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ORIGINAL RESEARCH

Behavior of the Geriatric/General Oral Health Assessment Index (GOHAI) and Oral Impacts on Daily Performances (OIDP) in a senior adult population in Mexico City

Comportamiento del Geriatric/General Oral Health Assessment Index *(GOHAI) y* Oral Impacts on Daily Performances *(OIDP) en una población de adultos mayores de la Ciudad de México*

Christopher Montes-Cruz,* Teresa Juárez-Cedillo,§ Ángel Cárdenas-Bahena,§ Claudia Rabay-Gánem,‖ Erika Heredia-Ponce,¶ Carmen García-Peña,§ Sergio Sánchez-García.§,¶

ABSTRACT

Objective: To determine the behavior of the Geriatric/General Oral Health Assessment Index as well as the Oral Impacts on Daily Performances as effective measures in oral-dental health related to quality of life in senior citizens in a given population. **Methods:** A representative sample of senior citizens entitled to medical services at the Instituto Mexicano del Seguro Social (Mexican Institute of Social Security) located in the southwest region of Mexico City. Home interviews were conducted in order to ascertain the sample's characteristics as well as the application of the Geriatric/General Oral Health Assessment Index and Oral Impacts on Daily Performances instruments. Clinical evaluation in order to determine experience of crown caries (CPO-D) and root caries CO-R). **Results:** A total of 531 subjects aged 60 years and over participated in the study, of which 68.4% were female. Age average (AA) was 71.4 years (7.0). Geriatric/General Oral Health Assessment Index exhibited a mean of 46.8 (6.2) and Oral Impacts on Daily Performances showed 4.1 (12.4). Subjects included in the sample had attended school for over 6 years, did not present limitations of cognitive deterioration, and were depression-free, exhibited a higher mean in Oral Impacts on Daily Performances score than those which did not present those characteristics ($p < 0.05$). Six or more years of schooling with paid work and depression-free subjects presented lesser Oral Impacts on Daily Performances scores when compared to those who did not. ($p < 0.05$) A correlation was found between the Geriatric/General Oral Health Assessment Index and filled components, functional teeth ($p > 0.05$). Filled and lost components and CPO-D index as well as healthy crowns and functional teeth exhibited a correlation

RESUMEN

Objetivo: Determinar el comportamiento del *Geriatric/General Oral Health Assessment Index* y *Oral Impacts on Daily Performances* como medidas de efecto de la salud bucodental relacionada con la calidad de vida en adultos mayores en una misma población. **Métodos:** Muestra representativa de adultos mayores derechohabientes del Instituto Mexicano del Seguro Social del suroeste de la Ciudad de México. Se realizaron entrevistas domiciliarias para conocer las características de la muestra y aplicación de los instrumentos *Geriatric/General Oral Health Assessment Index* y *Oral Impacts on Daily Performances.* Evaluación clínica para determinar la experiencia de caries coronal y caries radicular. **Resultados:** Un total de 531 sujetos de 60 años y más participaron, 68.4% mujeres. La media (desviación estándar) de edad fue de 71.4 (7.0) años. El *Geriatric/General Oral Health Assessment Index* presentó una media de 46.8 (6.2), y 4.1 (12.4) para el *Oral Impacts on Daily Performances*. La escolaridad mayor de seis años, no presentar limitaciones, con deterioro cognitivo y sin depresión, presentaron una media mayor del puntaje del *Geriatric/General Oral Health Assessment Index* en comparación con los que no presentaban ($p < 0.05$). La escolaridad mayor de seis años, con una actividad laboral remunerada y sin depresión, presentaron una media menor del puntaje del *Oral Impacts on Daily Performances* en comparación a los que no presentaban ($p < 0.05$). Existe una correlación entre el *Geriatric/General Oral Health Assessment Index* y componentes obturados, dientes funcionales ($p < 0.05$). Los componentes perdidos, obturados e índice caries coronal, así como coronas sanas y dientes funcionales presentaron una correlación con el *Oral Impacts on Daily Perfor-*

