Community Dental Health (2012) **29,** 219–223
Received 29 January 2011; Accepted 6 July 2011

doi:10.1922/CDH_2783Du05

Oral Health Related Quality of Life among Older Adults in Central China

Y. Zhou[1], M. Zhang[1], H. Jiang[1], B. Wu[2] and M. Du[1, 3]

[1]School & Hospital of Stomatology, Wuhan University, Hubei, China; [2]School of Nursing and Global Health Institute, Duke University, Durham, NC 27710, USA; [3]Key Laboratory for Oral Biomedical Engineering of Ministry of Education, School & Hospital of Stomatology, Wuhan University, Hubei, China.

Aim: To obtain information about the impact of oral health status on the quality of life in older adults in Central China, and furthermore, to investigate the influence of various demographic and socio-economic factors on oral health related quality of life (OHRQoL). ***Methods:*** This study comprised a stratified random sample of 1,000 older adults in Central China. Questionnaires including demographic factors, education and income level, denture wearing status and Oral Health Impact Profile (OHIP)-14 were used in a face-to-face interview. ***Results:*** Of the study population 82% stated that they had some forms of problems related to their quality of life. The mean value of the simple count and single summary item scores for OHIP-14 were 0.47 (sd 0.50) and 6.83 (sd 6.84) respectively for the entire study population. "Uncomfortable to eat" and "taste worse" were the two most common problems reported using the simple count method for OHIP-14, while the "physical pain" being the highest scored domain of the measure. When the effect of all independent variables was analysed in multivariate analysis, education level and denture wearing status were significantly ($p<0.05$) associated with the OHRQoL measure. ***Conclusions:*** In this Chinese older adult sample, education level and denture wearing status were related to having oral problems as estimated using the OHIP-14.

Key words: *oral health impact profile (OHIP)-14, oral health related quality of life (OHRQoL)*

Introduction

Economic growth in China has led to improved public health and medical service, which have increased life expectancy of the Chinese population. The extension of people's lifespan and the enhancement of their quality of life (QoL) are fundamental goals of health care systems. Health-related quality of life is a multidimensional concept that includes patient-driven measures such as perceptions and functional status (Petersen *et al.*, 2010). Although common oral diseases are not life threatening, there is an increasing recognition that oral health problems and diseases can have a significant impact on individual's QoL (Barbosa *et al.*, 2011; Choi *et al.*, 2010; Stewart *et al.*, 2008). The concept of oral health-related quality of life (OHRQoL) has received much attention in the past two decades, with different instruments developed aiming to measure the impact of changes in oral health on QoL (Hassel *et al.*, 2010; Ravaghi *et al.*, 2011; Yusuf *et al.*, 2006).

OHRQoL measures emerged out of the development of socio-dental indicators to capture non-clinical aspects of oral health that broadened the focus of oral epidemiological research. The oral health impact profile (OHIP) is one of the most comprehensive instruments and serves as a valid measure in assessing OHRQoL (Locker and Allen, 2007). The original OHIP consisted of 49 questions with 7 domains: functional limitations, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap (Slade and Spencer, 1994). OHIP-14 was developed as a shortened version of OHIP-49 with good reliability, validity and precision (Allen and McMillan, 1999; Slade, 1997). Xin and Ling (2006) evaluated the Chinese version of the OHIP-14 and found it also had good validity and reliability.

There have been several recent national epidemiological studies on OHRQoL (John *et al.*, 2004; Rusanen *et al.*, 2009; Sanders *et al.*, 2009; Slade *et al.*, 2005; Steele *et al.*, 2004) but results from representative samples are still limited. Meanwhile, most oral health surveys conducted in China only targeted clinical oral health status, neglecting patients' perceptions of QoL. Moreover, in the past two decades China has experienced increases in the number and proportion of older adults: a trend likely to continue. Up till now, the concept of OHRQoL of Chinese people is still elusive, and there is no report of how elderly Chinese perceive their OHRQoL. Therefore, research on OHRQoL among older adults in China becomes increasingly important.

The objective of the present study was to assess the OHRQoL of people aged 65 and over from urban areas in Central China by using OHIP-14, and to investigate the influence of various demographic and socio-economic factors on OHRQoL in the population.

