Validity of Self-Assessment of Oral Health Among 15-Year-Olds in Tehran, Iran

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Purpose: The objective of the present study was to compare the self-assessed and the clinically determined findings of oral health and their determinants among 15-year-olds in Tehran, Iran.

Materials and Methods: A cross-sectional study based on World Health Organization criteria and the methods of the Second International Collaborative Study was carried out among the 15-year-olds (N = 509). The data were based on a self-administered questionnaire and a clinical dental examination.

Results: Altogether 78% of the 15-year-olds assessed their oral health as good or better. Based on self-assessment, 46% reported gingival bleeding, 28% reported the need for a filling and 23% for teeth straightening. Clinical examinations showed that 40% of the students had sound dentition (decayed, missing or filled teeth, DMFT = 0), 40% had current caries (decayed teeth, DT > 0), 92% had gingival bleeding and 26% had a definite need for orthodontic treatment. Most of those with DMFT = 0 and DT = 0 assessed their oral health as good or better. Compared with clinical findings, sensitivity for self-assessed need for fillings, gingival bleeding and the need for teeth straightening were 42%, 49% and 37%, respectively, whereas the corresponding specificities were 82%, 80% and 81%, respectively. Good or better self-perceived oral health was more likely among those with sound dentition (odds ratio, OR = 2.1, P = 0.01), with no self-assessed need for fillings (OR = 2.1, P = 0.01), with a self-assessed absence of gingival bleeding (OR = 2.9, P < 0.001) or with highly educated parents (OR = 1.2, P = 0.007).

Conclusions: When compared with clinical evaluations, the students most accurately detected healthy conditions. Educating the students on the signs of dental diseases could increase the reliability of self-assessment to provide a useful method for reporting oral conditions, especially in countries with developing oral health care systems.

Key words: adolescents, self-assessment, sensitivity, specificity, validity

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Oral health can be evaluated using two different methods: clinical examination by a dental professional and by self-examination. Researchers have described these two methods of measurement as objective and subjective measures, respectively (Locker, 1988; Östberg et al, 2003). A number of terms for the subjective evaluation or self-rating of oral health have been used in various studies,

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including the terms self-reported, self-assessed and self-perceived. Despite the differences between these terms, the concepts they represent are close to each other in meaning (Kallio, 1996; Gilbert and Nuttall, 1999; Östberg et al, 2001). The availability of valid self-reported measures of oral health diseases would offer an easier, low-resource and lowcost method of obtaining data for research (Blicher et al, 2005). Self-assessment can also serve as a motivational tool for good oral hygiene, which can prove to be useful for community studies (Kallio, 1996; Robinson et al, 1998; Buhlin et al, 2002).

A single-item rating of self-perceived oral health has proved to be helpful in evaluating oral health outcomes and in risk identification in populations (Locker, 1996; Atchinson and Gift, 1997).

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Additionally, single-item measures show higher sensitivity than do multi-item measures (Locker, 1996).

The results of comparing self-perceived oral health and clinical findings have shown various degrees of usefulness; they are more useful for ascertaining the number of teeth and the presence of dentures, fillings, root canal therapy, and fixed and removable prostheses (Könönen et al, 1986; Palmqvist et al, 1991; Pitiphat et al, 2002) though they are less useful for identifying dental caries and periodontal disease (Kallio, 1996; Östberg et al, 2003; Goodman et al, 2004). Clinical findings of the need for orthodontic treatment is usually higher than that perceived by the subject (Sheats et al, 1998; Chestnutt et al, 2006). The importance of self-perception concerning orthodontic treatment cannot be underestimated, because demand is based more on the desire for orthodontic treatment than on the need (Yeh et al, 2000; Mandall et al, 2001). However, simply detecting clinical need may not be useful for predicting demand or manpower planning. Adding self-perception to clinical assessments would likely provide a more comprehensive basis for the allocation of health resources, the monitoring of oral health, research, public health and clinical practice (Locker, 1996; Östberg et al, 2003).

Trends in dental diseases indicate a need to determine how the young people of today perceive their oral health (Östberg et al, 2001). Adolescence is an important period for establishing health patterns, and the 15-year-olds are one of the index age groups that the World Health Organization (WHO) recommends to include in oral health studies (WHO, 1997). Unfortunately, data on self-perceived oral health for this age group are limited. The objective of the present study was to compare self-assessed and clinically determined findings of oral health determinants among 15-year-olds in Tehran, Iran.

MATERIALS AND METHODS

The present cross-sectional study was carried out among 15-year-olds at public schools in Tehran, Iran. A multi-stage random sampling procedure included the selection of 17 public schools from a list provided by the Head Office for Education in Tehran (HOET). In each school, one class of 15-year-olds was randomly selected. The total sample comprised 509 students: 260 boys and 249 girls. Participation was voluntary, and all the participants provided their written informed consent. The present study was approved by the Ethics Committee and the Iran Center for Dental Research of the School of Dentistry, Shaheed Beheshti University of Medical Sciences Tehran, Iran.

Data collection included clinical examination (WHO, 1997) and a self-administered structured questionnaire, the framework of which was based on the Second International Collaborative Study (Chen et al, 1997). The questionnaire asked the subjects about their socioeconomic status and consisted of questions about their background information and self-perceived oral health.

In order to motivate the subjects to participate, data collection began with a short explanation of the study by one of the authors (R.Y.); the questionnaire was delivered to the participants who completed and returned it in the class before the clinical dental examination.