* Graduate, Public Health Specialty, Graduate and Research School, National School of Dentistry, National University of Mexico (UNAM).
§ Epidemiologic Research and Health Services, Aging Area, Centro Médico Nacional Siglo XXI (Siglo XXI National Medical Center) National Institute of Social Security, Mexico City.
‖ School of Dentistry, Latin-American University, Morelos Campus, Mexico.
¶ Oral Epidemiology and Public Health Department, National School of Dentistry, National University of Mexico (UNAM).

with Oral Impacts on Daily Performances ($p < 0.05$). **Conclusion:** Geriatric/General Oral Health Assessment Index exhibited higher discrimination in the population's characteristics whereas Oral Impacts on Daily Performances showed higher correlation with the state of the dentition.

mances ($p < 0.05$). **Conclusión:** El *Geriatric/General Oral Health Assessment Index* tuvo mayor discriminación en las características de la población y el *Oral Impacts on Daily Performances* presentó mayor correlación con el estado de la dentición.

Key words: Senior citizens, Oral-dental health related to Quality of life (ODHQL). Geriatric/General Oral Health Assessment Index (GOHAI), Oral Impacts on Daily Performances (OIDP).
Palabras clave: Adultos mayores, salud bucodental relacionada con la calidad de vida, *Geriatric/General Oral Health Assessment Index*, *Oral Impacts On Daily Performances*.

INTRODUCTION

Current concepts on health suggest that oral-dental health must be defined as physical, psychological and social welfare with respect to dentition as well as soft and hard tissues in the mouth.[1-3] One of the contributions of Dentistry is to improve or preserve the population's quality of life, since most oral-dental diseases and their consequences bear impact on the quality of life.[4]

Traditionally, methods used to assess oral and dental health are limited to measurement of clinical indicators and oral-dental indexes, as well as to presence or absence of disease. These methods do not provide information on the perception people can possess on the state of their oral-dental health, as well as the impact oral-dental health can have on their quality of life.[3]

The relationship between oral-dental health and quality of life (OHRQL) has been frequently used as a multi-dimensional concept which specifically self-reports all matters related to oral-dental health encompassing the functional, social and psychological impact that oral-dental diseases exert on a given subject. For example, a disease or a specific disorder (caries) gives rise to a deficiency (loss of teeth) and this, in turn will cause a disability (masticatory deficiency). These factors will determine a handicap in the subject, which in turn will affect his daily activities.[5]

On the other hand, during the last three decades, there has been an increase in the use of measuring OHRQL as an essential component in oral-dental health surveys, clinical essays and other studies geared at assessing results in preventive and therapeutic programs targeting improvement of oral-dental health. In view of this renewed interest, several researchers have developed different instruments in order to measure the social, psychological and functional impact as a result of oral-dental disorders[6]. These instruments are characterized by considerable variation in the precision of their objectives, number of items, technical data with respect to presence or absence of sub-scales, method of administration, response options, incorporation or lack of weight, and presence or absence of disposition in the final punctuation.[7]

Some of the aforementioned instruments are the Geriatric/General Oral Health Assessment Index (GOHAI) and the Oral Impacts on Daily Performances (OIDP). These instruments have shown to possess psychometric properties which are acceptable in senior citizen populations.[3,5]

GOHAI, described by Atchison and Dolan in 1990,[8] was based on three suppositions: 1) oral-dental health can be measured through self-evaluation, 2) levels of oral-dental health vary among subjects, and this variation can be evidenced through the use of measurements based on the subject's self-perception, and 3) self-perception has been identified as an oral-dental health predictive tool. GOHAI consists on a 12 item questionnaire with Likert-type responses which evaluates problems related to oral and dental health in the last three months. Currently there are GOHAI versions for Spain, China, France, Sweden, Malaysia, Japan, Germany, Turkey Jordan and, more recently, Mexico.[5,9-17]

