

Validation of the oral impact on daily performance frequency scale in Ibadan, Nigeria

FB Lawal, JO Taiwo and MO Arowojolu

Department of Periodontology and Community Dentistry, College of Medicine, University of Ibadan and University College Hospital, Ibadan, Nigeria

Abstract

Background: Oral health related quality of life measures provide alternative ways to evaluate oral health status in a way that prioritises impact on lifestyle. These measures are, however, hardly used in our setting. Before the measures can be used effectively, validity of the tool needs to be evaluated. The aim of the study was to validate the Oral Impact on Daily Performance (OIDP) frequency scale in an adult Nigerian patient population.

Methodology: This was a descriptive cross sectional study in which consecutive patients attending the Primary Oral Health Care Centre, Idikan and the Oral Diagnosis Clinic of the University College Hospital, Ibadan were recruited. Data was collected with OIDP structured interviewer administered questionnaires, global self-rating and perceived treatment need questions and by oral examination. The frequency scale of the OIDP index was used to compute the impact scores. Data collected was subjected to statistical analysis using SPSS version 19.

Results: A total of 204 patients participated in the study. The OIDP score ranged from 0 to 40; 78.9% of the participants reported an impact on daily performance with eating and enjoying food being the most reported activity impacted upon. The Cronbach's alpha coefficient was 0.811; the OIDP index was significantly associated with global self-ratings of oral health, perceived need for dental treatment and was able to discriminate between patients with or without dental caries.

Conclusion: The OIDP frequency scale exhibited satisfactory psychometric properties amongst adult dental patients in Ibadan, Nigeria.

Keywords: Oral health, quality of life, OIDP, validity, internal consistency, self rating

Résumé

Contexte: la santé orale connexe de la qualité de vie mesures offrent d'autres façons d'évaluer la santé orale statut d'une façon qui priorise impact sur le

Correspondence: Dr. F.B. Lawal, Department of Periodontology and Community Dentistry, College of Medicine, University of Ibadan, Ibadan, Nigeria. E-mail: folakemilawal@yahoo.com

orale statut d'une façon qui priorise impact sur le style de vie. Ces mesures sont, toutefois, guère utilisés dans notre établissement. Avant que les mesures peuvent être utilisés efficacement, la validité de l'outil doit être évaluée. L'objectif de cette étude était pour valider la Oral impact quotidien sur les performances (OIDP) échelle de fréquence un adulte nigérian population de patients.

Méthodologie : Il s'agit d'un descriptif de la section transversale étude dans laquelle patients consécutifs qui assistent à l'oral primaire Centre de soins de santé, Idikan et orale du diagnostic clinique de l'University College Hospital, Ibadan ont été recrutés. Les données ont été recueillies avec OIDP structuré intervieweur administré des questionnaires, mondial d'auto-évaluation et traitement perçu besoin questions et par examen oral. L'échelle de fréquence de l'OIDP index a été utilisé pour calculer l'impact des scores. Données collectées a été soumis à une analyse statistique utilisant SPSS, version 19.

Résultats : Un total de 204 patients ont participé à l'étude. L'OIDP score variait de 0 à 40; 78,9 % des participants ont indiqué un impact sur les performances quotidiennes de manger et apprécier la nourriture étant les plus signalés activité affectés. L'alpha de Cronbach coefficient était 0,811 ; l'OIDP index était significativement associée au mondial d'auto-évaluations de santé bucco-dentaire, besoin perçu pour les soins dentaires et a été en mesure de faire la distinction entre les patients a été en mesure de faire la distinction entre les patients avec ou sans caries dentaires.

Conclusion : La fréquence OIDP échelle présentait satisfaisant propriétés psychométriques entre adulte patients dentaires à Ibadan, Nigéria.

Introduction

The professional concept of oral health, which is mainly through clinical measures and assessment of oral health, does not take into consideration the feelings and perception of an individual. Similarly, dentists treat diseases and tend to neglect the impact of these diseases on the well-being of the patient, which is actually the most important concept to the patient. These and other limitations led to the evolution of oral health related quality of life (OHRQoL), which characterises the perception of an individual about oral health and how it impacts daily performances [1]. Oral health related quality

of life is a multidimensional concept, which places individuals as the main focus of consideration. Different oral health related quality of life measures have been developed and have been found useful in assessing the oral health status of individuals subjectively and in determining treatment outcomes of patients; of which the most popular is the Oral Impact on Daily Performance (OIDP) index [2-4].

