

Research Article

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Assessment of Relation Between Subjective Memory Complaints and Objective Cognitive Performance of Elderly Over 55 Years Old Age

Elli Beş Yaş Üstü Popülasyonda Subjektif Bellek Yakınması ile Objektif Kognitif Performans Arasındaki İlişkinin Belirlenmesi

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ABSTRACT

Introduction: This study investigated the frequency of forgetfulness in elderly individuals over 55 years of age and examined the association of subjective memory complaints (SMCs) with objective cognitive functions, depression and other risk factors.

Methods: We recruited 405 patients over 55 years of age who were referred to Neurology, Cardiology, or Physical Therapy and Rehabilitation outpatient clinics. All subjects were questioned regarding forgetfulness and then were administered the Subjective Memory Complaint (SMC) Scale, Mini Mental Test (MMT), Verbal Fluency Test (VFT), Clock Drawing Test (CDT) and the Geriatric Depression Scale (GDS). Subjects with SMC were compared with those without SMC in terms of cognition, depression and some laboratory parameters.

Results: Of the patients, 42.5% complained of forgetfulness. None of these patients had been admitted to hospital for this complaint. Women and patients with low education had more forgetfulness as well as poorer results on the SMC Scale, MMT, VFT, and GDS. Patients with SMC had lower hemoglobin, ferritin and free T4 levels. Female gender and depression was found to be a risk factor for SMCs.

Conclusion: SMCs are common in people over 55 years of age. Being a woman as well as depression was found to be a risk factor for SMC. Since depression is a treatable condition, these people should be assessed carefully in terms of depressive symptoms. Laboratory parameters, such as hemoglobin, ferritin and free T4 levels should be investigated in patients with SMC. Unlike the other cognitive tests, CDT performance is independent of subjective memory complaints. Elderly patients rarely visit hospital with complaint of SMC, therefore, clinicians should be watchful for this problem. (*Archives of Neuropsychiatry 2014; 51: 57-62*)

Key words: Memory disorders, depression, cognition, dementia, aging

Conflict of interest: The authors reported no conflict of interest related to this article.

ÖZET

Amaç: Bu çalışmanın amacı 55 yaş üstü popülasyonda unutkanlık yakınmasının sıklığını ve bu yakınmayla objektif kognitif performans, depresyon ve diğer risk faktörleri arasındaki ilişkiyi araştırmaktır.

Yöntem: Çalışmaya Nöroloji, Kardiyoloji ve Fizik Tedavi Rehabilitasyon Polikliniklerine başvuran 55 yaş üstü 405 kişi dahil edilmiştir. Tüm katılımcılar unutkanlık açısından sorgulanmış ve hepsine Subjektif Bellek Yakınması Ölçeği (SBYÖ), objektif kognitif performans ve depresyonu değerlendiren Standardize Mini Mental Test (SMMT), Sözel Akıcılık Testi (SAT), Saat Çizme Testi (SÇT) ve Geriatrik Depresyon Ölçeği (GDÖ) uygulanmıştır. Subjektif Bellek Yakınması (SBY) olan ve olmayan bireyler kognitif fonksiyonlar, depresyon ve laboratuvar parametreleri açısından karşılaştırılmıştır.

Bulgular: Katılımcıların %42,5'i unutkanlık yakınmaları olduğunu belirtmiştir. Bu kişilerden hiçbiri bu yakınmalar nedeniyle doktora başvurmamıştır. Kadınlar ve düşük eğitim düzeyi olan bireylerin daha fazla unutkanlık yakınması olduğu belirlenmiştir. Unutkanlık yakınması olanlar SBY Ölçeği, SMMT, SAT'dan daha düşük sonuçlar elde etmiş. Bu kişiler GDÖ'den de daha yüksek puanlar elde etmiştir. SBY tarifleyen kişilerde hemoglobin, ferritin ve serbest T4 düzeyleri anlamlı düzeyde düşük bulunmuştur. Kadın cinsiyetin ve depresyonun SBY için risk faktörü olduğu belirlenmiştir.