OIDP was first described by Adulyanon in 1996.[18] It is theoretically based upon Locker's interpretation[19] for Dentistry of the International Classification of Deficiencies, Disabilities and Handicaps (ICDDH)[20] of the World Health Organization (WHO) on the final impacts on oral health deterioration related to quality of life. OIDP is composed of eight items. Each item assesses the frequency and severity of problems encountered with teeth or dentures in the last six months, and how these problems impacted on the development of daily activities. Currently there are OIDP versions for Greece, Thailand, Tanzania, Uganda, Brazil, Norway, Myanmar, France, Mexico Japan, Korea, Sweden, China, South Africa and Spain.[3,18,21-33]

Nevertheless, the behavior of these two instruments as effective measurements of oral-dental health related to quality of life of senior citizens in one location is still

unknown. In view of the aforementioned, our study purported the objective of determining the behavior of the Geriatric/General Oral Health Assessment Index (GOHAI-Sp) and Oral Impacts on Daily Performances (OIDP-Sp), both in their Spanish version, as measures of the effect of oral-dental health related to the quality of life in senior citizens of a given population.

MATERIALS AND METHODS

A cross-sectional study was conducted on subjects who were 60 years old and over. Subjects resided in the southwest area of Mexico City and enjoyed the benefits of services at the Familial Medicine Unit, number 28 of the Instituto Mexicano del Seguro Social (Mexican Institute of Social Security) IMSS. This institute provides health care to affiliated workers and their dependants. Participants belonged to a population-based cohort which was integrated in order to assess risk factors for root caries (Sanchez-Garcia S, Reyes Morales H, Juarez Cedillo T, Espinel-Bermudez C, Solorzano-Santos F, García-Peña C. A prediction model for root caries in an elderly population. *Community Dentistry and Oral Epidemiology*. 2011; 39 (1): 44-52).

The minimum sample size appropriate for the present study was calculated according to the following suppositions: effect frequency of oral-dental health related to quality of life in senior citizens over 21.5%[3], level of confidence 95%±5.0%). The result was a minimum of 260 subjects. The study was conducted from January through April, 2005. Participating subjects granted informed consent. Clinical evaluations and home visits were conducted for all participants. The interview gathered information on gender, age, marital status, education level, paid work activity, limitations in basic daily life activities (BDLA), pertaining to self-care and mobility, as well as instrumental activities of daily life (IADL), which are activities undertaken in order to interact with our immediate environment, self-perception on general and oral-dental health, chronic diseases (conditions), cognitive deterioration, depression, polypharmacy, use of oral-dental health services in the last year, as well as GOHAI and OIDP instruments.

The GOHAI Spanish version validated for geriatric Mexican population was used.[5] This version was composed of 12 items (two positive items and ten negative ones) with Likert-type responses. Values went from 1 to 5: always (1), frequently (2), sometimes (3), rarely (4), never (5). Items 3 and 4 possess inverse value with respect to the other items. This conversion was performed at the moment the analysis was conducted, in order to assess problems related to oral-dental health in the last three months. Items 1, 2, 3 and 4 assess the physical function which bears impact on the functions related to eating, speaking, and swallowing. Items 6,7,9,10 and 11 assess the psychosocial function, including concern for oral-dental health, dissatisfaction with physical appearance, self awareness with respect to oral-dental health and difficulties to establish social contact due to dental and oral problems. Items 5, 8 and 12 assess pain and discomfort, including use of drugs to relieve pain in the oral-dental cavity.

GOHAI is built through the simple summation of the answers of each subject. The rank is 12 to 60 points; the highest value indicates the best perception of oral-dental health.