The OIDP measure is a short and easy to administer index, which measures behavioural impacts on daily activities [2]. It also focuses on the ultimate outcomes of diseases and thereby ignores less trivial impacts on daily activities [2]. Furthermore the index is based on a theoretical framework of the World Health Organisation's International Classification of Impairments, Disabilities and Handicaps (ICIDH) and amended for Dentistry by Locker [5]. This theoretical framework is divided into three levels in which there is a linear link to disease via impairments, disability and handicapping state. The OIDP index has a frequency scale and a severity scale. There has been no significant difference between usages of the two scales because the frequency and the severity scores generated from the two scales had similar predictive power [6]. However, the frequency scale exhibits better reproducibility and is a preferred option if either of the two scales are to be used singly to enhance simplicity and efficiency of the index [6]. Although the reliability and validity of the OIDP frequency scale have been documented worldwide [3,7] and their different psychometric properties stated, there is no report on its use in Nigeria. This is notable considering the influence of culture and lifestyle of people on their responses to OHRQoL measures [8,9] and the difficulty in juxtaposing the validity of the tool in a Western society to a low-middle income country such as Nigeria with a different set of norms and cultural values.

The objective of this study therefore was to determine the validity and internal consistency of the OIDP frequency scale in an adult Nigerian patient population.

Methodology

This was a descriptive cross sectional study carried out amongst adult patients attending the Primary Oral Health Care Centre, Idikan and the Oral Diagnosis Clinic of the University College Hospital, Ibadan, Nigeria between September and December 2011. Following ethical approval from the joint UI/UCH Research Ethics Committee, data was collected with the use of interviewer administered OIDP

questionnaire, global self rating of oral health status, perceived need for dental treatment and by oral examination. The questionnaire was administered to 204 consecutive patients aged 18 years or older who presented to the two clinics during the study period and consented to participate in the study. The sociodemographic characteristics of the study participants collected included; age, gender, tribe, marital status, educational qualification and occupation.

Measures: OIDP scale

The original version of the OIDP frequency scale developed by Adulyanon and Sheiham [6] in English was used. The OIDP frequency items were assessed by asking 'During the past 6 months, how often have problems with your mouth and teeth caused you any difficulty with: *eating and enjoying food, speaking and pronouncing clearly as to affect communication, cleaning teeth, sleeping and relaxing, smiling and showing teeth without embarrassment, maintaining usual emotional state, carrying out daily task and social role, and enjoying contact with others?*' (See Appendix) Each question was assessed using a 6 - point scale in the range: 0 - 'never', 1 - 'affected less often than once a month (e.g. once a year or once in three years etc)', 2 - 'once or twice a month', 3 - 'once or twice a week', 4 - '3 to 4 times a week' and 5 - 'every day'. In addition, the questionnaire was cross culturally adapted for use by the non-English speaking population by translating it into Yoruba, the main language spoken in this locality and in the South Western region of Nigeria. The translation into Yoruba was done independently by two scholars well versed in both English and Yoruba languages. The back translation into English was done by a different scholar, after which it was compared with the original English version with no difference noted.

Global self rating of oral health status

The global self rating of oral health was assessed by the question "How would you rate your oral health presently"? Response was on a five point scale as follows; 1-poor, 2-very poor, 3- neither poor nor good, 4-good and 5-very good. For cross tabulation purposes, the global self rating of oral health status was considered as good (to include very good or good) and poor (which included very poor, poor or neither good nor poor).

Perceived need for dental treatment

The perceived need for treatment was assessed by the question; "Do you perceive a need for dental

treatment presently?" The response was recorded as either "Yes" or "No".

Oral examination

Oral examination was performed by a trained and calibrated examiner. Oral examination was conducted on a dental chair, with natural light serving as source of illumination.

Intra examiner variability was determined by duplicate examination of every 10th patient. Examination was conducted in accordance with the WHO standard guidelines for oral health assessment. Oral findings documented were dental status; number of teeth present, caries experience using the Decayed, Missing, Filled and Total (DMFT) index, periodontal status assessed by the Community Periodontal Index (CPI) and loss of attachment, and presence or absence of mobile teeth.

Data management and analysis

Data obtained was analyzed using SPSS version 19 software. Frequencies, proportions and percentages were used to summarise the qualitative variables and means with standard deviations were used in summarising quantitative variables.

Occupational classification was done according to that of Esan *et al.*, [10] based on OPCS 1999 and modified for this environment.

