics and com-



Graph 1. Distribution of the sample according to the departments to which they were referred

Table 2. Group means and one-way analysis of variance results.

	Group 1 (n=30)		Group 2 (n=41)		Group 3 (n=23)				
	M	SD	M	SD	M	SD	F	p	n^2
Attention									
WMS-R attention subtest Digit span forward	4.57	0.90	4.59	0.77	5.09	0.81	3.264	0.04	0.07
Digit span backwards	3.27	0.87	3.48	1.01	3.82	0.73	2.368	0.10	0.05
Executive functions									
Clock Drawing Test	4.11	1.72	4.27	1.26	4.84	0.38	1.706	0.18	0.04
Abstraction-I Proverbs	0.90	0.23	0.95	0.11	0.97	0.08	1.360	0.26	0.03
Abstraction-II WAIS-R Word associations	0.82	0.16	0.77	0.18	0.84	0.21	0.796	0.45	0.02
Stroop Test Time difference	80.96	50.44	64.09	31.55	57.05	29.37	2.515	0.08	0.06
Error count	3.12	4.16	1.89	2.66	0.88	1.20	2.791	0.06	0.07
Spontaneous corrected errors	3.52	4.40	3.44	2.98	2.44	1.90	0.613	0.54	0.02
Phonemic fluency K-A-S	23.50	10.95	25.38	12.07	29.91	11.36	1.917	0.15	0.04
Semantic fluency Animal	14.77	4.40	16.82	4.69	19.55	4.91	6.704	0.002	0.13
Visuospatial perception									
Benton Face Recognition Test	44.72	4.53	44.64	4.54	48.65	3.67	5.241	0.008	0.15
Memory									
Immediate recall	47.04	9.24	48.92	8.52	52.64	13.91	1.108	0.37	0.03
Learning	50.85	7.51	55.29	6.59	56.16	6.95	3.684	0.03	0.09
Delayed recall	46.03	10.34	52.78	6.58	56.72	6.22	7.798	<0.001	0.18
Recognition	53.71	10.49	47.45	7.33	42.11	8.66	6.903	0.002	0.16
False positive recognition	50.76	9.19	47.20	7.61	49.28	5.19	1.306	0.28	0.04
Total retrieval	45.58	13.06	51.96	5.63	51.78	2.30	3.078	0.05	0.12
	Group 1 (n=30)		Group 2 (n=41)				t	*p*	*d*
Language									
Boston Naming Test	82.24	17.15	82.51	14.06			0.07	0.95	0.21

Abbreviations: M: Mean, SD: Standard deviation, F: ANOVAvalue, n^2: partial eta square; WMS-R: Wechsler Memory Scale-Revised; WAIS-R: Wechsler Adult Intelligence Scale; t: t-test; d: Cohen s effect size.

plaining of SMC were impaired compared to the others (Table 3). In backwards digit span, no difference was observed in the variance analysis between the three groups; it was seen that they were at similar levels in terms of working memory.

The Clock Drawing Test was scored using a 5-point Likert scale according to the Shulman scoring system. There were no significant differences on CDT scores between three groups ($F(2,91)=1.706$; $p=0.18$). Also in the Stroop Test, which evaluates interference effect, no difference was found between the groups in terms of the duration difference and spontaneously corrected errors. However, a trend level of difference was observed in the number of errors ($F(2,91)=4.22$; $p=0.06$). Post hoc analyses revealed that this difference was due to patients in Group 1 (3.12 ± 4.16) making more errors than the healthy controls in Group 3 (0.88 ± 1.20) ($p=0.02$; Table 3). Therefore, it can be concluded that patients referred from neurological departments (Group 1) may have difficulties in suppressing inappropriate responses. Among the verbal fluency assessments, a significant difference was observed in semantic fluency between the three groups ($F(2,91)=6.52$; $p<0.001$) with moderate to strong effect size ($\eta2=0.13$). Both Group 1 (14.77 ± 4.40) and Group 2 (16.82 ± 4.69) patients were able to name significantly fewer words than the control group (19.55 ± 4.19) ($p<0.001$; $p=0.02$, respectively). However, no significant difference was observed between the groups in the phonemic fluency category ($F(2,91)=2.00$; $p=0.15$).