OIDP was used in the Spanish language version, which was validated for Mexican geriatric population.[3] It was composed of eight items. Each of these items was assessed according to whether in the last six months there were problems with teeth or dentures which might have caused difficulties in the performance of daily activities such as 1) eating and enjoying food, 2) correct speech and pronunciation, 3)teeth cleansing, 4) sleep and relaxation, 5) smiling and laughing showing teeth without embarrassment, 6) preservation of emotional status, without irritations, 7) normally perform work or social role activities, 8) enjoy contacting people. In order to assess frequency, the instrument considered six response options: «never affected» (0 points), «less than once a month» (1 point), «once or twice a month» (2 points) «once or twice a week» (3 points) « 3 to 4 times a week» (4 points) «nearly every day» (5 points). Severity was classified according to the following: «not at all» (0 points), «very little» (1 point), «little» (2 points), «moderate» (points) «severe» (4 points), «very severe» (five points).

OIDP was built with the product of multiplying obtained frequency scores by gravity scores in all eight items, by 100 over 200, eliciting thus a 0 to 100 range. The lower value indicated best self-perception of oral-dental health.

It must be noted that GOHAI and OIDP were applied separately; that is to say that each instrument was applied at different times during the interview. This was done in order to avoid the impression of repetitive questions which in turn could affect the responses.

Katz's et al instrument[34] as well as Lawton and Brody instrument[35] were used in order to determine the presence of limitations in basic daily life activities (BDLA) and instrumental daily life activities (IDLA), respectively.

The Spanish version of the MMSE instrument (mini-mental state), validated for the Mexican population,[36] was used to determine presence of cognitive deterioration. The instrument GDS-10 was used (Geriatric Depression Scale with 10 items). The Yesavage[37] abbreviated version, translated to Spanish and validated for the Mexican population, was used in order to determine presence of clinically significant symptoms of depression.

In order to assess self-perception of general and oral-dental health, it was asked to the elderly subjects how they considered their general and oral dental health. To this end, they counted with four response options (excellent, good, medium and bad).

A clinical evaluation was undertaken in order to determine crown caries (CPO-D) and root caries (CO-R) experience. The number of healthy crowns present as well as functional teeth was equally determined. A tooth was deemed functional when it could suitably perform masticatory, phonetic, esthetic and facial expression functions. The tooth could exhibit a restoration in some or all surfaces, but nevertheless be able to perform the aforementioned functions.

Three dentists conducted the clinical assessment. These professionals had previously been exposed to a training and standardization process (Kappa $\geq$ 0.85 inter and intra-examiner) in accordance with criteria recommended by the World Health Organization.[38]

Evaluation was conducted with the patient sitting on a chair (in some instances, in a wheelchair), under natural light, using a Number 5 mirror and probe type WHO (PCP 11.5B, Hu-Friedy, Chicago/Illinois). In those cases when subjects wore removable prostheses, the appliance was removed before undertaking the clinical examination.

The original research protocol was reviewed and approved by the IMSS Health Research Committee of the number 3 Delegation (Mexico City, Southwest), Registration number 2002-721-0013)

Data analysis

A descriptive analysis was conducted, and mean (SD = standard deviation) of GOHAI and OIDP scores were obtained for the following variables: gender, age, marital status, academic level, paid work activities, limitations in basic daily life activities (BDLA) and limitations in instrumental daily life activities (IDLA), self-perception of general and oral-dental health, chronic conditions, cognitive deterioration, depression, polypharmacy, use of oral-dental health facilities in the last year, as well as GOHAI and OIDP instruments. In order to compare both means, the Mann-Whitney test for independent samples was used. Pearson correlation coefficient was obtained among components gathered from the clinical evaluation of CPO-D and CO-R indexes, healthy crowns, as well as the number of functional teeth with GOHAI and OIDP scores. Working confidence level was 95%. The analysis was conducted using the statistical package SPSS version 15 for Windows.

RESULTS

531 senior citizens formed the sample. Mean age (SD) was 71.4 (7.9) years. Female subjects were 68.4% (n = 363), male subjects 31.6% (n = 168). Mean ages were 71.2 (6.9) and 72.0 (7.1), respectively.

Figure 1 presents frequency and distribution of GOHAI scores. It can be observed that the minimum score was 21 points. The highest score for frequency was 48 points with 13.4% (n = 71). In *figure 2* it can be observed that the minimum score for OIDP was zero points with a 76.6% frequency (n = 407).

