Evaluation of the Reliability of the Geriatric Oral Health Assessment Index (GOHAI) in Institutionalised Elderly in Romania: A Pilot Study

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Abstract

Purpose: The purpose of this study was to assess the preliminary psychometric properties of the Romanian version of the Geriatric Oral Health Assessment Index (GOHAI) in a sample of institutionalised elderly Romanian. ***Methods:*** The 12 items in GOHAI were translated into Romanian using a back-translation technique. A pilot study approved by the local ethics committee of the university assessed the comprehensibility of the Romanian (RO) version. Forty-five institutionalised elderly answered the questionnaire. A clinical examination with three calibrated dentists was then performed. Reliability was measured with Cronbach's alpha and test–retest analysis using statistical software. ***Results:*** The mean GOHAI-Ro item scores were higher for elderly people who perceived negative impact on the quality of life, especially for physical function. Lower GOHAI-Ro scores were associated with a positive impact on the quality of life, such as satisfaction with teeth. Cronbach's alpha greatest value (0.7123) was reached when only 11 items were used. One of the 12 GOHAI-RO items had a negative item-total correlation, -0.797, and three others had low values. Test–retest correlation, with a value of 0.6990 for intra-class correlation coefficient, indicated moderate stability. ***Conclusions:*** The preliminary analysis of the GOHAI-Ro demonstrated moderate reliability. Elimination of the negative and low score items may be indicated after a further, larger study.

Key Words: Elderly, Geriatric Oral Health Assessment Index, Quality of Life, Reliability, Romania

Introduction

The measurement of oral conditions that impact on quality of life is an important part of assessing oral health. The use of only clinical indicators for oral health status and treatment-needs evaluation is recognised to have serious limitations [1]. Health is no longer defined in terms of illness and disease and socio-dental indicators that assess physical, psychological, and social aspects of well-being must also be considered [2]. A variety of oral health-related quality of life instruments have been developed during the past 20 years. Frequently used questionnaires include the Oral Health Impact Profile (OHIP) [3], the Oral Impacts on Daily Performance (OIDP) [4], and the well-established Geriatric/General Oral Health Assessment Index (GOHAI) [5]. The use of these indicators represents one of the most detailed methods for the measurement of oral health impact on quality of life [6]. They have been used in many international cross-sectional and longitudinal studies, as well as in comparative studies in different countries, allowing valid comparisons of the concerns of the population about their oral health status, when evaluated both objectively and subjectively and based on standardised criteria [7].

The GOHAI [5] was developed by Atchinson and Dolan in 1990 and used in North America for elderly patients. Its internal consistency is satisfactory and its validity has been confirmed in Swedish [8], Malay [9], Arabic [10], and German [11] studies. However, there is no version in the Romanian language. Before introducing an index such as GOHAI, it is essential to carry out a rigorous translation and validation process of the instrument prior to using it in another population with a different culture.

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Aim

The aim of this pilot study was to assess the reliability of the Geriatric Oral Health Assessment Index (GOHAI) in a sample of institutionalised elderly Romanians.

Methods

The process of adapting the GOHAI index for elderly into Romanian version and evaluating its psychometric properties involved three main steps: translation of the English version into Romanian, a pilot study, and a main study for validity and reliability testing [12]. This paper is only concerned with the first two of these steps.

Translation

The GOHAI was translated into Romanian by two dentists who were fluent in both Romanian and English. The Romanian first version was then back-translated into English by another two dentists fluent in English and Romanian. The back-translated version was compared with the original version to verify that the questions had been properly translated.

The Geriatric Oral Health Assessment Index (GOHAI) consists of 12 questions that reflect those aspects considered to have an impact upon the quality of life of the older population, such as functional limitation, aesthetic dissatisfaction, chewing discomfort and avoidance of certain food, the avoidance of social contacts, and self-medication administered for dental pain.

