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Original Study

The Saint Louis University Mental Status Examination Is Better than the Mini-Mental State Examination to Determine the Cognitive Impairment in Turkish Elderly People

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A B S T R A C T

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Introduction: Presence of detailed screening instruments to detect cognitive impairment in the older adults' culture and language is very essential. The Saint Louis University Mental Status Examination (SLUMS) is one of cognitive screening scales used. The aim of the study was to establish the validity and reliability of the Turkish version of SLUMS (SLUMS-T).

Methods: Two hundred seventy-four participants aged 60 years and older admitted to our geriatric clinic were screened for cognitive impairment using SLUMS-T and Mini-Mental State Examination. Internal consistency was analyzed with Cronbach α test. Area under curves of receiver operating characteristic analyses were used to test the predictive accuracy of the SLUMS-T for detecting amnesic mild cognitive impairment (aMCI) and Alzheimer disease (AD) to set an appropriate cut-off point.

Results: The SLUMS-T scores were positively correlated with the Mini-Mental State Examination scores of the patients with aMCI and patients with AD and controls ($r = 0.687$, $P < .001$; $r = 0.880$, $P < .001$; respectively). Internal consistency of the SLUMS-T was Cronbach $\alpha = 0.85$. It was found that SLUMS-T with a cut-off point of 23 had a sensitivity of 66.6% and a specificity of 72.3% for the diagnosis of aMCI, and with a cut-off point of 20 had a sensitivity of 83.8% and a specificity of 87.3% for the diagnosis of AD.

Conclusions: SLUMS-T was demonstrated to have sufficient validity and reliability to evaluate cognitive impairment including MCI among Turkish elderly people.

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Screening older adults for cognitive impairment has been of great concern in clinical practice and in research settings because complaints of cognitive problems are very common among older adults in clinical practices, and identification of its presence affects the treatment regimen and future plan of the patient and the family. In research settings, to identify study participants with or without cognitive impairment related to the study's criteria is essential for ensuring the best targeted treatment effect or outcome.¹ Furthermore, researchers strive to investigate how the changes that result from age-related disease differ from those that result from cognitive aging.² Therefore, it is important to have a validated and reliable instrument

to detect those with cognitive impairment. There are few detailed cognitive screening instruments available for use with adults older than 60 years of age in our country. One of the most commonly used measures is the Mini-Mental State Examination (MMSE),³ but it has several limitations such as ceiling effects when used with individuals with high educational circumstances, poor specificity rates in identifying mild cognitive impairment (MCI), and poor staging for questionable dementia.^{4–6} The Saint Louis University Mental Status Examination (SLUMS) is an 11-item, 30-point clinician-administered cognitive screening measure. It has been reported to be easy to administer, to assess several cognitive domains including attention, calculation, immediate and delayed recall, animal naming, abstract thinking, and visuospatial skills in a short amount of time (approximately 7 minutes). It does not require collateral informants.^{4,7}

Tariq et al⁴ showed that the SLUMS and the MMSE both could be used as a screening tool to detect dementia, and that the SLUMS could recognize a group of patients with mild neurocognitive disorder,

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which the MMSE failed to recognize as defined by the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition criteria. They not only demonstrated that the SLUMS had excellent sensitivity and specificity rates for mild neurocognitive disorder in both high and low educated groups in a large veteran population, but they also demonstrated that the sensitivity and specificity rates for dementia in both education level groups were very high (0.92/0.81, respectively, in a less than high school educated population; and 0.95/0.76, respectively, in a greater than high school educated population). Cruz-Oliver et al⁸ continued the validation work for the SLUMS by exploring its predictive validity for institutionalization and mortality after 7.5 years in patients with dementia. Feliciano et al⁵ then validated SLUMS in community-dwelling older adults and found that the SLUMS had predictive neuropsychological functioning over the MMSE and was more likely to better determine memory and executive functioning. It was not so surprising because different from the MMSE with regard to these functions, the SLUMS had monetary calculations in addition to digits backward task, animal naming, and clock drawing. In a very recent long follow-up study by using SLUMS scores, it was reported that discontinuation of anticholinergic drugs and visual corrections provided improvement or reversion back to normal cognition in 24% of the individuals.⁹

The SLUMS has been translated to several languages and validated in different cultures.^{10,11} Cao et al¹⁰ had studied the SLUMS in a Chinese population. The scores of SLUMS were found to be fairly consistent with the Chinese version of MMSE and the Beijing version of Montreal Cognitive Assessment. Likewise, Arabic version of SLUMS examination was found to be a valid and reliable cognitive screening tool in the community dwelling Egyptian elderly.¹¹

Therefore, the present study aimed to establish the validity and reliability of the Turkish version of the SLUMS in patients with impaired cognitive status and to investigate the discriminative power of the test in patients with mild cognitive disorder and in normal participants.