In the verbal memory assessment, according to variance analysis between the groups showed no significant difference in terms of immediate recall, which is the first step of the word list learning trials ($F(2,91)=1.108$; $p=0.37$; Table 2). However, a significant difference was observed in learning ability, as assessed by the total score from the learning trials ($F(2,91)=3.684$; $p=0.03$) with moderate effect size ($\eta2=0.09$). Post hoc analyses revealed that the total learning scores of healthy controls (Group 3; 56.16 ± 6.95) were significantly higher than those of patients referred from neurological sciences

Table 3. Post Hoc comparisons of tests with significant differences between groups; p values.

Cognitive Tests	Group Comparisons	Mean Diff.	Std Error	p_{Tukey}
Attention				
WMS-R Digit span forward	Group1/Group2	-0.018	0.198	0.84
	Group1/Group3	-0.524	0.231	0.03
	Group2/Group3	0.505	0.217	0.03
Executive functions				
Stroop Test	Group1/Group2	1.231	0.791	0.35
Error count	Group1/Group3	2.245	0.973	0.02
	Group2/Group3	-1.014	0.913	0.25
Semantic fluency	Group1/Group2	-2.054	1.129	0.14
	Group1/Group3	-4.779	1.305	< 0.001
	Group2/Group3	2.725	1.240	0.02
Memory				
Learning	Group1/Group2	-5.251	2.183	0.04
	Group1/Group3	4.601	2.505	0.03
	Group2/Group3	-9.852	2.319	< 0.001
Delayed recall	Group1/Group2	-7.535	2.168	0.002
	Group1/Group3	-6.890	2.489	0.02
	Group2/Group3	-0.645	2.304	0.95
Recognition	Group1/Group2	5.872	2.273	0.03
	Group1/Group3	4.111	2.609	0.26
	Group2/Group3	1.760	2.415	0.74
Total retrieval	Group1/Group2	-9.222	3.388	0.02
	Group1/Group3	-10.924	3.542	0.008
	Group2/Group3	1.702	3.038	0.84
Visuospatial perception				
Benton Face Recognition Test	Group1/Group2	0.079	1.306	0.99
	Group1/Group3	-3.925	1.462	0.02
	Group2/Group3	4.004	1.330	0.01

Abbreviations: Mean Diff.: Mean Difference; Std Error: Standard Error; WMS-R: Wechsler Memory Scale-Revised.

(Group 1; 50.85±7.51) and other clinics (Group 2; 55.29±6.59) (p=0.03; p<0.001, respectively). Additionally, patients referred from other clinics scored significantly higher than those referred from neurological sciences (p=0.04) (Table 3).

According to the delayed free recall scores (approximately 20 minutes after learning process) a significant difference was found between the scores of the three groups (F(2,91)=7.798; p<0.001) with strong effect size (η2=0.18). Post hoc analyses revealed that the delayed free recall scores of the patient groups in Group 1 (46.03±7.51) and Group 2 (52.78±6.58) were significantly lower than those of the control group (56.72±6.22) in pairwise comparisons (p=0.002; p=0.02, respectively). Additionally, the variance in recognition scores among the three groups also showed a significant difference (F(2,91)=6.905; p=0.002)) with strong effect size (η2=0.16). However, no significant difference was observed between the patients referred from neurological sciences and those referred from other clinics in terms of delayed recall score. When recognition skill, the final stage of memory, was examined, Group 1 (53.71±10.49) showed a higher recognition score than Group 2 (47.45±7.33) (p=0.03; Table 3). Furthermore, the total retrieval score, calculated by adding the total learning score and recognition score, was examined, a significant difference was observed between the three groups (F(2,91)=3.978; p=0.05) with moderate to strong effect size (η2=0.12). This difference was derived from Group 1 (45.58±13.06) scoring significantly lower than both Group 2 (51.96±5.63) and Group 3 (51.78±2.30) (p=0.02; p=0.008, respectively; Table 3).

The visual-spatial skills were assessed using BFRT scores, a widely used test for visual and spatial perception. A significant difference was observed between the groups (F(2,91) = 5.241; p = 0.008), and post hoc analyses revealed that the control group (48.65±3.67) had significantly higher scores than both Group 1 (44.72±4.53) and Group 2 (44.64±4.54) (p < 0.001; p = 0.01, respectively).

Table 4. Distribution of diagnoses across groups following psychiatric assessment and cognitive evaluation.