Participants

The population sample was recruited from 216 institutionalised patients resident in the St Cuvioasa Parascheva Centre for Assistance and Nursing in Iasi, Romania. Patients with terminal illness and dementia were excluded. In the pilot study reported in this paper, data were collected from a convenience sample of 45 subjects, aged over 60 years, who attended the Centre's dental office for routine care and treatment. All participants received written information about the study and signed an informed consent form. The study was approved by the local ethics committee of the Grigore T. Popa University of Medicine and Pharmacy, Iasi, Romania. Oral status evaluation was conducted by three calibrated dentists using World Health Organization (1997) criteria [13]. The oral status examination involved the recording subject's *general data*—gender, general health status, age—and *clinical data*—denture status (denture wearer/not a denture wearer), crowns and fixed restorations,

type of denture worn, any incomplete prosthodontic treatment and denture need (no denture/s needed, fixed restoration/s needed, denture/s needed) *(Table 1)*.

Table 1. Overview of Respondents' Characteristics

	Variables	
	n	**%**
Gender		
Male	13	28.9
Female	32	71.1
General health status		
Cardiovascular disease	16	35.5
Diabetes mellitus	9	20.0
Neurological diseases	6	13.3
Other diseases	14	31.1
Age in years		
60-64	7	15.6
65-74	21	46.7
>75	17	37.8
Denture status		
No denture	8	17.8
Crown and fixed restoration	5	11.1
Denture worn	23	51.1
Incomplete prosthodontic treatment	9	20.0
Denture need		
No denture(s) needed	22	48.5
Fixed restoration(s) needed	2	4.4
Denture(s) needed	21	46.7

Data analysis

Data were analysed using statistical software (Statistical Package for Social Science [SPSS] version 14 for Windows; SPSS Inc, Chicago, USA). The internal consistency of the Romanian version of the GOHAI was assessed by standardised Cronbach's alpha, alpha if item deleted and item-total correlation coefficients [14,15]. To assess test–retest reliability, the group population repeated the GOHAI two weeks after the questionnaire was first administered. Test–retest reliability was measured using intra-class correlation coefficient.

Results

Linguistic translation

It was necessary to rephrase some items to make them more understandable. Question GOHAI 3 was changed from *Were you able to swallow comfortably?* to *Unable to swallow comfortably?* and ques-

tion GOHAI 5 from *Were you able to eat anything without feeling discomfort?* to *Have you any discomfort when you eat any kind of food?* The other ten questions were used in their original form.

Reliability of the GOHAI Index

Table 2 shows the participants' responses to the GOHAI-Ro items, and the values of mean GOHAI-Ro score and standard deviation. It also shows that the most serious problems were reported as follows:

- 55% of participants answered "always" for question GOHAI-Ro 2: trouble biting or chewing (mean=2.91, SD=1.49).
- 53.3% of participants answered "always" for GOHAI-Ro 1: limit the kinds of food (mean=2.89, SD=1.51).
- 42.2% of participants answered "always" for GOHAI-Ro 5: discomfort when eating any kind of food (mean=2.89, SD=1.30).

Social dimensions were much less affected. For GOHAI-Ro 11 (uncomfortable eating in front of others), only 11.1% answered "often" and 2.2% "always" (mean=0.89, SD=1.15). For GOHAI-Ro 10 (self-conscious of teeth, gums or dentures), only 4.4 % % of the subjects felt that this was "always" a problem (mean=1.44, SD=1.36). None of the participants answered "often" or "always" to GOHAI-Ro 3 (problems swallowing comfortably; mean=1.16, SD=1.35). Only 2.2% answered "always" and none "often" for GOHAI-Ro 8 (used medication to relieve pain; mean=0.64, SD=0.91) and for GOHAI-Ro 7, only 4.4% were never pleased with the look of their teeth (mean=0.42, SD=0.23).