Correspondence to: Dr Minquan Du, Professor in Preventive Dentistry, School & Hospital of Stomatology, Wuhan University, Luoyu Road 237, Wuhan City, Hubei, China 430079. Email: minquandu@163.com

Materials & Methods

The study was conducted in Wuhan, a city with a population over 8 million and the major commercial center serving as the gateway in Central China. The targeted enrollment of the survey was 1,000 adults aged 65 years and above recruited from 20 Wuhan communities. In the first stage, all 5 administrative districts of Wuhan: Wuchang, Hanyang, Qingshan, Qiaokou and Jiang'an were selected. Using a 3-stage stratified simple random sampling method, 2 sub-districts were chosen from each district. Next, 2 resident communities were selected from each sub-district to serve as the survey sites. In the third stage, 50 subjects were selected from each community.

The study protocol was approved by the Ethics Committee of the School of Stomatology, Wuhan University, P.R. China, and each subject gave their informed consent based on an explanation of the study's purpose and procedures. Interviews were conducted face-to-face with participants during 4 weeks in the summer of 2006. On average, the interviews lasted 10 minutes and the subjects' participation was strictly voluntary with no incentives offered. The questionnaire included demographic characteristics, education and income level, denture wearing status and the OHIP-14 instrument. Education was categorised into 3 levels: primary, secondary (junior high and/or senior high) and tertiary (college or university). Income was coded as ≤500 Yuan, 500-1000 Yuan and ≥1000 Yuan per month). Denture wearing status was self-declared as with or without denture.

For each of the OHIP questions, respondents rated their experience of dental problems in previous year. Each item was scored on a Likert-style scale from 0-4: 0, never; 1, hardly ever; 2, occasionally; 3, fairly often; 4, very often. The OHIP-14 scores were calculated in the simple-count method (OHIP-14 SC) and the sum of OHIP-14 (Allen and Locker, 1997). OHIP-14 SC simply counts the number of items to which a subject responded "fairly often" or "very often". The sum OHIP-14 sums the numeric response codes (0-4) for all 14 items producing a score ranging 0-56, with higher scores indicating poorer OHRQoL (Allison *et al.*, 1999). Differences in OHIP-14 scores between groups were analysed with *t*-test and ANOVA. The relationship between OHIP scores and the demographic variables was assessed. The independent variables were included in multivariate regression. The dependent variable was dichotomised comparing the proportion of subjects with a sum OHIP-14 of 6 or more to subjects with 5 or less using the median split. The results were presented as odds ratios (OR) with 95% confidence intervals (CI). All the data were analysed using SPSS17 software with significance inferred at $p<0.05$.

Results

A total of 913 participants completed the survey, yielding a response rate of 91.3%. The mean age of the subjects was 73 (sd 6) years old. 61.8% was in 65-74 age group and 38.2% in the age group 75 and above. More than half of the participants' highest level of education was primary school (Table 1).

The summary scores to the OHIP-14 are presented in Table 2. The most responses were in the "never" category. A minority of patients reported symptoms in the "fairly often" and "very often" category, ranging from 1.10% for "unable to function" to 14.79% for "uncomfortable to eat any foods". Reports of "uncomfortable to eat" and "taste worse" were the 2 most commonly reported problems, 14.79% and 12.71% respectively. The most prevalent items were those in the domain of physical pain and functional limitation. In the present study, the distribution of the sum OHIP-14 ranged from 0 to 43 with the mean of the individual scores for each item ranged from 0.13 for "irritable with others" to 1.04 for "painful aching" where high scores indicate more impacts on QoL. Items in the physical pain domain scored highest on the sum OHIP-14 score, followed by "taste worse" and "life unsatisfying" in the functional limitation and handicap domains respectively. On the other hand, least frequently reported were "unable to function" and "irritable with others" in the handicap and social disability domains respectively .

Table 3 presents mean OHIP-SC and sum OHIP-14 scores. Male participants, those who received tertiary education and with a natural dentition had significantly lower mean OHIP-14 SC scores. The bivariate analyses using the sum OHIP-14 scoring method found associations with gender and education level and were similar to the results of the OHIP-14 SC scores.