Sonuç: Subjektif bellek yakınmaları 55 yaş üstü popülasyonda sık görülen bir bulgudur ve depresyon bu kişilerde daha yüksek oranda gözlenmiştir. Bu kişiler özellikle tedavi edilebilir bir hastalık olmasından dolayı depresyon açısından dikkatle sorgulanmalıdır. Ayrıca kolaylıkla tespit edilip düzeltilebilen hemoglobin, ferritin ve tiroid fonksiyon testleri ile ilişkili bozukluklar bu kişilerde mutlaka araştırılmalıdır. SÇT performansının diğer kognitif testlerden farklı olarak subjektif bellek yakınmalarından bağımsız olduğu gözlemlenmiştir. Hekimler yaşlılarda unutkanlık yakınmasını sorgulamalı ve bu yakınma ile ilişkili olarak daha dikkatli ve uyanık olmalıdır. (*Archives of Neuropsychiatry 2014; 51: 57-62*)

Anahtar kelimeler: Bellek bozuklukları, depresyon, kognisyon, demans, yaşlanma

Çıkar çatışması: Yazarlar bu makale ile ilgili olarak herhangi bir çıkar çatışması bildirmemişlerdir.

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Introduction

The complaint of forgetfulness which is also called subjective memory complaint (SMC) is substantially common in the elderly. Population based studies have shown that the prevalence of SMC ranges between 25% and 56% (1,2). The diagnoses of Alzheimer's disease (AD) which is one of the most common causes of dementia and mild cognitive disorder (MCD) which is its predemential stage are also based on memory complaints and it has been reported that very mild cognitive symptoms occur in these individuals years before the diagnosis (3). It is difficult to decide if forgetfulness in the elderly is related with normal aging process or a precursor of dementia. In recent years, definition of the process of transfer from healthy aging period to dementia has been studied intensively. In the Baltimore aging study, it was shown that the episodic memory was affected 7 years before the diagnosis of dementia (4). At this point, the periods during which memory complaints emerge, but the diagnostic criteria of dementia is not yet met gain importance in terms of clinical researches. In the guideline published in 2011 by The National Aging Institute and Alzheimer Association directed to clinical researches in which the preclinical period of AD (when pathological changes occur, but the clinical criteria of MCD and AD are not met) was defined, it is planned to diagnose and treat AD in the preclinical period before cognitive involvement progresses similar to treatment of heart disease and cancer (3). Many studies are being conducted with this objective. Examples of these studies include demonstration of beta amyloid load which has a significant role in the pathogenesis of AD directly in the CSP or by way of PET using C11 labeled Pittsburgh component and functional MRI studies showing synaptic dysfunction (3,5). With these methods the pathogenesis of dementia can be identified starting from the early stages. These recommendations which are not yet clinically applied promise hope in terms of early diagnosis and treatment in AD and cause to an increase in the interest to the earliest stages of the process of dementia.

Subjective memory complaints is a condition which is observed with a higher rate as the age advances and in women and in individuals with a low education level. There are many studies examining the relation of this condition with dementia (5,6,7,8,9,10). Although presence of a relation between SMC and cognitive deterioration has been shown in most of these studies, the results have been evaluated to be inadequate (2), because SMC may also be affected by different conditions including depression and personality characteristics (8,9,10). However, it is being discussed that depression may be related with the early period of dementia in the elderly (11). In addition, it is known that cognitive deterioration observed in AD is a gradual process and making a definite diagnosis of dementia may sometimes extend to a long time. Considering the studies which suggest that there is a relation between SMC and cognitive deterioration, SMC may be a significant marker in identifying mild cognitive deterioration (10). In addition, SMC should also be examined closely because of its relation with low quality of life and increased health cost (12).

The aim of this study was to examine the complaint of forgetfulness which is observed very frequently in the elderly population, determine the conditions related with this complaint and investigate the relation of SMC with objective cognitive performance, depression and other risk factors in the Turkish population.

