Pharmacophore

ISSN-2229-5402

Journal home page: http://www.pharmacophorejournal.com

Pharmacophore
an International Journal
ISSN 2229-5402

EVALUATION OF CULTURAL ADAPTATION, VALIDITY AND RELIABILITY OF THE QUESTIONNAIRE OF GERIATRIC LOCOMOTIVE FUNCTION SCALE - 25 QUESTIONS

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ARTICLE INFO

Received:
03th Jun 2017
Accepted:
29th Nov 2017
Available online:
14th Dec 2017

Keywords: *Locomotive syndrome, Psychometric, GLFS-25, elderly, Iran*

ABSTRACT

Introduction: The term of Locomotive syndrome refers to conditions under which elders may soon require nursing care because of problems of the locomotive organs. the purpose of study be to evaluate the cultural adaptation, validity and reliability of the 25-question Geriatric Locomotive Function (GLFS-25), for early manifestation of locomotive syndrome.
Materials and Methods: The present research is a methodological. The translation and cultural adaptation of GLFS-25 carried out by standard method of translating and equivalent, the International Quality of Life Assessment model. Face validity, Content validity, construct validity, criterion validity, internal-consistency reliability and reproducibility by test-retest reliability examined by psychometric analysis. To determine the sensitivity, specificity and cutoff point of the tool, the ROC curve used.
Results: Study 1 analyzed 250 Iranian elderly ≥60 years old. Results of analysis factor for construct analysis showed that the construct structure consisted of 4 factors (pain, ability of daily activities and quality of life, social relationships, mental-psychological). For the association between the GLFS-25 and European Quality of Life Scale-5 Dimensions (EQ-5D) and VAS, Pearson's correlation coefficient was 0.858 and -0.722, Respectively (P = 0.01). as for Internal consistency confirmed by Cronbach's α reliability coefficient of 0.932. the test-retest correlation coefficient was equal to 0.96. In study 2, 70 individuals analyzed and the best sensitivity and specificity for the cut point evaluated at point 16.
Conclusion: The Persian version of GLFS-25 offers as reliable and valid tool, for detecting locomotive syndrome in Iranian elderly population.

To Cite This Article: Nasim Sadeghi Mahali, Mohammad Ali Hosseini, Mehdi Rahgozar, Kian Norouzi Tabrizi*, (2017), "Evaluation of cultural adaptation, validity and reliability of the questionnaire of Geriatric Locomotive Function Scale - 25 questions", ***Pharmacophore, 8(6S),*** *e-1173929.*

Introduction

The world's elderly population will grow from 10.5% (in 2007) to 21.8% (in 2050). by 2050, more than 20 percent of the world's population is over 65 years old [1]. In Iran, it is estimated that by 2026, 10 years will be added to the middle age of the population and will reach 40.2 and by the year 2050 the aging population of Iran will be 5 times [2]. [2]. Demographic changes have a great impact on society. Growth the number of elderly people in the world will increase the number of people in need of long-term nursing care [3]. locomotive diseases are one of the most important factors in reducing the quality of life and

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disability in the elderly. Most of these diseases are related to the motor system (bones, joints, muscles, nervous system) [4]. Locomotive system diseases, such as Osteoarthritis, Rheumatoid arthritis, Osteoporosis, Lumbar and Cervical Spondylosis, knee pain, etc., can lead to limitation of activity in the elderly and consequently, loss of quality of life [5]. For the prevention of locomotive dysfunction, the Japanese Orthopedic Association (JOA) proposed in 2007 the concept of "Locomotive Syndrome" (LS) to describe the conditions under which the elderly become dependent on care, or are at high risk of becoming dependent in the future, due to problems in the locomotor system [3, 6-8]. Regarding the aging process in Iran and the high prevalence of diseases associated with the locomotive system and its relevance to increasing life expectancy along with health and Functional independence, the screening issue and identifying the elderly at risk as soon as possible, With the aim of early intervention, is significant. For the screening for LS, Japanese researchers also developed an evaluation tool: the "25-question Geriatric Locomotive Function Scale" (GLFS-25). The aim of this study was to determine the cultural adaptation and the psychometric characteristics of the GLFS25 instrument in Iranian society.