Table 4 summarises the logistic regression analysis results for the summary score of OHIP-14. A significantly higher likelihood of sum-OHIP was observed in those participants whose highest level of education was primary (OR 0.764). Respondents with dentures were found to be almost 1.5 times as likely to report problems compared with those who had natural dentition (OR=1.375). However, age, gender and financial status were not significantly associated with the sum OHIP-14.

Table 1. Demographic backgrounds of the elderly subjects

	n	*%*
Gender		
Male	529	57.9
Female	384	42.1
Age		
65-74 years old	564	61.8
≥75 years old	349	38.2
Education		
Primary	465	50.9
Secondary	345	37.8
Tertiary	103	11.3
Income per month		
≤500 Yuan	272	29.8
500-1000 Yuan	431	47.2
≥1000 Yuan	210	23.0
Dental Status		
Without denture	541	59.3
With denture	372	40.7

Table 2. Summary of the simple count and single summary item scores for OHIP-14 from Wuhan, China (n =913)

	Domains	*Items*	*OHIP-SC*[*]		*OHIP score*[**]	
			%	*Rank*	*Mean (sd)*	*Rank*
1a	Functional limitation	Trouble pronouncing words	6.57	5	0.50 (0.98)	6
1b		Taste worse	12.71	2	0.78 (1.22)	3
2a	Physical pain	Painful aching	11.83	3	1.04 (1.18)	1
2b		Uncomfortable to eat	14.79	1	1.03 (1.26)	2
3a	Psychological discomfort	Self-conscious	4.71	7	0.36 (0.86)	8
3b		Tense	1.75	13	0.20 (0.62)	12
4a	Physical disability	Diet unsatisfactory	5.70	6	0.47 (0.94)	7
4b		Interrupt meals	4.70	8	0.57 (0.95)	5
5a	Psychological disability	Difficult to relax	2.85	11	0.33 (0.79)	9
5b		Been embarrassed	3.18	10	0.32 (0.78)	10
6a	Social disability	Irritable with others	4.16	9	0.13 (0.48)	14
6b		Difficulty doing jobs	1.86	12	0.22 (0.63)	11
7a	Handicap	Life unsatisfying	9.86	4	0.73 (1.12)	4
7b		Unable to function	1.10	14	0.15 (0.50)	13

[*] The OHIP-SC indicates the proportion of participants who responded "fairly often" or "very often"
[**] The individual's OHIP score is the mean of the codes: 0=never, 1=hardly ever, 2=occasionally, 3=fairly often and 4=very often.

Table 3. Mean and standard deviation of OHIP-14 SC and sum OHIP-14

		OHIP-14 SC		*Sum OHIP-14*	
	n	*Mean (sd)*	*p*	*Mean (sd)*	*p*
Total	913	0.47 (0.50)		6.83 (6.84)	
Gender					
Male	529	0.44 (0.50)	0.023	6.41 (6.47)	0.048
Female	384	0.51 (0.50)		7.37 (7.25)	
Age					
65-74 years old	564	0.48 (0.50)	NS	6.95 (6.90)	NS
≥75 years old	349	0.46 (0.50)		6.60 (6.69)	
Education					
Primary	465	0.50 (0.50)		7.30 (7.25)	
Secondary	345	0.47 (0.50)	NS	6.49 (6.24)	NS
Tertiary	103	0.35 (0.48)	0.005	5.73 (6.60)	0.033
Income					
≤500 Yuan per month	272	0.48 (0.50)	NS	7.09 (7.40)	NS
500-1000 Yuan per month	431	0.49 (0.50)		7.03 (6.64)	
≥1000 Yuan per month	210	0.43 (0.50)		6.02 (6.39)	
Denture Wearing Status					
Without denture	541	0.45 (0.50)	0.049	6.63 (7.03)	NS
With denture	372	0.51 (0.50)		7.08 (6.51)	

NS, not significant.