Methods

Our study included patients aged 55 years and above who presented to Zonguldak Karaelmas University Medical Faculty, Neurology, Cardiology and Physical Therapy and Rehabilitation (PTR) Outpatient clinics between May 2010 and April 2011. A total of 2273 patients presented to these three outpatient clinics during this period. The patients who had a history of cerebrovascular disease, cerebral palsy and/or mental retardation, dementia or neurodegenerative disease (epilepsy, multiple sclerosis, parkinson's disease etc.), who had terminal illness (malignancy, advanced stage organ failure), who had a history of acute systemic disease in the last one month, who had hearing and visual loss which could not be corrected, who had a history of cranial trauma associated with loss of consciousness, who used neuroleptics and benzodiazepines and who had psychiatric disease including major depression and psychotic disorder were excluded from the study. A total of 405 patients with eligible characteristics who accepted to participate in the study were examined prospectively in order. Approval was obtained from the ethics committee of Zonguldak Karaelmas University Ethics committee before the study was initiated and all participants read the informed consent form and gave consent.

The ages, gender, education levels and accompanying chronic diseases were interrogated to determine the socio-demographic properties of the patients. Detailed physical and neurological examinations were performed in all patients. Afterwards, presence of SMC was investigated by asking the question "Do you have forgetfulness which affects your daily life?". After this question, SMC (13) was applied to all patients, SMMT was applied to both literate and illiterate patients (14), CDT which asks the participants to place the numbers of a clock by giving a drawn circle and to show the time of 10 past 11 graded on a 5 point scale was applied (15,16) and VFT (17) which evaluates the number of animals listed in one minute and GDS (18) short form were applied. The relations of the subjective memory complaints described by the patients and objective cognitive performances with dementia were examined. In addition, the hemoglobin (Hb), ferritin, thyroid function tests, vitamin B12 and folic acid levels were recorded by retrospective examination and their relations with clinical findings were evaluated.

Statistical analysis

Statistical evaluation was made using SPSS 18.0 program. The compatibility of numerical variables to the normal distribution was examined by Kolmogorov-Smirnov test. The differences between the groups with and without SMC in terms of categorical variables and the relations between the variables

were examined using chi-square test. In comparison of the two groups in terms of numerical variables, the significance test of the difference between two means was used when the parametric test assumptions were met and Mann-Whitney U test was used when the parametric test assumptions could not be met. For examination of the linear relation between two numerical variables, Pearson correlation analysis was used when the parametric test assumptions were met and Spearman correlation analysis was used when the parametric test assumptions could not be met. Multivariate logistic regression analysis was applied by using Forward Stepwise method in order to determine the risk factors for SMC. The results were evaluated in a confidence interval of 95% and a p value of $<.05$ was considered statistically significant.

Results

Demographic properties

A total of 405 individuals aged between 55 and 85 years (mean 64.64 ± 7.58) were included in the study. 37.3% of the individuals were male ($n=151$) and 62.7% were female ($n=254$). 135 of the participants presented to the neurology outpatient clinic (33.4%), 136 (33.6%) presented to the cardiology outpatient clinic and 134 (33%) presented to Physical Therapy and Rehabilitation outpatient clinic. The patients who had an education period of shorter than 5 years were considered illiterate and constituted 49.1% of the whole group ($n=199$). The education level of the women was significantly lower compared to the men ($p<.001$).

Presence of hypertension, diabetes mellitus, hyperlipidemia and coronary artery disease was interrogated in all patients and at least one morbidity was present in 80.5% of the patients ($n=326$). Hypertension was present in 68.1% of the patients ($n=276$), diabetes mellitus was present in 28.1% ($n=114$), coronary artery disease was present in 33.3% ($n=135$) and hyperlipidemia was present in 13.5% ($n=55$).

Evaluation of the patients by the complaint of forgetfulness

Presence of forgetfulness at a level affecting daily life was interrogated in all patients. While 172 of the patients (42.4%) stated that they had complaints, 233 (57.5%) stated that they did not have any complaints.