Methods

Translation and Adaptation Procedure

The process of Turkish translation of the SLUMS (SLUMS-T) examination included the following steps. First, 2 independent forward translations into Turkish were done by 2 native linguistic specialists. Both translators were blinded to the other's translation text. Second, a consensus forward version was developed by 2 specialists who are highly skilled in English. Finally, this consensus forward version was back-translated into English by a bilingual person; the backward version and the original text were compared by an independent supervisor. It was found that some contents required modifications. In third item "state" was modified to "city/şehir," in the fourth item one of the objects "tie" for immediate and delayed recall was modified to "ball/top"; "car" to "train/tren." In the fifth item, "\$100" was modified to "100Liras"; "\$3" to "6Liras"; "\$20" to "20Liras"; "apples" to "egg/yumurta"; "tricycle" to "saucepan/tencere". In the eleventh item, in the story "Jill" was modified to "Nil" and "stockbroker" to "teacher"; "Chicago" to "Istanbul" and "Jack" to "Cenk" for being commonly used in Turkish and for having a similar number of syllables as the original version. Otherwise the contents of the test did not require further modification.

Participants

The participants were aged 60 years and older and were enrolled from June 2014 to June 2015 in a geriatric outpatient clinic. The investigators evaluated each participant during a routine clinic visit and, in addition, a history was obtained from corroborating sources, and a comprehensive geriatric assessment including physical and mental

status examination and laboratory evaluation was performed.¹² The diagnosis of amnesic MCI was established according to the Mayo Clinic Criteria (Petersen et al¹³), and the diagnosis of Alzheimer disease (AD) was established according to the National Institute of Neurological and Communicative Disorders and Stroke and the Alzheimer's Disease and Related Disorders Association (NINDS-ADRDA) criteria (McKhann et al).¹⁴ A geriatrician blinded to the diagnosis then completed the MMSE and SLUMS-T. Those who did not qualify by any of those criteria were considered having normal cognition or as controls. A sample size of 143 participants was calculated to ensure that the minimum required size was within a 95% confidence interval and 5% of the true proportion.

The inclusion criteria for the study were that the participants were at least 60 years of age and consent to the tests. Patients with severe deafness and blindness and those considered to be too sick to be questioned, including those in delirium, were excluded from participating. Those who were taking medications that might affect their memory or thinking and those who reported previous head injury resulting in unconsciousness and/or a period of memory impairment and patients who were unable to provide informed consent and those who were illiterate were also excluded from participation. This study was approved by the university institutional review board. All of the participants signed informed consent forms.

Measures

The SLUMS is a brief screen for cognitive impairment, developed in 2006 and validated in a large veteran population. The scale was obtained from the official website (Veterans Affairs Medical Center SLUMS examination) which is available at <http://aging.slu.edu/uploads/slums/English%20Australia%20final%20translation.pdf> For less than high school education SLUMS normal score is 25–30, SLUMS mild neurocognitive impairment score is 20–24, and SLUMS dementia score is 1–19. For high school or more than high school education, SLUMS normal cognition score is 27–30, SLUMS mild neurocognitive impairment score is 21–26, and SLUMS dementia score is 1–20. SLUMS was grouped into 6 subitems including orientation, memory, executive functions, attention, visuospatial skill, and clock drawing.

The MMSE is widely used in practice as screening tool for dementia and has been validated in Turkish population.¹⁵

The Geriatric Depression Scale^{16,17} was administered to all participants; those with Geriatric Depression Scale scores higher than 7 were excluded.

According to the patients' education level, they were divided into 2 groups: less than high school education (≤ 8 years) and high school education and higher (≥ 9 years).

Initially, the SLUMS-T examination was administered before the clinical evaluation and 1 week after the initial examination for investigating test-retest reliability. The data were collected by a geriatrician who was blinded to the diagnosis, as well as the previous MMSE and the SLUMS-T. A total of 60 participants (12 were the patients with AD, 13 were the patients with amnesic MCI, and 35 were participants with normal cognition) completed the retest. Others were not available after 1 week.

Data Analysis

Analyses were performed using the statistical package for the social sciences (SPSS v 20.0; SPSS Inc, Chicago, IL). Descriptive statistics are reported as means $\pm$ standard deviations or percentages. Between group differences were tested either 1-way analysis of variance or Kruskal-Wallis test because of the distributional characteristics. Interclass correlation coefficient was evaluated for the test-retest reliability analysis. Internal consistency was analyzed with Cronbach α test. In order to test the predictive accuracy of the SLUMS for

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