Iranian J Publ Health, Vol. 42, No.4, Apr 2013, pp.417-421

Original Article

Evaluation of Psychometric Aspects of Cleveland Scale of Activity Daily Living in the Diagnosis of Dementia in Iran

Maryam NOROOZIAN [1], ****Zahra POORMAND*** [2], ***Vali Allah FARZAD*** [2], ***Gholamreza HADJATI*** [3], ***Anita BAGHDASARIYANS*** [2]

1. *Dept. of Memory & Behavioral Neurology School of Medicin , Tehran, Iran*
2. *Dept. of Psychometry, School of Social Science, Islamic Azad University, , Tehran, Iran*
3. *Dept. of Psychiatry, AJA School of Medicine ,Tehran, Iran*

***Corresponding Author:** Tel: +98-912-4021794 Email: zpoormand55@yahoo.com

(Received 20 Oct 2012; accepted 14 Jan 2013)

Abstract

Background: The purpose of this study was to design a valid questionnaire to the Iranian culture for dementia diagnosis and more specifically in its early stage.

Methods: A cross-sectional study was conducted in 2012 in Memory Clinic of Roozbeh Hospital and Iranian Alzheimer Association in Tehran in 2012. Among 235 subjects, there were 72 patients with Alzheimer's disease (AD), 137 patients with other types of dementia, and 26 subjects with Mild Cognitive Impairment (MCI), which 107 of them were male. Moreover, 42 healthy subjects were selected as control group. We considered psychometric properties of the Cleveland Scale of Activity Daily Living (CSADL) questionnaire and used standard making operations according to exploratory factor analysis.

Results: Three factors were extracted: self-care (21 items), language skills (14 items), and planning (7 items). Convergent validity was 0.86 and cut off point for total, basic and instrumental scores respectively was 20, 3 and 20.

Conclusion: It can be claimed that Persian Version of CSADL psychometric questionnaire has appropriate indicators and can serve as a useful tool for research in dementia and in its early stage. It can also enable the implementation of scientific research in academic and medical centers on dementia in general and Alzheimer's disease specifically in Iran.

Keywords: Psychometric characteristics, Dementia, Alzheimer's disease, Iran

Introduction

According to WHO, all people aged more than 65 years are defined as old (1). The average annual growth rate of aged population over 65 is annually 2.5%. In Iran, the growth rate of 4.3% in 1995 has increased to 5.2% in 2005, and it is estimated to reach more than 7.2%. According to the report of WHO, by 2050, the number of elderly population in Iran will reach 26,393,000 people and at that time, elderly population will form 26% of population. Therefore, Iran society will change to aged population and we will face common aging disorders (2). Dementia mainly affects people over 65 years (3). Thus, memory impairment and amnesia is the most common disease in the old age. According to the statistics reported by the Iranian Alzheimer Association, about 450,000 patients suffer from this disease and the costs of medical treatments and care for them is very high. Hence, this trend in the coming years will cause a high financial cost and emotional burden on the health care system in Iran. Approximately 80% of patients with dementia receive care from family members. The amount of time spent providing care to these patients is significantly associated

with the level of cognitive impairment and the patient's dysfunction. Psychological stress which caregivers incur, including the time spent away from community to care patient (an average of 11 hours a day), illness stigma, behavioral and Psychological Symptoms of Dementia (BPSD), insomnia, memory impairment and cognitive dysfunction(4).
Early diagnosis and treatment of the disease at early stages of the disease before can stop the course of destruction and consequently improve the quality of these patients' lives and reduce the burden of future maintenance costs. Dementia has not been considered as a major problem in Iran health system so diagnosis of dementia and create tools which are free of educational level and culture is very crucial in improving the national health care system. Most of available neuropsychological tests to recognize dementia are highly dependent to culture and education (years of schooling). Due to high rates of dementia in developing countries, illiteracy and low literacy levels in the countries such as Iran, there is an unmet need to develop appropriate scales, which are independent to education and culture (5).
This research was done to provide the psychometric properties of the Persian version of CSADL questionnaire for the patients with dementia and AD in Iran.

Materials and Methods

Used method in the present research was cross - sectional, descriptive and correlation one. The aim was to examine the convergent validity of the correlation between test performance evaluations with CSADL as the evaluation of the correlation function, and Cleveland were also calculated on the same number of sample. The study population included all patients diagnosed with dementia and were referred to Memory Clinic at Roozbeh Hospital and IAA in 2011 -2012 and were selected randomly from these centers and observed. Dementia diagnosis was based on the expert opinion. Samples were recruited through purposive sampling. The sample size according to number of questions of questionnaire that was 46 was estimated 235 patients. Among them 72 patients suffered AD, 137 people suffered other types of dementia and 26 people suffered MCI.
In total, main caregivers of 235 subjects completed the questionnaire, which 107 of the patients were male. An average year of schooling in men was 9 years and in women was 5 years. Moreover, 42 healthy subjects were selected as control group. These people were selected from the relatives of patients who accompanied them. Instrument used in this study was Cleveland Scale of Activities Daily Living (CSADL)(6). CSADL has been designed to evaluate the dependence on others to perform activities of daily living (ADL). These measures are based on behavioral aspects affected by poor physical and cognitive. This questionnaire is used for elderly people who have cognitive impairment due to dementia. The assessed people should have a normal developmental record and behavior of patients before suffering dementia should be like a normal adults. The scale has 48 questions, and two questions (number 32 and 48) are not used in scoring. Any questions should be rated with five following options: fully autonomous [0], rarely dependent[1], the time-dependent [2], dependent [3], not assessed[9].
The score range is from 0 to 138. The scale should be managed by a trained experimenter. Experimenter is not necessary to be someone with an advanced professional degree. An informed person who respond the questionnaire should be aware of patient dependency rate and should take care of patient in a way that have direct relation with patient at least two or three days a week. Implementation time is 15 to 20 minutes. According to research main objective, in the psychometric properties of the Cleveland questionnaire, instruments standard making operations, including reliability assessment practicality, validity and software troubleshooting according to Exploratory factor analysis with Promax method and using SPSS version 18 software .