Internal consistency was evaluated with Cronbach's alpha coefficient. The value was 0.6357, with the limits varying from 0.4751 to 0.7948, for the 95% confidence interval. Correlation between global score and items was tested to assess the internal consistency of the scale. The results are presented in *Table 3* and show that one of the items (GOHAI-Ro 12) correlated negatively with the global score, with coefficient of -0.0794, suggesting that this question did not provide useful information about what concerned those who took part in the study. If GOHAI-Ro 12 is eliminated, it increases Cronbach's alpha coefficient from 0.6357 to 0.7123. In fact, the column *"Cronbach's alpha if item deleted"* shows that elimination of the question GOHAI-Ro 12 leads to a higher Cronbach's alpha coefficient of 0.6873.

Table 3. *Reliability Analysis Using Cronbach's Alpha*

GOHAI-RO items	Corrected Item-total Correlation	Cronbach's alpha if item deleted
GOHAI 1	.6983	.5482
GOHAI 2	.7110	.5466
GOHAI 3	.0573	.6687
GOHAI 4	.4961	.6644
GOHAI 5	.7195	.5510
GOHAI 6	.1700	.6620
GOHAI 7	.0232	.6769
GOHAI 8	.1426	.6576
GOHAI 9	.2512	.6444
GOHAI 10	.2552	.6447
GOHAI 11	.3696	.6264
GOHAI 12	-.0794	.6873

Standardised Cronbach's alpha=0.6357

Table 2. *Item Responses (%) and GOHAI Scores*

GOHAI-Ro Items	1 Never	2 Seldom	3 Sometimes	4 Often	5 Always	Mean GOHAI score	SD
1.Limit the kinds of food	15.6	6.7	4.4	20	53.3	2.89	1.51
2.Trouble biting or chewing	12.5	5	7.5	20	55	2.91	1.49
3. Problems to swallow comfortably	64.4	24.4	11.1	0	0	0.47	0.69
4. Problems to speak clearly	46.7	17.8	17.8	8.9	8.9	1.16	1.35
5. Discomfort when eating any kind of food	8.9	8.9	8.9	31.1	42.2	2.89	1.30
6. Limit contact with people	42.5	45	7.5	2.5	2.5	0.89	0.94
7. Pleased with look of teeth	4.4	26.7	13.3	33.32	2.2	0.42	0.23
8. Used medication to relieve pain	57.8	24.2	15.6	0	2.4	0.64	0.91
9. Worried about teeth, gums or dentures	13.3	22.2	13.3	35.6	15.6	2.18	1.32
10. Self-conscious of teeth, gums or dentures	35.6	22.2	8.9	28.9	4.4	1.44	1.36
11. Uncomfortable eating in front of others	53.3	20	13.3	11.1	2.2	0.89	1.15
12. Sensitive to hot, cold or sweet foods	57.8	8.9	13.3	13.3	6.7	1.02	1.37

The test–retest correlation for the total GOHAI-Ro score with intra-class correlation coefficient (ICC) was found to be 0.6990 for the 95% confidence interval and ranged from 0.5561 to 0.8108.

Discussion

This pilot study was necessary because it provided important qualitative and quantitative data on the questionnaire's internal consistency, difficulties relating to interpretation at a cultural level, patients' understanding of the questions and their ability to answer them. At this stage, the first version of the questionnaire can be changed, some misunderstandings caused by the translation from English can be resolved, and questions can be reformulated. It is important that after the pre-test, the question's scale has sufficient internal consistency and validity so that it may be used for a representative population sample in the validation process [16,17].

Translation

When subjects answer a psychological questionnaire, some of the questions may create confusion or be incorrectly interpreted. For the GOHAI-Ro questionnaire, the initial answers to questions 3 *(Were you able to swallow comfortably?)* and 5 *(Were you able to eat anything without feeling discomfort?)* were evasive and of the "yes" or "no" type. For this reason, in order to facilitate understanding, it was considered necessary to rephrase the questions in a negative form, to make them easier to understand correctly during subsequent use.