No difference was observed between the patients who did and did not have forgetfulness in terms of age, accompanying chronic disease and outpatient clinic of presentation ($p=.826$, $p=.909$, $p=.909$, respectively). However, it was found that the complaint of forgetfulness was more common in women and in patients with a low education level ($p<.001$ and $p<.001$) (Table 1).

Hb, ferritin and free T4 values were statistically significantly lower in the patients with forgetfulness compared to the patients who did not have forgetfulness ($p<.001$, $p=.020$, $p=.049$). No significant difference was observed between the patients who did and did not have forgetfulness in terms of vitamin B12, folic acid, free T3 and TSH levels ($p=.709$, $p=.821$, $p=.565$, $p=.692$) (Table 2).

Evaluation of cognitive functions of the patients

The SMCS and GDS scores of the patients with forgetfulness were significantly higher. The SMMT and VFT performances of these individuals were statistically significantly

more unsuccessful compared to the patients who did not have forgetfulness ($p<.001$, $p<.001$). When the SMMT results were examined in more detail, it was observed that the orientation, recall scores which are the subgroups of SMMT were statistically significantly lower in the patients who had forgetfulness ($p<.001$, $p<.001$, respectively). When the group who described SMC was compared with the group who did not have SMC in terms of success of drawing a shape, a statistically significant difference was observed ($p=.006$). The patients with SMC were also more unsuccessful in the part of the SMMT which included drawing a shape. The mean total SMMT score was found to be 27.17 ± 2.50 in all patients, but the SMMT scores were below 24 in 27 patients. 25 of these subjects were female and 2 were male. While only one of these 27 patients was primary school graduate, the other 26 were illiterate. The SMMT and VFT scores were significantly low in women, in the subjects with advanced age and in the subjects with a low education level ($p<.001$ both for SMMT and VFT). It was found that CDT was not affected by gender, but was significantly low in the subjects who had advanced age and who had a low education level ($p=.201$, $p=.031$, $p<.001$).

No statistically significant difference was observed between the patients who did and did not have forgetfulness in terms of CDT score ($p=.176$). Table 3 summarizes comparison of the cognitive test data between the patients who did and did not have forgetfulness.

The relations of all tests with each other were evaluated. In this evaluation, all tests except for CDT had a significant relation with SMCS which assesses SBC. Again, all tests except for CDT were significantly related with GDS ($p>.001$, $p=.260$).

Logistic regression analysis was used to determine the risk factors for forgetfulness. It was found that female gender increased the risk of SMC by 1.9 fold ($p=.045$) and GDS score increased the risk of SMC by 1.48 fold ($p<.001$) (Table 4).

Discussion

This study was planned to examine the frequency of subjective memory complaints and the relation of these complaints with objective cognitive performance, depression and other risk factors in the population aged above 55 years. Tests which can be applied in a short time in clinical practice were applied to the participants and their cognitive performances were evaluated objectively. Since there was no study evaluating the complaint of forgetfulness in the Turkish population, it was thought that this study would provide useful information about the characteristics of the complaint of forgetfulness in our own elderly population.

In our study, about half of the patients (42.5%) who presented to the hospital because of different reasons described SMC in accordance with the literature (1,2). However, none of the patients previously presented to hospital with this complaint. Therefore, it was thought that social awareness should be increased in relation with the concepts of forgetfulness and dementia.

Our study showed that SMC was more common in women and in the subjects with a low education level. Different results have been obtained in the studies conducted in this area in the literature. Although there are studies reporting that SMC is more

Table 1. Descriptive features belonging to the patients with and without forgetfulness

		Complaint present (n=172)		Complaint absent (n=233)		Total (n=405)	p
		Number	%	Number	%	Number	
Age		64.70±7.70		64.69±7.50		64.64±7.58	.826
Gender	Female	136	79.1	118	50.6	254	<.001
	Male	36	20.9	115	49.4	151	
Education	Illiterate	109	63.4	90	38.6	199	<.001
	Primary school	49	28.5	96	41.2	145	
	Secondary school	5	2.9	10	4.3	15	
	High school	6	3.5	28	12.0	34	
Chronic disease	University	3	1.7	9	3.9	12	.909
	Yes	138	80.2	188	80.7	326	
Outpatient clinic	No	34	19.8	45	19.3	79	.070
	Neurology	66	38.4	69	29.6	135	
	Cardiology	59	34.3	77	33.0	136	
	PTR	47	27.3	87	37.3	134	

*The descriptive statistics were expressed as mean±standard deviation for numerical variables and as figures and percentages for categorical variables.