The OIDP score was calculated by the simple additive method. Cronbach's alpha was used to determine the internal consistency of the OIDP measure; construct validity was assessed by relating the OIDP score with the clinical oral findings using Chi square statistics; and Spearman rank correlation was used to correlate OIDP score with the global self ratings of oral health status. The criterion validity was assessed by comparing the OIDP scores with the gold standards of subjective assessment of oral health; the global self rating of oral health and the perceived needs for dental treatment by the study participants. Construct validity of the instrument was evaluated by comparing it with oral examination findings to see if it could distinguish correctly between those with oral disease or not. The p-value for statistical significance was set at 0.05.

Results

Sociodemographic characteristics of the study participants

A total of 204 patients participated in the study consisting of 101 (49.5%) males and 103 (50.5%) females. The mean age of the participants was 40.9 years (SD = 14.9 years, range: 18 to 83 years). The majority, 123 (60.3%), were Christians and 81

(39.7%) were Muslims. All other sociodemographic characteristics are on table 1.

Oral impact on daily performances (OIDP) scores of the participants

The mean OIDP score of the participants was 8.6 (SD = 8.2, range: 0 to 40). A total of 43 (21.1%) participants had an OIDP score of zero (0), i.e. no impact, and 161 (78.9%) had a score of 1 or higher.

OIDP inventory items of the participants

Of the eight OIDP inventory items, none of the impacts on daily performances was experienced by 43 (21.1%) participants and all eight were experienced by 21 (10.3%). The mean number of impacts experienced was 3.0 (SD = 2.6) impacts. The three most commonly reported OIDP items as a result of oral health status were "difficulty with eating and enjoying food" (69.6%), "difficulty with sleeping and relaxing" (49.0%) and "difficulty with cleaning teeth" (41.7%).

Global self rating of present oral health status

A total of 86 (42.1%) participants rated their present oral health status as very good or good while 118 (57.9%) rated their present oral health status as very poor, poor or neither good nor poor.

Perceived need for treatment

The majority (156, 76.5%) of respondents perceived a need for treatment, while 48 (23.5%) did not perceive a need for treatment.

Oral health status of the study participants

The mean decayed missing filled teeth (DMFT) of the study participants was 2.3 (SD = 2.9, range: 0 to 17). A total of 74 (36.3%) participants had a DMFT of 0, while 130 (63.7%) had a DMFT > 0 (Table 2). Out of the total DMFT, the decayed (D) component made up 53.3%, the missing (M) component 36.6% and the filled (F) component 10.1%.

One or more tooth/teeth were missing from the oral cavity of 104 (51.0%) respondents and 51 (25.0%) had one or more mobile tooth/teeth, with the number of mobile tooth/teeth per respondent ranging from 1 to 32 (Table 2).

Periodontal status using CPI

The majority, 159 (77.9%), had a CPI of 2. A total of 36 (17.7%) participants had pathological periodontal pocket, 167 (81.8%) did not have pathological periodontal pocket and one (0.5%) had healthy periodontium.

Table 1: Sociodemographic characteristics and relationship with OIDP scores

Sociodemographic characteristics	0 (No Impact) No (%) *	OIDP scores > 0 (Impact) No (%) *	Total No (%) *	χ^2	p value
<i>Gender</i>					
Male	23 (22.8)	78 (77.2)	101 (100.0)	0.345	0.557
Female	20 (19.4)	83 (80.6)	103 (100.0)		
Total	43 (21.1)	161 (78.9)	204 (100.0)		
<i>Age (Years)</i>					
≤ 40	21 (17.5)	99 (82.5)	120 (100.0)	3.492	0.174
41 - 64	19 (28.8)	47 (71.2)	66 (100.0)		
> 65	3	15 (83.3)	18 (100.0)		
Total	43 (21.1)	161 (78.9)	204 (100.0)		
<i>Marital status</i>					
Unmarried	7 (11.3)	55 (88.7)	62 (100.0)	5.130	0.024*
Married	36 (25.4)	106 (74.6)	142 (100.0)		
Total	43 (21.1)	161 (78.9)	204 (100.0)		
<i>Educational status</i>					
Secondary or lower	16 (19.0)	68 (81.0)	84 (100.0)	0.354	0.552
Post-secondary or >	27 (22.5)	93 (77.5)	120 (100.0)		
Total	43 (21.1)	161 (78.9)	204 (100.0)		
<i>Occupational class</i>					
1 - Skilled	16 (23.2)	53 (76.8)	69 (100.0)	0.582	0.747
2 - Unskilled	20 (21.3)	74 (78.7)	94 (100.0)		
3 - Dependant	7 (17.1)	34 (82.9)	41 (100.0)		
Total	43 (21.1)	161 (78.9)	204 (100.0)		

* - Statistically significant

Loss of Attachment (LA) scores of the participants

An LA score of zero (0) was recorded in the oral examination of 153 (75.0%) study subjects, and a score of 1, 2 or 3 in 51 (25.0%) participants. None of the participants had an LA score of 4.

