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Assessment of cognition in older adults using the test your memory test

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Abstract

Introduction: The prevalence of age-related health problems is becoming an important public health issue in older adults. Dementia and other cognitive problems are the most commonly found. Alzheimer's disease (AD) is the commonest form of dementia which is strongly associated with functional disability and institutionalization leading to a decreased quality of life. The Test Your Memory (TYM) is a quick test to administer for patients screening and evaluates a large number of cognitive skills.

Methods: Total 218 community dwelling elderly individuals with age>60 years and who were willing to participate were included in the study. The Greek version of TYM test was used for cognitive assessment of 218 community dwelling elderly volunteers, older than60 years.

Results: showed that 53.8% older adults scored less than the cut off score of 42 on TYM test and age correlated significantly with the TYM score ($r = 0.375$, $p<0.000$).

Conclusion: 53.8 % of older adults scored less than cut off value on TYM test and age correlated significantly with the TYM score.

Keywords: test your memory, TYM, cognition, older adults

1. Introduction

As the proportion of older adults in worldwide population is growing, the prevalence of age-related health problems is becoming an important public health issue. Dementia and other cognitive problems are the most commonly found [1]. Alzheimer's disease (AD) is the commonest form of dementia, representing an increasing challenge to public health and the health care system, and having a tremendous impact at both the individual and the societal levels [1,2]. AD accumulated data, reveal a non-constant prevalence globally, with lower incidence rates reported in Asian countries than in the industrialized world. Milder forms of cognitive dysfunction, including mild cognitive impairment, affect many more people [3].

People with mild cognitive impairment (MCI) develop dementia at a rate of 10–15% per year, while the rate for healthy controls is1–2% per year [4]. MCI represents a clinical challenge due to the variety and often dynamic nature of symptoms. Precise knowledge of the magnitude and pattern of mild cognitive impairment is of importance because of the prospect that early intervention might delay progression to dementia [5].

Among the elderly population, AD is strongly associated with functional disability and institutionalization leading to a decreased quality of life. At the individual level, AD significantly shortens life expectancy. Hence, it is important to have reliable estimates of prevalence of cognitive impairments in elderly as this may help in accurate revision for planning and optimal care management of elderly individuals affected by cognitive impairment [6].

There are a number of assessment scales available to assess the cognition in older adults but very few of them cover this broad range of use. In addition, some scales have a cost attached to them which hinders their use in clinical practice. The widely used assessment tools are Mini Mental State Examination (MMSE), Abbreviated Mental Test Score (AMTS), 6-item Cognitive Impairment Test (6CIT), Mini-cog, General Practitioner Assessment of Cognition (GPCOG),Montreal Cognitive Assessment Scale (MoCA), Addenbrookes Cognitive Examination-III (ACE) and Test Your Memory (TYM) test [7,8,9].

The Test Your Memory (TYM) test is quick to administer for screening and tests a large number of cognitive skills. Initial work published in the BMJ suggests that is a useful, valid and powerful screening test for Alzheimer's disease. Results suggest that patients with a pre-test low risk of Alzheimer's disease who score well on the TYM test are very unlikely to have Alzheimer's disease. This test consists of a series of tasks including ability to copy a sentence, semantic knowledge, calculation, verbal fluency and recall ability. The test is designed to use minimal operator time and to be suitable for non-specialist use [1,9].

The estimates of rate at which a disease develops can only be measured in prospective longitudinal studies for which assessment of individuals plays an important role.Hence, the aim of our study was to assess cognition in an elderly population in the region of Western Greece, in order to establish an initial profile for the disease, via the TYM test and investigate the degree variables such as age, level of education and gender, predict the TYM score.The study

hypothesis was that age, level of education and gender are significant predictors for the TYM score.