Results

Questions whole validity was 0.95. The correlation of each score with whole score showed that all questions have proper and high relation with scale

so it is better not to make changes in questions and delete them. Final observation showed Coefficient after two weeks with retest method. To perform main factor analysis value and prove the point that Correlation matrix of the data is not zero in society, Bartlett's test of sphericity is used so gained results was meaningful statistically (KMO=0.93, P<0.001). Therefore, based on the analysis of both criteria, correlation matrix of the observed sample group can be explained. To determine the observed assessment instrument (whole question) saturated by several factors, three factors were considered. 1 – Eigen Value 2 - Eigen value rotated diagram 3 - the amount of variance explained by each factor. To extract the relevant factors, factor analysis has done multiple times with a variety of solutions, including solutions, 8.7, 6, 5, 4 factors. Eventually it became clear that the three factor solution is more adequate, and this solution was used. These three factors explain 47.76% of the variance (Table 1).

Table 1: Eigen values , percentage of variance and three factors cumulative variance percentage

Factor	Eigen value	Variance percentage	Cumulative percentage
1	17.446	37.926	37.926
2	2.930	6.369	44.295
3	1.598	3.474	47.769

Scary chart has been shown in Fig.1, so we can find out that first factor share in total variance of the variables is significant and is different from the other factors share. Furthermore, from the second factor, the slope is almost flat.

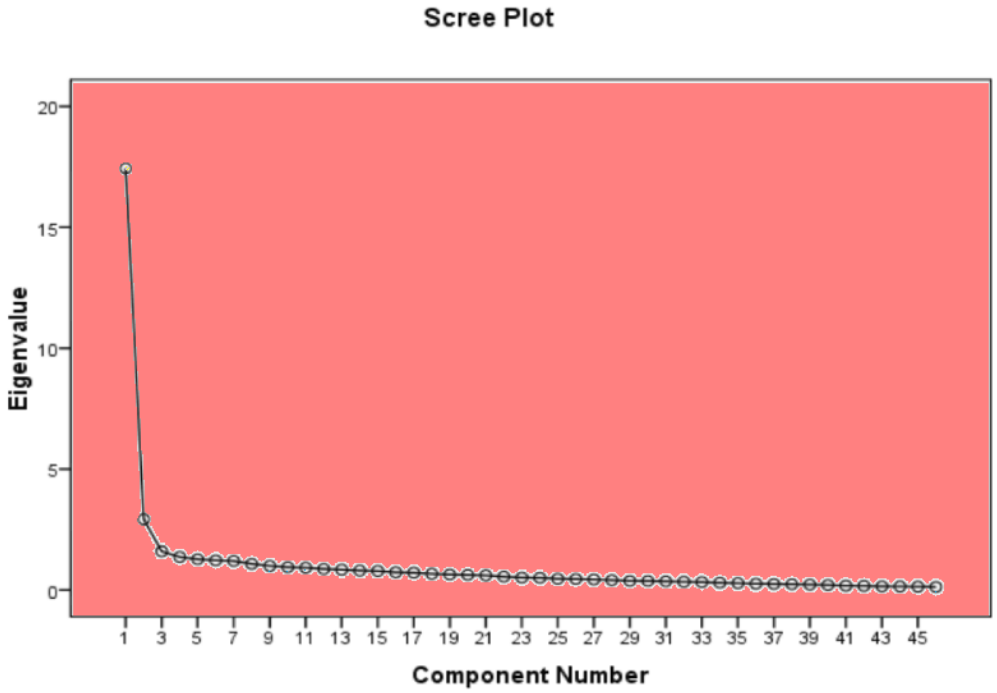

Fig. 1: Scary chart operating of Persian version of CSADL questionnaires factors

The lowest communality for each question is 0.174 belongs to question number 34 (effectively takes into things) and 0.071 belong to question 46 (write complex expressions). The highest communality is 0.71 belongs to question 7 (at the end of urination or defecation) and 0.694 belong to question 3 (ability to enter and exit the bath) and 23 (use the drug in specified time and amount). To simplify factors extraction and name them Varimax and Promax rotation method were

used. Factor analysis several results with different methods showed that the factors extracted by both methods are almost equal to each other. However, the results obtained from using the Promax rotation that is more suitable and less number of questions were deleted. Factor matrix which created by Promax rotation is shown in Table 2. In this matrix, questions 47, 35, 12 and 34 deleted in factor rotation, as they had no relation with factors and at last question numbers reached 42.