GOHAI score mean (SD) was 46.8 (6.2), and 4.1 (12.4) was the score for OIDP. *Table I* describes frequency and distribution of socio-demographic characteristics, limitation in basic daily life activities (BDLA) and instrumental daily life activities (IDLA), self perception of general and oral-dental health, chronic conditions, cognitive deterioration, depression, polypharmacy, use of oral-dental health services in the last year, as well as the mean (SD) of OIDP and GOHAI scores for all the characteristics previously mentioned.

We can observe that senior citizens who had attended school for over six years and did not present limitations in the IDLA, presence of cognitive deterioration, absence of clinically significant signs of depression presented a higher mean GOHAI score when compared to patients who did not exhibit these characteristics. A statistically significant difference was found among means ($p < 0.05$).

It could further be observed that senior citizens who had attended school more than six years, had paid work activities, and did not present clinically significant signs of depression, exhibited a OIDP score mean lower than that of subjects who did not present these characteristics. A statistically significant difference among means was observed ($p < 0.05$).

Table II presents clinical evaluation results, as well as mean (SD) of CPO-D and CO-R indexes and components, healthy crowns, number of functional teeth, as well as correlation coefficient of GOHAI and OIDP score with the aforementioned.

It can be observed there is a statistically significant correlation coefficient between GOHAI and filled

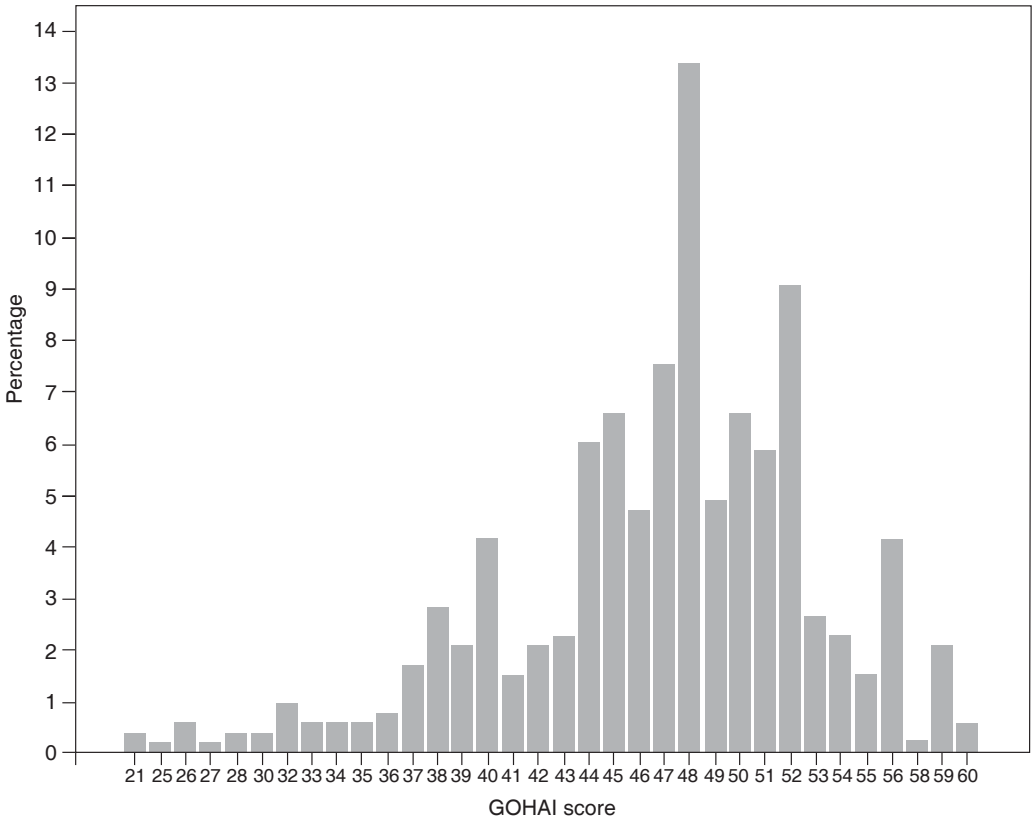

Figure 1.