Materials and Methods

This is a methodologic study, taken from the master's thesis on Geriatric nursing, approved by the Ethics Committee of Tehran University of Social Welfare and Rehabilitation Sciences[1]. 320 elderly people aged 60 years and older participated in this study with Available sampling based on Inclusion and Exclusion criteria. All participants received informed consent and they were assured that the information would remain confidential. For the translation and cultural adaptation of the GLFS25, the standard method of translating and equivalent, the International Quality of Life Assessment model (Keller, 1998) was used. After translation, for Formal validity, the apparent features of the questionnaire considered. Rationality, suitable, attractive, logical sequence of questions, illustrative, and brief of questions evaluated by 10 samples from the target group. For Content validity, a committee composed of experts from different fields (Specialists from Nursing, Geriatric, Physiotherapy) scored items. Content Validity Index calculated for questionnaire. This instrument entered the next stage of psychometric verification. The Structural validity (factor analysis), concurrent criterion validity by Pearson correlation coefficient, and the Reliability of the tool was based on internal consistency, calculation of Cronbach's alpha coefficient and test and retest. In the second step, the researcher investigated the cut-off point for the screening tool.

Inclusion criteria:

1. Individual ≥ 60 years old of either sex
2. Individual who can check and answer questionnaires by themselves.
3. The satisfaction to participate in the research.
4. Life in Iran and Persian language ability.

Exclusion criteria:

1. Individuals who are unable to walk without assistance from another person.
2. Individual with brain disease or sever cardiovascular, pulmonary, or renal disease.
3. Individuals with mental illness.
4. Individuals with the history of fractures of the lower extremities and/or spine within the preceding 6 months.
5. Individuals who are receiving treatments for acute trauma.

For all of participants, demographic data (age, gender, marital status, education level, job status) obtained. Data on the history of chronic diseases, presence of chronic pain (for 6 months and more), the frequency of the fall in a past year, European quality of life questionnaire (EQ-5D), self-perceived health status (VAS) and last version of GLFS25-Farsi collected. Concurrent validity for GLFS25 and EQ-5D evaluated using Pearson′ s correlation coefficient. For reliability, Internal consistency and test-retest used for GLFS25 by Cronbach′ s α coefficient and correlation coefficient (interval 2 weeks).

To determine the cutoff point for screening tools, 70 participants examined by a specialist physician and reviewed by the medical records. Then the questionnaire completed by them. The cutoff score was calculated drawing ROC curve. Conventional receiver-operating characteristic curve (ROC) analysis used to re-confirm the cutoff value yielding the highest combined sensitivity and specificity with respect to distinguishing between two groups. The discriminative ability of the model assessed using the area under the ROC curve. In the final stage of the psychometric analysis of the GLFS25, the positive and negative predictive value, was calculated. SPSS version 23 used for all statistical analysis.

Result

320 individuals participated in this study. As result, data from 320 individuals (168 men, 82 women; mean age 69.7 ± 7.8, range 60-91) were included for analysis. About 30.8 % were in the 60-64 age group. 75% of all samples were married, 32.5% had average education level (diploma), 50.4 % retired, 76% had at least one chronic disease, 44.4% had chronic pain history for 6 months and more and 57.5% had a positive history of at least one fall in last year. Table 1 Structural validity of the questionnaire performed by factor analysis. After collecting the data, for first step the bartlett′s test and KMO[2] performed (KMO = 0.91). After performing the first step, the Component Matrix extracted from data and the output factors analyzed by

[1] Ethics Code= IR.USWR.REC.1396.46
[2] Kaiser-Mayer-Olkin Measure of Sampling Adequacy

expert and the research team. Based on the results of total variance, to explain the factor structure of the GIFS25, totally, 6 factors in seniors express 68.5% of the total variance of data. Because of the conceptual similarity and Proximity of load factor of the three functional groups, with the opinion of specialists and research team, Finally, 4 factors introduced. The first factor is the ability of daily activities and quality of life (questions 5-21), the second factor associated with pain (Questions 1 to 4), the third factor of social relationships (Questions 22 and 23), and the mental-psychological factor (questions 24 and 25), recognized.