Table 2. Analysis of the laboratory data of the patients with and without forgetfulness

	Number of individuals whose tests were evaluated (n)	Subjects with complaint Mean±SD	Subjects without complaint Mean±SD	Total Mean±SD	p
Hemoglobin (mg/dl)	369	12.95±1.43	13.48±1.57	13.26±1.53	.001
Ferritin (ng/ml)	163	77.75±115.76	112.07±131.70	96.91±125.70	.020
Vitamin B12 (pg/ml)	204	396.58±263.75	384.69±222.12	389.82±240.41	.709
Folic acid (ng/ml)	174	8.90±3.79	9.26±4.93	9.10±4.44	.821
fT3 (pg/ml)	255	3.40±.97	3.38±.81	3.39±.88	.565
fT4 (ng/ml)	256	1.27±.55	1.31±.50	1.29±.53	.049
TSH (uIU/ml)	270	2.16±3.77	1.67±1.96	1.89±2.90	.692

*The descriptive statistics were expressed as mean±standard deviation for numerical variables.

common in women and in individuals with a low education level (19), some studies have not supported this relations (10). This finding suggests that different results can be obtained in different populations. In our study, it was observed that SMC was more common and the SMMT and VFT scores were lower in the female patients. Similarly, the studies which found that SMC and related cognitive involvement were more common in women interpreted that this finding might be related with decreased estrogen in the postmenopausal period (20). When the results of the multi regression analysis were examined, identification of female gender and GDS scores among the variables which were thought to be potential risk factors for SMC as risk factors enabled us to more strongly emphasize the relation between gender and SMC.

Since female gender and low education level which are

known to be risk factors for AD were observed more commonly in the patients who had SMC in our study, it was thought that the complaint of forgetfulness should be examined more carefully in the population aged above 55 years.

In many studies, the relation between SMC and objective memory performance has been examined. There are studies reporting that these type of complaints are heralds of dementia which will develop in the future (6,7) as well as studies advocating that there is no relation between these complaints and cognitive disorder. It has been proposed that these difference arise from the differences in the tests applied and the differences in age, gender, education and depressive complaints of the individuals examined (21). In our study, the results of SMMT and VFT which evaluate cognition objectively were found to be more

Table 3. Analysis of the cognitive test data in the patients with and without forgetfulness

	Subjects with complaint (n=172)	Subjects without complaint (n=233)	p
SMCS	6.16±3.42	2.24±1.87	<.001
SMMT total	26.51±2.71	27.65±2.22	<.001
VFT	14.22±4.76	16.46±4.56	<.001
CDT	4.13±1.15	4.36±.93	.321
GDS	4.91±3.45	2.10±1.96	<.001

*The descriptive statistics were expressed as mean±standard deviation for numerical variables.

Table 4. Evaluation of the risk factors related with forgetfulness

Risk factor	Odd ratio	95% CI	p
Age	1.010	.977-1.044	.563
Gender	1.925	1.015-1.925	.045
Education	1.436	.749-1.436	.438
SMMT score	1.003	1.003-.874	.968
VFT score	.987	.913-1.068	.746
GDS	1.480	1.315-1.667	<.001

SMMT: Standardised Mini Mental test, VFT: Verbal Fluency Test, GDS: Geriatric Depression Scale

unsuccessful. These individuals obtained high scores in SMCS which is used to more objectively evaluate memory complaints and in GDS which evaluates depression.