GOHAI frequency and distribution in a sample of Mexican senior citizens

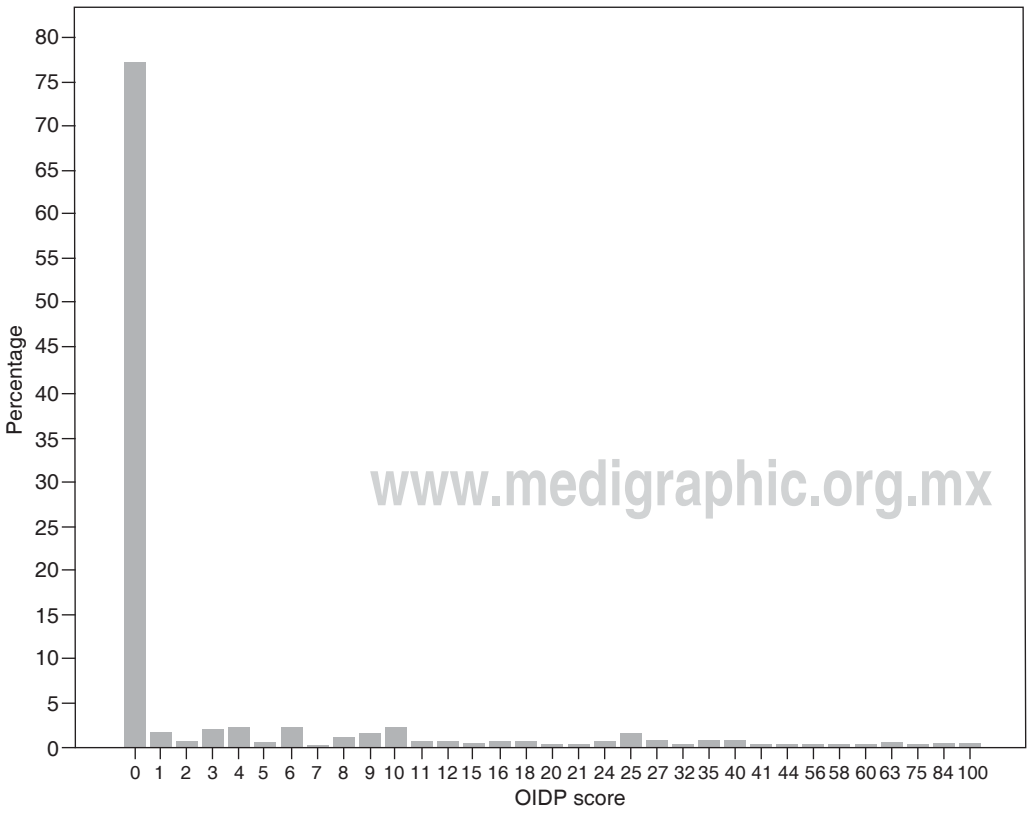

Figure 2.

OIDP frequency and distribution in a sample of Mexican senior citizens.

components. This was also the case for crown-functional teeth ($p < 0.05$). A statistically significant correlation coefficient in decayed, lost or CPO-D, as well as healthy teeth crowns ($p > 0.05$) was not presented.

Lost, filled and CPO-D index components, as well as healthy crowns and functional teeth presented a statistically significant correlation coefficient with OIDP ($p < 0.05$). A statistically significant correlation coefficient was not present for caries component (p

Table I. Mean (SD) of GOHAI and OIDP scores according to characteristics of a senior citizen population sample in Mexico City (n = 531).