2. Materials and Methods

- The present study was conducted in Greece at Municipality's elderly care centers of Patras. The study received approval from the Institutional Ethics Committee of the Technological educational Institute of Western Greece, Aigio. Participants were screened based on the inclusion and exclusion criteria described below. Those individuals who were willing to participate were briefed about the study with a detailed information sheet and a written informed consent was obtained.
- This was a prospective cross-sectional observational study. Participants were 218 community dwelling elderly individuals with age>60 years who volunteered for the study. Participants who were illiterate or refused to participate were excluded. Data was collected with two questionnaires. At first the sociodemographic data such as age, gender and level of education were collected. Then, the Greek version of TYM test was used for cognitive assessment [10].
- The TYM test is a series of 10 tasks on a double sided sheet with spaces for the patient to fill in. The patient's ability to complete the test is an 11th task. The tasks are orientation (10 points), ability to copy a sentence (2 points), semantic knowledge (3 points), calculation (4 points), verbal fluency (4 points), similarities (4 points), naming (5 points), visuospatial abilities (2 tasks, total 7 points), and recall of a copied sentence (6 points). The ability to do the test is also scored (5 points), giving a possible total of 50 points. The scores for the subsets are printed on the card and the total score calculated by adding the subset scores as per the scoring instructions. [1]
- Data analysis was conducted using the Statistical Package for the Social Sciences (SPSS) version 20 using descriptive statistics.

3. Results

Total sample consisted of 218 elderly individuals, 71.1% were female. The mean age of the sample was 71.3± 6.2 years. The demographic data of the sample are presented in table 1.

Table 1:

Demographic variables		N	%
Gender	Males	63	28.9
	Females	155	71.1
Education	Primary	83	38
	Secondary	86	39.4
	Higher	49	22.4

According to the results, 118 individuals (53.8%) scored less than the cut off score 42 on TYM test suggesting the need for further assessment to diagnose AD.

Stepwise multiple regression analysis was performed in order to test the relationship between the independent variables i.e. age, level of education and gender and to the dependent variable of TYM score (Table 2).

Table 2: Correlation matrix for the dependent variable TYM

		TYMscore	age	Education	gender
Pearson Correlation	TYMscore	1.000			
	Age	-.375*	1.000		
	Education	.105	-.444	1.000	
	Gender	.104	-.334	-.204	1.000

*= p<.000

Table 3: Model Summary of the dependent variable TYM

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.375[a]	.140	.137	7.380	1.395

a. Predictors: (Constant), age

As findings revealed, only age correlated significantly with the TYM score (r = 0.375, p<0.000) whereas education and gender were not significantly correlated with TYM test score.

4. Discussion

The aim of the study was to assess cognitive status of older than 60 years community dwelling volunteers via the TYM score and identify its predictors.

The assessment by TYM test showed that 53.8 % of elderly individuals scored less than the cut off value 42 hence suggesting the cognitive impairment. This result is in line with the previous studies. A study done by Mathuranath *et al* stated that incidence rate of AD increased significantly and proportionately with increasing age. The incidence rates appear to be much higher than that reported from previous studies in rural north India, comparable with that reported from China, and marginally lower than that reported from the western world [3].

The only variable whose variance correlated significantly with the TYM score was age and the prediction model showed that with each year of age (mean 71.3) the TYM score drops by 0.47 points.

Anderson *et al* (2007) reported the significant impact of sociodemographic variables on the MMSE performance of 1,792 elder Australians. The regression analysis showed that older age, educational level, language, occupation and gender made significant and unique contributions to performance on the MMSE [11].

The result of the present study is in line with the study by Hanninen *et al* (1996), who found that mild cognitive impairment was more prevalent in older and less-educated elderly in Finland, while gender played no role. Investigation of cognitive function involves too many factors, thus, results may vary [12]. However, even in a much different study in terms of volume and methodology, amnesic disorder in a sample of more than 15 thousand elderly in Central America and Asia, was not associated with gender and education. Only gender appeared to were found to present a modest association [13]. In our study, sample size was considerably

lesser and hence such a weak correlations might have been observed

The strong association of AD with increasing age in the current study may partially reflect the cumulative effect of different risk and protective factors over the lifespan, including the effect of complex interactions of genetic susceptibility, psychosocial factors, biological factors, and environmental exposures experienced over the lifespan [2]

The strengths of our study are the screening tool TYM was culturally and linguistically appropriate, also developed and validated locally [10]. All elderly individuals in this study were community dwelling. Opportunities were provided to interview relatives, when participants were not cognitively stable for any reason. The limitation of our study is that TYM is not a diagnostic test. The diagnosis of AD or MCI needs to be made on clinical grounds. There could be many reasons for a poor TYM score. The follow-up could not be done for the participants recruited at the time of screening; hence, the incidence was not calculated.

From this study it was concluded that 53.8 % of older adults scored less than cut off value on TYM test and age correlated significantly with the TYM score.

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