OIDP scores and sociodemographic characteristics

A higher proportion of unmarried participants had OIDP scores greater than zero (have impacts) when compared to those who were married (88.7% vs. 74.6%, $p = 0.024$). There were no significant associations between OIDP scores and; gender, age, educational status or occupational class (Table 1).

OIDP scores and clinical normative findings

The proportion of participants with a DMFT > 0 who reported impacts (OIDP > 0) was higher than that of participants with a DMFT of 0 who also reported impacts (86.2% vs. 66.2%, $p = 0.001$). A higher proportion of those with carious teeth (D > 0) reported impacts compared to those without carious teeth (88.0% vs. 66.7%, $p < 0.001$). There were no statistically significant associations between OIDP scores and having mobile teeth, having missing teeth, "missing" teeth component

of DMFT, "filled" teeth component of DMFT, presence of pathological pocket on examination of the periodontal status using CPI or presence of attachment loss ($p > 0.05$) (Table 2).

Global self rating of oral health status and oral health related quality of life scores

Table 3 illustrates the correlation between global self rating of oral health status, OIDP score and number of OIDP inventory item experienced. There was a negative correlation (-.29) between OIDP score and global self rating; individuals with higher OIDP scores were more likely to rate their oral health poorer than those with lower OIDP scores ($p < 0.01$). Participants with higher OIDP scores were more likely to report more inventory items being impacted upon by their oral health status ($r_s = .90$, $p < 0.01$).

Perceived need for treatment and OIDP score

None (0%) of the study subjects with an OIDP score of zero (no impact) perceived a need for treatment compared to 156 (96.9%) of those with an OIDP score greater than zero (have impact) who also perceived a need for treatment ($p < 0.001$).

Table 2: Oral health status and relationship with OIDP scores of participants

Normative findings	0 (No Impact) No (%)	OIDP scores		χ^2	p - value
		≥ 1 (Impact) present No (%)	Total No (%)		
<i>Has mobile tooth</i>					
Yes	7 (13.7)	44 (86.3)	51 (100.0)	2.210	0.137
No	36 (23.5)	117 (76.5)	153 (100.0)		
Total	43 (21.1)	161 (78.9)	204 (100.0)		
<i>Has missing tooth</i>					
Yes	17 (16.3)	87 (83.7)	104 (100.0)	2.856	0.091
No	26 (26.0)	74 (74.0)	100 (100.0)		
Total	43 (21.1)	161 (78.9)	204 (100.0)		
<i>DMFT status</i>					
- 0	25 (33.8)	49 (66.2)	74 (100.0)	11.268	0.001*
> 0	18 (13.8)	112 (86.2)	130 (100.0)		
Total	43 (21.1)	161 (78.9)	204 (100.0)		
<i>Decayed (DMFT)</i>					
- 0	29 (33.3)	58 (66.7)	87 (100.0)	13.695	<0.001*
> 0	14 (12.0)	103 (88.0)	117 (100.0)		
Total	43 (21.1)	161 (78.9)	204 (100.0)		
<i>Missing (DMFT)</i>					
- 0	32 (23.0)	107 (77.0)	139 (100.0)	0.990	0.320
> 0	11 (16.9)	54 (83.1)	65 (100.0)		
Total	43 (21.1)	161 (78.9)	204 (100.0)		
<i>Filled (DMFT)</i>					
- 0	39 (20.3)	153 (79.7)	192 (100.0)	1.151	0.283
> 0	4 (33.3)	8 (66.7)	12 (100.0)		
Total	45 (21.1)	161 (78.9)	204 (100.0)		
<i>CPI score</i>					
0 - 2 (No pocket)	34 (20.2)	134 (79.8)	168 (100.0)	0.404	0.525
3 - 4 (Has pocket)	9 (25.0)	27 (75.0)	36 (100.0)		
Total	43 (21.1)	161 (78.9)	204 (100.0)		
<i>LA Score</i>					
- 0	30 (19.6)	123 (80.4)	153 (100.0)	0.796	0.372
> 0	13 (25.5)	38 (74.5)	51 (100.0)		
Total	43 (21.1)	161 (78.9)	204 (100.0)		