Variables	n	%	GOHAI Mean (SD)	Mann-Whitney Test	OIDP Mean (SD)	Mann-Whitney Test
Gender						
Female	363	68.4	46.6 (6.5)	p = 0.501	4.5 (13.0)	p = 0.150
Male	168	31.6	47.2 (5.7)		3.1 (11.0)	
Age						
60-74 years	356	67.0	46.6 (6.2)	p = 0.135	4.7 (13.4)	p = 0.071
75 years and over	175	33.0	47.2 (6.4)		2.7 (10.0)	
Marital status						
Married	259	48.8	47.5 (5.1)	p = 0.088	3.4 (10.0)	p = 0.751
Single/widower/divorced	272	51.2	46.2 (7.1)		4.7 (14.3)	
Schooling						
> 6	300	56.5	47.6 (5.8)	p = 0.001	2.3 (7.2)	p < 0.001
≤ 6	231	43.5	45.8 (6.6)		6.4 (16.6)	
Paid work activity						
Yes	321	60.5	46.9 (6.7)	p = 0.185	3.1 (10.0)	p = 0.024
No	210	39.5	46.6 (5.5)		5.6 (15.2)	
BDLA limitations						
Yes	27	5.1	45.0 (6.7)	p = 0.166	3.2 (6.6)	p = 0.294
No	504	94.9	46.9 (6.2)		4.1 (12.6)	
IDLA Limitations						
Yes	47	8.9	43.7 (7.3)	p = 0.003	6.1 (16.2)	p = 0.064
No	484	91.1	47.1 (6.0)		3.9 (12.0)	
Self-perception of general health						
Excellent/good	407	76.6	47.0 (6.1)	p = 0.312	3.3 (10.3)	p = 0.207
Average/bad	124	23.4	46.2 (6.6)		6.4 (17.4)	
Self-perception of oral health						
Excellent/good	158	29.8	47.3 (5.5)	p = 0.588	2.9 (9.2)	p = 0.210
Average/bad	373	70.2	46.6 (6.5)		4.5 (13.5)	
Chronic illness						
≤ 3	98	18.5	45.5 (7.3)	p = 0.056	4.4 (11.7)	p = 0.290
> 3	433	81.5	47.1 (5.9)		4.0 (12.6)	
Cognitive deterioration						
Yes	136	25.6	47.8 (4.8)	p = 0.043	2.3 (7.4)	p = 0.077
No	395	74.4	46.5 (6.6)		4.7 (13.6)	
Depression						
Yes	206	38.8	45.9 (6.9)	p = 0.010	6.8 (16.3)	p < 0.001
No	325	61.2	47.4 (5.7)		2.3 (8.7)	
Polypharmacy						
≤ 4	49	9.2	46.6 (6.1)	p = 0.953	5.0 (15.0)	p = 0.521
> 4	482	90.8	46.8 (6.2)		4.0 (12.1)	
Use of oral health services in the last year						
Yes	288	54.2	47.0 (6.0)	p = 0.375	3.0 (11.0)	p = 0.069
No	243	45.8	46.6 (6.5)		5.3 (13.8)	

GOHAI = Geriatric/General Oral Health Assessment Index
OIDP = Oral Impacts on Daily Performances

> 0.05). In a similar manner a statistically significant correlation coefficient was not found among components and CO-R index (p > 0.05).

DISCUSSION

Our results suggest that GOHAI and OIDP are two instruments which behave in a similar manner when used as measurements of oral-dental health effect when related to quality of life in senior citizens. Nevertheless, GOHAI exhibited greater discrimination in the population characteristics under study, whereas OIDP presented greater correlation coefficient with the state of dentition.

It has been concluded that no single OHRQL instrument is better than the others, and that these cannot be considered a gold standard.[7] In our case, we are aware that GOHAI and GOIDP are based upon different theories, as well as the time in which the oral-dental related health problems are assessed are different: three and six months, respectively. In a similar fashion, GOHAI evaluation is presented in frequency, and OIDP evaluation is presented in frequency and severity. We must also consider that the building of the final score is achieved in different manners: since GOHAI is a summation of values obtained in its 12 items, and OIDP is achieved from a product of a multiplication by 100 over 200 of the frequency score by the seriousness score of each of the eight items.