Reliability of the GOHAI Index

Items were selected by Dolan *et al* (1990) [18] to reflect problems affecting old people in three dimensions:

1. Physical function, including eating, speech, and swallowing.
2. Psychological function, including worry or concern about oral health, dissatisfaction with appearance, self-consciousness about oral health, and avoidance of social contacts because of oral problems.
3. Pain or discomfort, including the use of medication to relieve pain or discomfort from the mouth [18].

The answers in *Table 2* suggest that some problems are more acutely perceived, especially those related to physical aspects, namely GOHAI-Ro 1, GOHAI-Ro 2, and GOHAI-Ro 5 (biting, eating, and chewing). This finding can be explained by the high number of totally edentulous subjects, some of whom were without dentures. It was underlined by the high values of Cronbach's alpha coefficient for GOHAI-Ro 1 (0.6983), GOHAI-Ro 2 (0.7110), and GOHAI-Ro 5 (0.7195), showing that these questions have sufficient internal consistency to be included in the questionnaire. This was not the case for the questions GOHAI-Ro 3 (0.0573), GOHAI-Ro 7 (0.0232), and GOHAI-Ro 12 (-0.0794). These values show that these questions made only a small contribution to the global score and suggest their irrelevance for use in the questionnaire. One explanation might be that the 45 subjects who filled in the questionnaire had few or no natural teeth and therefore little or no risk of dentine sensitivity to cold or heat (GOHAI-Ro 12) and were no longer really interested in the appearance of their teeth (GOHAI-Ro 7).

Statistical analysis of the scale showed that this form of the questionnaire led to a Cronbach's alpha coefficient of only 0.6357, which is low compared with the minimum required of 0.7 for the 12 items to be accepted [19]. The value could be increased by eliminating negative items, such as question GOHAI-Ro 12 where Cronbach's alpha is -0.0794.

Therefore, the next step in the internal consistency analysis was to make another statistical analysis but with the elimination of this item, which increased the final value to 0.7123. Analysis of the column *"Cronbach's alpha if item deleted"* showed that eliminating question GOHAI-Ro 12 would lead to an even higher Cronbach's alpha coefficient of 0.6875, compared with the initial value of 0.6357.

Thus, preliminary analysis of the questionnaire items suggests that it should include 11 questions only, because the last one was not relevant for the population studied. The study performed by the authors of the GOHAI questionnaire for its validation included 680 elderly subjects aged over 60 years, of whom 609 were dentate and 71 were edentulous [5], which explains the relevance of question GOHAI 12 for a largely dentate elderly population.

In the current pilot study, the statistical analysis showed that question GOHAI-Ro 12 has a negative value that, technically speaking, should require its elimination. However, some aspects should be considered before taking this step. First, this pilot study included small numbers of subjects, who were not representative of the entire sample. Secondly, the item GOHAI-Ro 12 *sensitive to hot, cold or sweet foods* could be relevant if many of

those assessed were not totally edentulous, unlike those included in the pilot study. The final decision regarding eliminating this question could be made only after the study was finished.

GOHAI-Ro 3 (ability to swallow comfortably) was another question with a low Cronbach's alpha coefficient. The percentage of subjects reporting such problems was small, and is explained by the fact that edentulousness does not necessarily imply an inability to swallow comfortably. A similar situation was seen when validating the questionnaire in the French language: question 3 had a low value of the Cronbach's alpha coefficient [20].

The accepted minimum value of the inter-item correlation is 0.2 [17], which was not found for GOHAI-Ro 3, 6, 7 and 8, suggesting that these were not relevant for the group that was studied in this pilot. However, the situation may change if all the residents at St. Cuvioasa Parascheva are clinically examined and interviewed.

Conclusions

- The original 12 items in the Romanian version of the GOHAI questionnaire had a moderate consistency of only 0.6357.
- Internal consistency was increased if question 12 was eliminated, and then reached a minimum acceptable level of 0.7123.
- Inter-item correlation analysis gave values lower than the minimum accepted level of 0.2 for questions GOHAI-Ro 3, 6, 8 and 12.
- The value of the test–retest correlation was 0.6990, indicating a moderate stability for 12 items.
- Preliminary analysis of the GOHAI-Ro showed moderate reliability, but elimination of negative and low score items will only be possible after the main study.
- The proposed main study for GOHAI-Ro can now take place, informed by the results of this pilot.