* - Statistically significant

Table 3: Spearman rank correlation coefficients (rho) of the relationship between global self rating of oral health, OIDP scores and inventory item number (n=204)

	OIDP score	No of OIDP item	Global self rating
OIDP score	1.00	.90**	-.29**
No of OIDP item	.90**	1.00	-.18**
Global self rating	-.29**	-.18**	1.00

**Correlation is significant at the 0.01 level (2-tailed),

*Correlation is significant at the 0.05 level (2-tailed)

Internal consistency of OIDP inventory items

The Cronbach's alpha for the OIDP inventory items was 0.811. The Cronbach's alpha for each of the eight OIDP inventory items, if the particular item was deleted ranged from 0.757 to 0.803; i.e. none was greater than 0.811.

Discussion

The need for health care professionals to understand how individuals feel about the state of their mouth and teeth as well as a thorough elucidation of how the status of oral health impacts on daily activities provides the background of research into oral health related quality of life [5,11]. However, the application of an instrument in any environment is

dependent on the cultural and linguistic influences, which may affect the validity of this instrument in the new environment [9,12,13]. The findings from this study revealed that the prevalence of impacts determined by the OIDP inventory was 78.9%. This prevalence is higher than that of 62% reported from Benin City, Nigeria in a study conducted on 356 adults attending an outpatient clinic and also adults from the university community [14]. The higher prevalence reported from the present study can be attributed to differences in the measuring instruments used; OIDP for this study compared with OHRQOL-UK used in the Benin City study.

In addition, all the participants from the present study were patients compared to the study by Okunseri *et al.* [14] where members of the university community were also recruited. Lower prevalence of impact than those found in this study were reported in Ugandan adolescents, where a prevalence of 62% was reported [15], Tanzanian students with a value of 51% [16], and 18% in the Norwegians [3]. This variation in impact prevalence across different parts of the world suggests that there are cultural and linguistic influences affecting the OHRQOL. Furthermore, the prevalence of reporting impacts arising from oral health status appears to be higher in patient based studies than in population based studies, not unexpectedly, since patients presenting to the dentists are likely to have more oral symptoms, which will have greater impact on their quality of life than other individuals.

The most frequently reported activity of daily living affected by oral impacts using the OIDP inventory was eating. This is consistent with documentations by various authors [15-18]. Sleeping and relaxing followed by cleaning of teeth were rated second and third item affected by oral impacts in the present study. These have also been reported by others amongst the top four activities affected by oral impacts [15-18]. The importance attached to eating and cleaning of the mouth and the primal relationship of eating to survival may explain the prominent position occupied by impacts on eating and cleaning the mouth.

The face validity of the OIDP measure was assessed by observing the ease of its use and how the study participants responded to the questions, since it was an eight item question with responses, none of the study participants lost or showed any loss of interest prior to the completion of the interview. Studies, however, have reported weak face validity for OIDP index considering the use of the frequency and the severity scales together [13,19]. This was reasoned out to be the complexity involved in the self administration of the OIDP questionnaire

as both the frequency and the severity items will need to be filled. The present study made use of interviewer administered questionnaire, which could have contributed to the compliance.

The criterion validity, tested by relating the OIDP scores to the global self rating of oral health correlated significantly as appropriate. Those with higher impacts rated their oral health unfavourably compared with those with lower impact scores. This is similar to what has been reported from a study conducted on British dental patients [19]. Significantly of note, also, is that those without impacts on daily activities perceived no need for dental treatment. The OIDP thus has highly rated criterion validity in this respect.

The construct validity, evaluated by relating the OIDP scores with oral examination findings was only able to discriminate significantly between those respondents with clinical oral condition using DMFT caries experience index and the decayed teeth in the expected direction. This corresponds with the findings of other authors [13,19]. Although the measure was able to discriminate between respondents with mobile teeth and missing teeth in the expected direction, it was not statistically significant.