	Group 1 n=41		Group2 n=30	
	n	%	n	%
Cognitive Decline	0		6	20
Major Depressive Disorder	32	78,05	15	50
Generalized Anxiety Disorder	2	4,88	6	20
Adjustment Disorder	2	4,88	1	3,33
Somatic Symptom Disorder	3	7,32	2	6,67
Attention-Deficit/Hyperactivity Disorder	1	2,44	0	
Obsessive-Compulsive Disorder	1	2,44	0	

The last cognitive domain assessed was language, with confrontational naming evaluated using the BNT. This test score was only available for the patient groups. According to pairwise comparisons, no significant difference was found between the two groups ($t = 0.07$; $p = 0.95$; Table 2).

The final diagnoses, following the psychiatric and cognitive evaluations of the patient groups, were presented in Table 4. According to the results, patients referred from neurological departments (Group 2) showed cognitive decline in only 6 individuals; but half of the group (n=15; 50%) was diagnosed with depression and 6 patients (20%) were diagnosed with generalized anxiety. In contrast, among patients referred from other clinical departments (Group 1), the rate of depression was even higher (n=32; 78.05%).

DISCUSSION

In our study, the neurocognitive test results of patients referred to the CLP for psychiatric assessment from various clinics were retrospectively examined. We aimed to evaluate whether the cognitive complaints of these individuals represented SMC symptoms or an objective presentation of any disorder. This study was designed to test the hypothesis that patients may have forgetfulness complaints besides of neurological conditions and that these may related with psychiatric conditions; significant differences were observed in the performance of the three subgroups of this study sample on forward digit span, semantic fluency, verbal memory (learning, delayed recall, recognition and retrieval) and face recognition tests. Our findings reveal that patients with SMC exhibited distinct neurocognitive profiles depending on the referring clinic. The absence of significant differences between the groups in terms of age and education level indicates that the observed cognitive differences were independent of these variables as suggested with the study by (26) emphasizing that subjective cognitive impairment should be evaluated independently of demographic characteristics.

Forward digit span is a test sensitive to attention capacity (27). It was found that the basic attentional functions assessed with forward digit span in patients referred from neurological sciences (Group 1) and other clinics (Group 2), who exhibited SMC, were significantly lower compared to the control group (Group 3). Several studies in the literature suggest that forward digit span may serve as an early indicator of neurological diseases such as Alzheimer's disease and Parkinson's disease in individuals with subjective memory complaints (28, 29). Additionally, various studies conducted with chronic medical patients demonstrate a relationship between systemic metabolic and vascular effects and attentional impairments in patients. These studies also indicate that the course of attentional impairment correlates with the severity of the disease (12,13,14). Considering our findings in light of previously reported information, this helps clarify the reduction in attention span observed in patients with medical chronicity.

Another executive function, abstraction skill, was evaluated separately at the WMS-R pairwise similarities level and at the proverbs level. No significant difference was observed between the groups in both subtests. Also, in the Stroop Test, which assesses the interference effect among executive functions, no difference was found between the groups in terms of interference time difference and spontaneously self-corrected errors. However, a trend level of difference was observed in the error count between the three groups. This difference emerged specifically in the patient group referred from neurology clinics. It was found that patients referred to psychiatry from neurology had difficulties inhibiting inappropriate responses and struggled when confronted with incongruent stimuli, which is an executive function typically attributed to the prefrontal brain area. Previous studies have consistently shown that the number of errors is higher in neurodegenerative diseases compared to healthy individuals (30,31). Therefore, despite the diagnosis of neurodegenerative disease have yet been concluded, patients with SMC should undergo comprehensive monitoring including psycho-

metric assessments.

Semantic fluency is one of the most frequently used cognitive tasks in the evaluation of executive functions, along with language skills. In this task, it is understood that the temporal cortex, which serves as the reference brain area for the semantic storage, works reciprocally with the prefrontal cortex (inferior frontal gyrus) (32,33). In the semantic fluency test, the performances of patients referred from both neurology clinics and other departments were found to be lower than those of healthy controls. Based on our results, it appears that, regardless of the underlying disease affecting attention functions, semantic fluency is one of the first cognitive function to be affected. However, the significant impairment in the semantic fluency test, in particular, supports the findings of Rabin et al. (34), suggesting that verbal fluency may be a sensitive marker for predicting neurodegenerative processes at an early stage.