References

1. Locker D. Concepts of oral health, disease and the quality of life. In: Slade G, editor. *Measuring Oral Health and Quality of Life.* Proceedings of the 4th Conference of the Californian Dental Association; 1996 Feb 3; Los Angeles, USA. Chapel Hill: University of North Carolina; 1997: pp. 11-24.

2. Inglehart MR, Bagramian RA. *Oral Health-Related Quality of Life*. Hanover Park, IL: Quintessence; 2002.

3. Slade GD, Spencer AJ. Development and evaluation of the oral health impact profile. *Community Dental Health* 1994; **11**: 3-11.

4. Adulyanon S, Sheiham A. Oral impacts on daily performances. In: Slade G, editor. *Measuring Oral Health and Quality of Life.* Proceedings of the 4th Conference of the Californian Dental Association; 1996 Feb 3; Los Angeles, USA. Chapel Hill: University of North Carolina; 1997: pp. 151-160.

5. Atchinson KA, Dolan TA. Development of the Geriatric Oral Health Assessment Index. *Journal of Dental Education* 1990; **54**: 680-686.

6. Atchinson KA, Der-Martirosian C, Gift HC. Components of self-reported oral health and general health in racial and ethnic groups. *Journal of Public Health Dentistry* 2002; **62**:78-83.

7. McGrath C, Bedi R, Gilthorpe MS. Oral health related quality of life: Views of the public in the United Kingdom. Community Dental Health 2000; **17**: 3-7.

8. Hagglin C, Berggren U, Lundgren J. A Swedish version of the GOHAI index. Psychometric properties and validation. *Swedish Dental Journal* 2005; **29**(3): 113-124.

9. Wan-Nasir WO, Kharizaeh AM, Rugayadr B. Validation of the Geriatric Oral Health Assessment Index in the Malay Language*, Journal of Public Health Dentistry* 2006; **66**: 199-203.

10. Shaker D, Zousef SK. Translation and validation of the Arabic version of the Geriatric Oral Health Assessment Index. *Journal of Oral Science* 2008; **50;** 453-459.

11. Hassel AJ, Rolko C, Koke U. A German version of the GOHAI. *Community Dentistry and Oral Epidemiology* 2008; **36**: 34-42.

12. Guillemin F, Bombardier C, Beaton D. Cross-cultural adaptation of the health-related quality of life measures: literature review and proposed guidelines. *Journal of Clinical Epidemiology* 1993; **46**: 1417-1432.

13. World Health Organization. *Oral Health Surveys: Basic Methods*. 4th ed. Geneva, Switzerland: WHO; 1997.

14. Cronbach L. Coefficient alpha and the internal structure of tests. *Psychometrika* 1951; **16**: 297-334.

15. Petrie A, Bulman JS, Osborn JF. Further statistics in dentistry. *British Dental Journal* 2002; **7**: 377-380.

16. Landrivon G, Delahaye F. [*Clinical Research, From Idea to Publication*.] Iasi, Romania: Dan; 2002; 169-179. [Publication in Romanian]

17. Albu M. [*The Construct of Psychological Tests*.] Bucharest: Clusium; 1998. [Publication in Romanian]

18. Dolan, TA, Crum P, Atchinson KA. Perceived oral health and utilization in an aged (75+) population. *Journal of Dental Research* 1990; **69**; 266(abstract 1261).

19. Clive J. Biostatistical consultation for dental research. *Dental Clinics of North America* 2006; **46**: 137-155.

20. Tubert-Jeannin S, Riordan PJ, Morel-Papemont A, Porcheray S, Saby-Collet S. Validation of on oral health quality of life index (GOHAI) in France. *Community Dentistry and Oral Epidemiology* 2003; **31**: 275-283.