GOHAI is interpreted in the following manner: the highest value indicated better self-perception of oral-dental health (range 12-60). This is not the case for OIDP, since this is inversely interpreted: that is to say, the lowest value indicated the best oral-dental health self-perception (range 0-100).

Results obtained in the present study indicated that GOHAI and OIDP could exhibit discrimination in schooling; that is to say, when subjects exhibited schooling over six years, they obtained higher GOHAI scores, and lower OIDP scores. This has been previously described.[3,11] It was the same with depression: senior citizens without clinically significant depression symptoms showed higher GOHAI scores and lower OIDP scores. This measurement was statistically significant with both instruments. Senior citizens who did not present IDLA or cognitive deterioration limitations presented higher GOHAI scores and lower OIDP scores. This was only statistically significant in GOHAI; OIDP score was lower for senior citizens with paid work, this represented statistically significant data, which was not the case for GOHAI.

It is possible that the presence of cognitive deterioration prevents participants to acknowledge oral-dental health problems when compared to clinically significant symptoms of depression, since this appears to exaggerate a negative perception of oral-dental health.[5]

On the other hand, state of dentition represents a serious oral-dental health problem of the senior citizens who composed our sample. This is consistent with other information reported in scientific literature.[39] Tooth loss is the final consequence of dental caries. This purports serious implications in the general health and quality of life of senior citizens.[40]

Table II. Correlation of GOHAI and OIDP with state of dentition in a sample of senior citizens in Mexico City.

		Pearson correlation coefficient			
	Mean (SD)	GOHAI		OIDP	
Crown		**r**	**p**	**r**	**p**
Caries	2.4 (3.1)	-0.047	0.284	0.024	0.585
Lost	11.8 (7.5)	-0.064	0.145	0.106	0.014
Filled	2.7 (3.1)	0.087	0.044	-0.098	0.025
CPO-D	17.0 (5.9)	-0.060	0.171	0.097	0.026
Healthy	8.8 (5.5)	0.042	0.334	-0.076	0.079
Functional teeth	13.4 (7.0)	0.092	0.034	-0.138	0.001
Root					
Caries	1.8 (4.5)	0.003	0.953	0.072	0.097
Filled	0.1 (0.6)	0.034	0.434	0.027	0.537
CO-R	2.0 (4.5)	0.007	0.866	0.075	0.084

GOHAI = Geriatric/General Oral Health Assessment Index
OIDP = Oral Impacts on Daily Performances

It can be observed that there is a statistically significant correlation coefficient between GOHAI and filled components, as well as with solely functional teeth. Nevertheless, lost, filled and CPO-D index components, as well as healthy crowns and functional teeth presented a statistically significant correlation coefficient with OIDP. This fact suggests that OIDP is more susceptible to correlate with the state of dentition, although this correlation level might be very low.

Available measurements for oral dental health, such as SBRCV approach, are not sufficiently useful to provide data on the oral-dental health status of a subject, in order to help in deciding to allot resources to the improvement of oral dental health of this population. Nevertheless, they can give an idea of how they affect habitual activities of subjects or population. Therefore, they must be taken into account when making decisions as well as to improve or preserve quality of life in senior citizens population.[3]

Our study did not include subjects with total loss of natural teeth; this could increase the negative impact of OHRQL. If these were to be included in the study, as was the case of the study conducted on senior citizens in Canada, conclusions could be that there is a positive impact in SBRCV in subjects who preserve full dentition when compared to those who did not conserve any natural tooth.[41]

Further studies are necessary in order to corroborate our results and ascertain how both instruments behave in clinical tests and other result evaluation studied in preventive and therapeutic programs destined to improve oral-dental health in senior citizens. We can finally conclude that GOHAI exhibited greater discrimination in the characteristics of the population under study, and OIDP presented greater correlation coefficient with the state of the dentition.

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Mailing address:
Dr. Sergio Sánchez García
E-mail: sergio.sanchezga@imss.gob.mx