Table 2: Type of disease by gender

	Male	Female	Total
Alzheimer	36	36	107
Dementia	62	75	128
Minimal Cognitive impairment	9	17	235

The factor scores for the three Total, Instrumental and Basic respectively is 0.867 and 0.819 and 0.828, which is a high correlation and significant at the 0.01 level. To evaluate the sensitivity and specificity of the questionnaire for the diagnosis of dementia syndrome of the ROC curve was used. Scores of 20 for the total score was chosen as cut of point. In this cut-off point test, sensitivity is 90% and specificity rate is 93%. If you select 26 for cut of point, sensitivity is 87% and specificity will be 100%. According to importance and sensitivity of test in related research, both of cut-off points can be chosen. The cut-off score Bas, 3 was the score at 88% sensitivity and 98% specificity. The cut- off score Ins, was 20 the test sensitivity is 91% and specificity is 100%. Compared to the average of the three groups of patients with AD and others dementia and MCI was Significant. X2 (2, N=235)=30.95, *P*=0.001, (AD, N=72: Dementia, N=137: MCI, N=26). Experimental tests showed that the dementia group (Md = 93.5) and Alzheimer groups (Md = 91) had higher median score than the (Md = 19.5) MCI. There was no significant difference in the scores of the two groups of others dementia and Alzheimer's (*P*=0.640, r=0.045, u=4738, z=-0.467). To control Type I error, the alpha level was used for correction bon ferroni and significant alpha level of 0.017 was used as the criterion. To determine the relationship between two genders variable and the risk of dementia, Alzheimer and MCI chi-square test was used. Two chi-square test for independence (with Yets correction) showed that no significant relationship exists between gender and dementia syndrome.

Discussion

This research was done with psychometric properties of the activities of CSADL. Whereas the number of published studies concerning CSADL measure are rare, but there are some studies about ADL in old population for providing methods relevant to assessment of dementia. In a study the authors developed an 11 item scale to screen for dementia in illiterate population in India with good internal consistency (Cronbach's α=0.82). Most of items of this scale are similar with CSADL scale (7).

Another research was done in 1996 to develop the Bristol ADL scale specifically for use with people with dementia that assess 20 daily-living abilities (8). In our study, principal components factor analysis followed by promax rotation. Three factors extraction were followed by an additional equity and scary chart confirms that these three factors are self-care (21 items), language skills (14 items), Planning (7 items). Four questions from the original questionnaire was eliminated by removing any of these questions, the Cronbach's alpha was increased only 0.002 and explained percentage of variance increased to 0.004 so due to the very small changes you can keep all the questions in the questionnaire. Scale reliability was assessed using the test –retest verification. Coefficients obtained in this study indicate Scale reliability. Our results are compatible with the findings of Patterson et al. (6). In their study to determine the ability of the CSADL to distinguish between AD patients and healthy elderly individuals and patients with physically impaired they compared this three groups and concluded that the CSADL is a reliable measure of functional deficits in individuals with AD. They developed CSADL to evaluate

a broad range of ADL including basic and complex activities (6). In our study correlation between scale scores and performance level, evaluation scale showed that in terms of theory, scales, and measures the desired characteristics. These findings indicate Persian version of CSADL is a reliable scale of activities of daily living in Iranian old population by using obtained ROC curve and cut-off points. The sensitivity and specificity of this questionnaire is able to separate the healthy subjects from the patients with MCI and dementia. It can be claimed that Persian version of CSADL questionnaire have appropriate indicators to serve as a useful tool for research in dementia and its early detection. It can also enable the implementation of scientific research in academic and medical centers about dementia syndrome and AD in Iran. Considering the fact that AD is the most common cause of dementia, it is recommended to do more research to differentiate AD and other types of dementia such as Vascular Dementia, Lewy Body Dementia, Fronto Temporal Dementia, etc.
The limitation of this study was the limited number of the caregivers who have enough time and energy to participate in our study, which shows the high burden of this devastating disease.

Conclusion

This research is specifically done on dementia as a whole. With a view to increasing age of our population and the burden of AD as the most common cause of dementia syndrome - including direct and indirect costs of the disease- the results of the psychometric tool for early detection and treatment of early stage disease could be helpful significantly in reducing healthcare costs imposed by illness and caregivers suffer loss due to delay in the progress of the disease. Moreover, attention of health planning authorities and scientific and research centers into the disease is necessary and can reduce the burden of the disease in the coming years significantly. Social intervention to improve attitudes, knowledge and performance of individuals is possible by public education through the mass media to enables the professionals make dementia diagnosis as early as possible.

Ethical considerations

Ethical issues (Including plagiarism, Informed Consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc) have been completely observed by the authors.

Acknowledgment

The authors wish to thank gratefully The Iranian Alzheimer Association for its cooperation and financial support of this research. The authors declare that there is no conflict of interest.

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