When the SMMT results obtained in our study were examined, it was found that the total SMMT score in 6.6% of our patients was below 24 which was determined to be the cut-off value for the Turkish population. It was found that 96.2% of these patients were illiterate and 92.5% were female. In a previous study, it was also found that illiterate individuals had lower SMMT scores (22). The results obtained suggest that a new SMMT with confirmed reliability and validity in which the cut-off values are specified according to individuals with a low education level is needed for population based epidemiological studies considering the fact that the education level is low in the elderly in our country.

Illiterate individuals and women obtained more unsuccessful results in VFT. The reason of use for this test in the study was the finding that one of the functions which was affected earliest in individuals who developed dementia was semantic memory in a study in which the elderly population was followed up prospectively for 14 years (23). Although episodic memory is the first memory type affected in dementia patients, semantic memory may also be affected in the early period in these in-

dividuals. VFT which is applied easily and evaluates semantic memory was included in the study for this reason. VFT performance may be affected by depression. In this study, depression was observed more commonly in the subjects with the complaint of forgetfulness, but other studies have shown that there is a relation between SMC and VFT after depression is excluded (10). This suggests that this test can be used in individuals with SMC as a test which can be applied in a short time and in a simple way to objectively evaluate cognitive performance.

CDT which has been stated to be mostly related with objective test performances and which enables measurement of many cognitive skills including verbal learning, memory, spatial information, planning, concentration and visuo-spatial functions was not affected in our study in contrast to the other tests and it was observed that this test was not related with GDS. In a study which compared the individuals with and without dementia, CDT was found to be disrupted with a rate of 89% in the dementia group and this rate was only 26% in the group without dementia (24). It was thought that CDT might be useful in patients in whom dementia and depression could not be differentiated considering the fact that CDT was related with the tests evaluating other cognitive functions, but not related with GDS scores in our study.

When the results of GDS which evaluated depression in the elderly were examined in our study, significant results related with the effect of depression on the elderly were obtained. The GDS scores were found to be significantly high in the subjects who had SMC. In addition, it was found that the GDS scores were significantly related with the SMMT and VFT results. In advanced analyses performed to determine the risk factors for the complaint of forgetfulness, increased GDS scores were observed to increase the risk fo forgetfulness by 1.5 fold. The relation between depression and SMC has been shown in many studies (8,10). In some studies, it has been stated that depression is one of the symptoms of the early period in dementia (10,23). Studies have found that the rate of development of dementia is 5% after depression is treated in the elderly with depression and this rate is higher compared to the normal rate (10). Therefore, it is important to closely monitor elderly patients with forgetfulness and depression in combination after depression is treated.

When the relation of the complaint of forgetfulness with some laboratory parameters was examined, hemoglobin and ferritin levels were found to be significantly low in the subjects with forgetfulness in accordance with the literature (25). Demonstration of the relation of SMC with both hemoglobin and ferritin levels suggested that iron deficiency might be related with cognitive performance in the elderly. In a study published in 2012, it was reported that iron deficiency was related with disruption in cognitive function independent of anemia (26). In another study, anemia was found to be a risk factor for AD. With the results obtained in these study and in our study it was concluded that the relation of dementia with anemia and iron deficiency should be examined more comprehensively (27). In addition, it was also found that free T4 values were lower in the subjects with SMC, but no such relation was found with vitamin B12 and folic acid.

A significant limitation of our study was the fact that a substantially great portion of our study population were illiterate and the reliability and validity study was performed in illiterate individuals only for SMMT among the tests we used. This shows that there is a big gap in this area in our country and practical scales with confirmed reliability and validity in illiterate individuals are needed to better evaluate patients in clinical practice. In addition, the fact that the rate of female patients was substantially high in the study population led to questions about to which level the study population represented the real elderly population. It was concluded that these results should be reevaluated in populations with a more balanced gender distribution.

In conclusion, SMC is observed commonly in the elderly who receive tertiary healthcare services. However, the community's awareness should be raised about the importance of this complaint. There is also a relation between SMC and depression and depression affects objective performances negatively. Female gender and depression are risk factors for the complaint of forgetfulness. Considering that these are also risk factors for dementia, it was thought that close follow-up of these individuals may be useful in early diagnosis of dementia.

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