As for the association between GLFS25 with EQ5D and VAS, Pearson′s correlation coefficient was (according the normal distribution of the test) 0.858 and -0.722, Respectively (P = 0.01). The results of study 1 showed a Cronbach′s α coefficient of 0.934, indicating a high degree of internal consistency. the test-retest correlation coefficient ranged from 0.596 to 0.961 for items and the total result was equal to 0.96. Table 2 this result demonstrated that the GLFS25 offered substantial test-retest reliability (P = 0.01).

According to ROC analysis, when GLFS25 ≥ 16, sensitivity was 0.886 and specificity was 0.846. the positive cutoff score for identifying elderly individuals with locomotive syndrome defined as 16, since the sum of sensitivity and specificity was highest at that cutoff point. The area under the ROC curve was 0.938, indicating good discriminatory power for this model. Based on this result, we propose using a cutoff score of 16, among the elderly Iranian. Table 3

After determining the sensitivity and specificity of the tools, the positive and negative predictive value of the tool was 0.98 and 0.81, respectively.

Discussion

Healthy locomotive organs are the foundation for disability free life expectancy in elderly. Lack of awareness can cause diseases associated with locomotive syndrome. These diseases can be accompanied by increased demand for nursing care. Preventing the loss of functioning of the locomotion system requires special attention from a public health aspect. GLFS25 was constructed in japan in 2011. The construction and psychometric Process of this instrument were published by the Japanese Orthopedic Association (JOA) in 2012. Despite the importance of the issue, the translation, validity, and reliability of GLFS25, yet, the process of translation, validity and reliability is carried out, only among Brazilian and Chinese elderly people.

To use any tool, we must first, investigated and analyzed its psychometric properties in the target population. In this study, we analyzed the Persian version of GLFS25 (GLFS25-persian), in the psychometric process. Thus, was easily understood b older people from different age groups and level of education. With the GLFS25-persian, we will be able to recognize the Iranian elderly at risk of locomotive syndrome.

To understand the importance dimensions of a multidimensional concept as locomotive syndrome, available statistical methods can be used to reveal the structural classes of questionnaire items. Factor analysis is one of the most important methods for verifying the tool structure. In the Factor Analysis method, the correlated variables are summed up in the form of a new variable with the name of the factor. Each factor represents common features that helps to grouping the variables. The instrument allows an essential analysis of the elderly, by of questions related to health and locomotion and grouped in: 1. ADLs and QOL (17 questions), 2. Pain (4 questions), 3. Social activities (2 questions), 4. Mental status (2 questions). The first domain, is the importance domain or a critical dimension of the instrument. Our study results at this stage are consistent with the results of Seichi et al (2012) and Tavares and Santos (2016), Ning et al (2016) [3, 4, 9]. Structural validity among the Japanese elderly shows that the GLFS25 has dimensions of: activities daily living, quality of life, pain, social activity and mental status. Seichi et al performed the analysis using the AIC statistics. As well as, the results of investigation into construct validity allowed them to manufacture quick 5-item version of the GLFS25. This GLFS5 can be applied as a rapid self-check tool for locomotive syndrome [3]. Similar results published by Tavares and Santos, classes include: daily care, difficulties related to the motion, pain, cognition, items associated with social activities [4].