Table 4. Logistic regression analysis results for sum OHIP-14 among older adults in Chinese

Independent Variable	*B*	*SE*	*p*	*OR*	*95% CI*
(a) Using forced entry method					
Gender	0.235	0.144	0.101	1.265	0.955, 1.677
Age	-0.137	0.141	0.332	0.872	0.661, 1.150
Education	-0.256	0.118	0.030	0.774	0.615, 0.975
Income	0.026	0.110	0.817	1.026	0.826, 1.273
Denture Wearing Status	0.325	0.139	0.019	1.384	1.054, 1.818
(b) Using forward stepwise method					
Education	-0.270	0.100	0.007	0.764	0.628, 0.929
Denture Wearing Status	0.319	0.137	0.020	1.375	1.051, 1.800

Dependent variable-sum OHIP-14 score: (0-5)=0, (6+)=1, dichotomised using median splits. Independent variables- gender: male =0, female =1; age: 65-74 years =0, 75+ years =1; education: primary =1, secondary =2, tertiary =3; financial status: ≤500 RMB per month =1, 500-1000 RMB per month =2, ≥1000 RMB per month =3; dental status: without denture =0, with denture =1. n=913.

Discussion

As far as we know, this is the first study in Central China in which a stratified random sample of selected older adults assessed their oral health and the influence of various demographic and socio-economic factors on OHRQoL using the OHIP-14 questionnaire. The results showed that a certain proportion of older adults in Central China reported experience of oral problems in the preceding year, and that these had an impact on their daily lives.

Reports of "uncomfortable to eat" in the domain of physical pain was the highest scored items using the OHIP-14 SC method, while "painful aching" being the highest using the sum OHIP-14 method, showing the same trend as in a Japanese study (Kazunori *et al.*, 2004) and some Scandinavian studies (Einarson *et al.*, 2009; Dahl *et al.*, 2011). Interestingly, results from the present study found out that the sum OHIP-14 scores for items such as "painful aching" and "interrupt meals" ranked higher than those same items using the OHIP-14 SC when the responses "fairly often" and "very often" were combined. However, the ranking of the rest of the items were more or less the same between the two scoring methods.

The sum of OHIP-14 was strongly associated with education level and denture wearing. Data from a previous study (Matthias *et al.*, 1993) indicated that higher impacts were reported by older adults with less education, showing a similarity with our study. It's an interesting finding considering that lower education level may lead to worse employment prospects and lower social status, resulting in poorer accessibility to dental care. Furthermore, participants who had dentures reported having a worse OHRQoL than those without dentures, which were in line with other studies on older adults (Sheiham *et al.*, 2001; Tsakos *et al.*, 2001), indicating that the older adults with dentures may have higher demand for dental service, greater awareness and perhaps greater problems.

However, neither age nor financial status were significantly associated with OHIP-14, which contradicts other studies (Hassel *et al.*, 2006; Ng and Leung, 2006; Swoboda *et al.*, 2006). It should be noticed that financial status was recorded in actual income levels rather than satisfaction level of participants, which may have contributed to the lack of a association between OHIP-14 and financial status. The reason for this may be attributed to the differences in patterns of dental service use between China and other developed countries. Very few people, regardless of their income level, view oral health as an important issue in China, and few go for regular dental checkups. Therefore, dental knowledge and attitude are similar across different income level groups.

It is important when comparing OHRQoL data from different countries to remember the culturally specific nature of people's perceptions of health. The use of OHIP in different linguistic and socio-cultural environments raises questions about cultural orientation and values reflected in these measures. The mean value of the sum OHIP-14 score for the population of the present study was 6.83, which is in good agreement with the mean values reported in an adult Swedish population (Einarson *et al.*, 2009). The physical pain domain tended to have highest ranking in OHIP-SC and sum OHIP, similar to the studies carried in Japan and other countries (Kazunori *et al.*, 2004; Slade *et al.*, 1996).

However, this study had limitations that may influence its interpretation and generalisability arising from the use of a sample selection that does not represent the whole Chinese elderly population. Most of the study participants had primary or secondary education. Therefore, our research is likely to overestimate the impact of oral health among the general older adults in China. Despite these limitations, we have described important attributes of OHRQoL of older adults living in Central China.

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