Semantic memory, as to roughly conceptualize, consists of stored information about the features and attributes that define a concept, as well as the processes that enable this information to be effectively retrieved and used in thought and language production. Word list learning tests are frequently used in the evaluation of verbal memory, allowing the measurement of all four stages of memory: Registration, learning, retrieval, and recognition. In this study, it was observed that learning ability, as measured by the score obtained from the sum of learning trials and delayed free recall (retrieval) ability, showed significant differences between the groups. Patients referred from both neurology clinics and other departments were able to learn and retrieve fewer words than the control group. The impairments in executive functions related to attention and memory observed in patients referred from neurology clinics are similar to the pre-clinical cognitive impairment pattern described in the study by (35). But patients with SMC differed in one memory component: recognition. When looking at the total recall score obtained by summing the recognition scores with the retrieval scores, it is noteworthy that patients referred from neurology clinics performed more poorly on recognition compared to patients from other departments and healthy controls. It is known that neurological diseases that affect primary brain structures involved in memory processing, such as the hippocampus and frontal cortex, leading to deficits in both short- and long-term memory (36,37). Our findings support the literature and suggest that the memory complaints in consultations from neurology clinics may have a high probability of being related to primary cognitive function loss associated with neurodegenerative processes. Additionally, the exclusion of major neurological diseases in our sample suggests that the observed cognitive impairments may be associated with early-stage or subclinical neurological processes. This approach is consistent with the findings of a previous study proposing that subjective cognitive decline may serve as an important marker in the preclinical stage of neurodegenerative diseases (38).

In evaluating visuospatial skills, both patient groups performed with lower scores on the face recognition test, compared to the control group. This test is attributed to the evaluation of the pathway extending from the occipital to the temporal area, known as the “what pathway” in visual processing. Impairments in visuospatial skills are observed in many neurological diseases, particularly in Alzheimer's disease and other forms of dementia, as well as in conditions like multiple sclerosis, migraines, and tension-type headaches (39,40,41). In a study conducted with Parkinson's patients who had not yet developed dementia and were not depressed, the authors interpreted the fact that this visuospatial impairment became more pronounced as the disease progressed as a strong predictor of Parkinson's disease dementia (42). It is also known that there are difficulties in visuospatial perception in cases of cerebral involvement due to vascular causes (43); therefore, it was considered that vascular deficiencies resulting from systemic diseases could negatively affect BNT performance. The absence of patients diagnosed with dementia in our study sample highlights the importance of CLP evaluations conducted solely based on SMC, especially before the development of dementia, in terms of detecting early symptoms of the disease.

The fact that patients with medical conditions that brain is not the primary disease targeted organ, performed worse on the NPT compared to healthy controls provides valuable data on the complex

relationship between physical health and cognitive function. Our findings are consistent with research indicating that cognitive dysfunction is common among patients with chronic medical conditions (44). The differences observed in our data, as well as in other studies, can be explained by various mechanisms. Some studies suggest that metabolic factors such as uremic toxins, electrolyte imbalances, and cardiovascular complications, as well as medications used in treatment, may impact cognitive function in individuals with physical illnesses (45).

Lastly, reviewing the final diagnoses following psychiatric and cognitive evaluations revealed that depression and anxiety were widespread among patients referred to CLP from both neurological and other clinical departments, while somatic symptom disorder was less prevalent than patients commonly stigmatized in patients. Patients often experience psychological distress in addition to their primary diagnoses, which require psychiatric diagnosis and treatment. However, the impact of these conditions on cognitive abilities is frequently overlooked. Depression is known to contribute to attention deficits with a disruptive effect on memory (46) and as mentioned above, it has even been suggested to act as a precursor to dementia (47). Nevertheless, due to sample characteristics (i.e., multicollinearity) and the limited sample size, performing prediction analysis based on the final diagnoses was not feasible in this study.

Our study has several strengths and limitations. One of the main strengths is that it was conducted in a branch of CLP not widely available in tertiary care institutions in our country, and that a comprehensive NPT battery was used. On the other hand, the relatively small sample size and the absence of long-term follow-up data, as the study was based solely on retrospective records, are limitations that should be considered. Due to the retrospective design of the study, laboratory values for all patients were not accessible; therefore, the impact of metabolic factors such as uremic toxins and electrolyte imbalances could not be examined.

The findings of our study provide important insights into our understanding of SMC and clinical approaches by revealing the differences in NPT performances of patients referred to the CLP division. It should be considered that, in patients referred with complaints of forgetfulness, memory complaints may be related to psychological factors accompanying medical conditions and this may play a significant role in cognitive dysfunction. Additionally, by developing evaluation strategies that vary according to the referring clinical department, personalized assessment models could be created. Future studies should consider longitudinal follow-ups of these patients to investigate in depth the relationship between cognitive changes and clinical progression.

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