New instrument should be evaluated relative to existing instruments with direct comparisons performed in the same population (criterion-related validity or concurrent validity). When no existing Gold standard is available, a less-established but related test can be used for comparison [3]. So, we used the EQ5D, for concurrent validity and the GLFS25 was seen to show good concurrent validity with its criterion. The results in previous studies confirm Our outcomes. Validity results and calculating the Spearman′s correlation coefficient in Seichi et al study, equal to 0.85 ($p < 0.001$) and in Ning et al equal to 0.854 ($p < 0.05$). Tavares and Santos used IADL and BADL for this aim. Their results showed according to the Pearson′s coefficient, regular and good correlations were obtained for the basic and instrumental activities of daily living, respectively ($p < 0.01$). Internal consistency was confirmed by Cronbach′s α (0.934). The results of this study are consistent with other studies. The Cronbach′s alpha value in previous studies, seichi et al (0.961), Tavares and Santos (0.942) and Ning et al for four factors (0.843). The correlation between the test-retest indicates that the instrument's reliability is high. Previous studies also show that this questionnaire has a high degree of time stability. In Japan, Brazil, and China, the results of the reliability by test-retest were 0.818, 0.97, and 0.852, respectively ($p < 0.05$). The results of the study, show that the GLFS25 has good reliability and reliability in the Iranian elderly. In the second part of the study, which was used to determine the cut-off point for screening the elderly in the risk of locomotive syndrome, the cut-off point for the Iranian elderly was estimated at 16. The results of the Seichi et al study in Japan confirmed this point. Another study to determine the cutting point of this tool was not found. Determining the predictive value of the study suggests that the probability that with positive test, the elderly is really at risk

for locomotive syndrome is 90%, and the probability that negative test, the elderly is not really at risk for locomotive syndrome is 81%. No was found similar study to compare the predictive value.

Conclusion

In conclusion, GLFS25 constitutes a tool with appropriate translation and cultural adaptation, and through the analysis of its psychometric properties. It was found that this instrument has proven reliable and valid for screening of locomotive syndrome in elderly individuals living in Iran.

Acknowledgments

Finally, we would like to thank the participants in the research, the professors of the University of Social Welfare and Rehabilitation Sciences of Tehran, the officials and staff of the Senior Citizens' Clubs of Tehran and Mazandaran, helped us to complete this study.

Table 1. Sample characterization

Variable	n	%	P value
Age (years) **Mean (CI:95) 69.7 (7.8)** **Min – Max: 60-91**			
60-64	77	30.8	P<0.05
65-69	61	24.4	
70-74	41	16.4	
75-79	37	14.8	
80-84	20	8	
85-89	12	4.8	
90-94	2	0.8	
Gender			
Male	168	67.2	P<0.05
Female	82	32.8	
Marital status			
Married	188	75.2	P<0.05
Single	9	3.6	
Widow/Separated	53	21.2	
Chronic disease			
Yes	190	76	P<0.05
No	60	24	
Chronic pain history			
Yes	112	44.8	P<0.05
No	138	55.2	
Fall history in past year			
Yes	144	57.6	P<0.05
1 time	76	30.4	
2times	38	15.2	
3times	30	27	
No	106	42.4	
GLFS-25 **Mean (CI:95) 21.7 (16.2)** **Min – Max: 0-80**	250		P = 0.01
EQ-5D **Mean (CI:95) 3.2 (2.3)** **Min – Max: 0 – 2**	120		P = 0.01
VAS **Mean (CI): 64.7 (20.2)** **Max – Min: 10-100**	120		P = 0.01

Table2. Reproducibility of each item and total

Item	Test-retest correlation coefficient	Total	N = 35, CI: 99

1	.957	.969	Normal Parameters [a,b] Mean: 23.1143 SD: 14.92 P = 0.01
2	0.961		
3	0.870		
4	0.763		
5	0.825		
6	0.795		
7	0.947		
8	0.929		
9	0.736		
10	0.671		
11	0.687		
12	0.921		
13	0.868		
14	0.596		
15	0.944		
16	0.949		
17	0.928		
18	0.732		
19	0.851		
20	0.898		
21	0.891		
22	0.868		
23	0.921		
24	0.862		
25	0.640		

Table 3. GLFS-25 cutoff score

Score	sensitivity	Specificity	1 - specificity
14	1	0.577	0.423
15	0.977	0.692	0.308
16	**0.886**	**0.846**	**0.154**
17	0.773	0.885	0.115
18	0.705	0.885	0.115
19	0.659	0.923	0.077

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