In this study, the OIDP measure showed adequate reliability in terms of its internal consistency. The Cronbach's alpha score for the OIDP was high (0.81) and above the recommended value of 0.70 [20]. The value for OIDP in this study is higher than that (0.65) reported in the original study of its development [2]. Moreover, this value is within the range reported by other authors who validated the OIDP measure in different parts of the world [13,16,19,21]. This showed that the different items of the OIDP frequency scale measure the same dimension in the adult patient population studied. A major limitation of this study was that of the sampled population being patients, thus it would be difficult to generalise the findings to healthy subjects, presumably without oral health complaints.

Conclusion

The OIDP frequency scale has good psychometric properties in the sampled adult patient population of Ibadan, Nigeria and could thus be a useful tool to complement the normative assessment of oral health status.

References

1. Locker D and Slade G. Concepts of oral health, disease and the quality of life. *Measuring oral health and quality of life* 1997: 11-24

2. Adulyanon S, Vourapukjaru J and Sheiham A. Oral impacts affecting daily performance in a low dental disease Thai population. *Community Dent Oral Epidemiol* 1996; 24: 385-389
3. Astrom AN, Haugejorden O, Skaret E *et al.* Oral Impacts on Daily Performance in Norwegian adults: the influence of age, number of missing teeth, and socio-demographic factors. *Eur J Oral Sci* 2006; 114: 115-121
4. Locker D. Oral health and quality of life. *Oral Health Prev Dent* 2004; 2 Suppl 1: 247-253
5. Locker D. Measuring oral health: a conceptual framework. *Community Dent Health* 1988; 5: 3
6. Adulyanon S, Sheiham A and Slade G. Oral impacts on daily performances. *Measuring oral health and quality of life* 1997: 151-160
7. Wong MC, Lo EC and McMillan AS. Validation of a Chinese version of the Oral Health Impact Profile (OHIP). *Community Dent Oral Epidemiol* 2002; 30: 423-430
8. Herdman M, Fox-Rushby J and Badia X. A model of equivalence in the cultural adaptation of HRQoL instruments: the universalist approach. *Qual Life Res* 1998; 7: 323-335
9. John MT, Miglioretti DL, LeResche L *et al.* German short forms of the Oral Health Impact Profile. *Community Dent Oral Epidemiol* 2006; 34: 277-288
10. Esan TA, Olusile AO, Akeredolu PA *et al.* Socio-demographic factors and edentulism: the Nigerian experience. *BMC Oral Health* 2004; 4: 3
11. Leao A and Sheiham A. The development of a socio-dental measure of dental impacts on daily living. *Community Dent Health* 1996; 13: 22-26
12. Hagglin C, Berggren U, Hakeberg M *et al.* Evaluation of a Swedish version of the OHIP-14 among patients in general and specialist dental care. *Swed Dent J* 2007; 31: 91-101
13. Montero J, Lopez JF, Vicente MP *et al.* Comparative validity of the ODP and OHIP-14 in describing the impact of oral health on quality of life in a cross-sectional study performed in Spanish adults. *Med Oral Patol Oral Cir Bucal* 2011; 16: e816-821
14. Okunseri C, Chattopadhyay A, Lugo RI *et al.* Pilot survey of oral health-related quality of life: a cross-sectional study of adults in Benin City, Edo State, Nigeria. *BMC Oral Health* 2005; 5: 7
15. Astrom AN and Okullo I. Validity and reliability of the Oral Impacts on Daily Performance (ODP) frequency scale: a cross-sectional study of adolescents in Uganda. *BMC Oral Health* 2003; 3: 5
16. Masalu JR and Astrom AN. Applicability of an abbreviated version of the oral impacts on daily performances (ODP) scale for use among Tanzanian students. *Community Dent Oral Epidemiol* 2003; 31: 7-14
17. Jung SH, Ryu JI, Tsakos G *et al.* A Korean version of the Oral Impacts on Daily Performances (ODP) scale in elderly populations: validity, reliability and prevalence. *Health Qual Life Outcomes* 2008; 6: 17
18. Kida IA, Astrom AN, Strand GV *et al.* Clinical and socio-behavioural correlates of tooth loss: a study of older adults in Tanzania. *BMC Oral Health* 2006; 6: 5
19. Robinson PG, Gibson B, Khan FA *et al.* Validity of two oral health-related quality of life measures. *Community Dent Oral Epidemiol* 2003; 31: 90-99
20. Streiner DL and Norman GR. *Health measurement scales: a practical guide to their development and use*: Oxford University Press, USA; 2008
21. Dorri M, Sheiham A and Tsakos G. Validation of a Persian version of the ODP index. *BMC Oral Health* 2007; 7: 2

Received: 08/05/13

Accepted: 22/07/13