Self-perceived oral health was assessed in general with a single-item rating of self-perceived oral health, and as self-assessed need for a filling, gingival bleeding and need for teeth straightening. The question 'How would you describe your oral health?' offered six alternatives: excellent, very good, good, poor, very poor and I don't know. For further analysis, the latter was excluded and the other responses were dichotomised as good or better (excellent, very good and good) and poor (poor and very poor). The need for a filling was enquired with the following question: 'If you were to go to a clinician right now for an examination, do you think the clinician would say you need fillings?'; the alternative answers were 'yes' or 'no'. Self-assessed gingival bleeding was established by asking the following question: 'When do you have bleeding from your gums?'; participants could choose from four alternatives: 'While brushing teeth', 'While eating hard things (such as an apple)', 'Spontaneously' and 'I have not noticed bleeding from my gums'. The responses were dichotomised into 'yes' or 'no' for gingival bleeding. The self-assessed need for orthodontic treatment was investigated by asking the following question: 'If you were to go to a clinician right now for an examination, do you think the clinician would say your teeth need straightening'; the alternative answers were 'yes' or 'no'.

The clinical dental examination took place during school hours in the health office at the school in a comfortable chair and was performed with the use of a headlamp, a mouth mirror and a WHO probe. Dental caries was recorded tooth by tooth; current caries were described according to the decayed teeth (DT) index and past caries (caries experience), according to the decayed, missing or filled teeth (DMFT) index (WHO, 1997). Findings on bleeding were recorded separately for each of the index teeth (DD 16, 11, 26, 36, 31 and 46). We used the Community Periodontal Index of Treatment Needs bleeding criteria (WHO, 1997) for recording gingival bleeding and the modified index of orthodontic treatment need (IOTN) for the clinical evaluation of orthodontic treatment need; two scores were used: 0 = no need, 1 = definite need (Burden et al, 2001).

The students' socioeconomic background was defined according to three dimensions: (1) the wealth status of the family (good = living in own house and poor = living in a rented house); (2) location of the school (affluent and non-affluent, based on the HOET information); and (3) the highest level of education attained by either parent. The latter was obtained separately for the father and the mother by offering six alternatives that were later categorized into three: low (illiterate, primary or secondary school degree), medium (high school or diploma degree) and high (university degree) for the analyses.

Statistical evaluation of the differences between the subgroups included the chi-square test for frequencies. The validity of the self-assessed need for fillings, gingival bleeding and the need for teeth straightening in comparison with clinical findings was measured by sensitivity (Sn), specificity (Sp), positive predictive value (PPV) and negative predictive value (NPV). The sum of Sn + Sp or PPV + NPV exceeding 120% was considered to be of good validity for the tests (Blicher et al, 2005). We fitted a logistic regression model to the data to explain factors related to having good or better self-perceived oral health. The model, controlled for socioeconomic backgrounds, produced the odds ratio (OR) and 95% confidence interval (CI). Goodness-of-fit was evaluated with the Hosmer-Lemeshow test.

RESULTS

A total of 78% of the 15-year-olds assessed their oral health as good or better. Based on self-assessment, 28% reported the need for a filling, 46% reported gingival bleeding and 23% reported the need for teeth straightening (Table 1).

In the clinical examination, we found sound dentition (DMFT = 0) in 40% of the 15-year-olds; 40% of the students had current caries (DT > 0) and 92% had gingival bleeding. We observed a definite need for orthodontic treatment in 26% (Table 1).

Self-assessing one's oral health as good or better was related to a higher level of parental education among girls (P = 0.03), but not among boys. Selfassessed oral health showed no variation according to the wealth status of the family or the location of the school. More of those with DMFT = 0 and DT = 0 Table 1 Distribution of self-assessed and clinically determined aspects of oral health among 15-year-olds, boys (n = 260) and girls^{**} (n = 249), in Tehran, Iran

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Self-assessment	Boys		Girls		P value [*]			
	n	(%)	n	(%)				
Oral health					0.855			
Excellent	26	11	25	10				
Very good	38	15	36	15				
Good	129	50	101	40				
Poor	41	16	41	17				
Very poor	9	3	7	3				
l don't know	17	5	39	15				
Need for a filling					0.106			
Yes	65	25	78	32				
No	195	75	170	68				
Gingival bleeding					0.040			
Yes	130	50	103	42				
No	130	50	143	58				
Need for teeth straightening					0.120			
Yes	53	20	65	26				
No	207	80	183	74				
Clinical findings								
DMFT					0.069			
0	114	44	91	37				
> 0	146	56	155	63				
DT					0.275			
0	160	62	144	59				
> 0	100	38	102	41				
Gingival bleeding					0.405			
Yes	241	93	223	91				
No	19	7	23	9				
IOTN					0.113			
Yes	60	23	72	29				
No	200	77	174	71				
*Chi-square test. **Data missing for 1 to 3 girls.								

assessed their oral health as good or better (P < 0.05).

Of those students who reported no need for a filling and the absence of gingival bleeding, one in three had assessed their oral health as excellent or very good (Table 2).

Sensitivity for the self-assessed need for a filling, presence of gingival bleeding and the need for teeth straightening were 42%, 49% and 37%, respectively; the corresponding specificities were 82%, 80% and 81%, respectively. Data in Table 3 present the measures of validity by gender.

The data in Table 4 present the results of the logistic regression model, controlled for socioeconomic backgrounds, clinical findings and self-assessments.

Table 2 Relationships between self-perceived oral health and self-assessment of the need for a filling, gingival bleeding and the need for teeth straightening among 15-year-olds in Tehran, Iran

Self-assessment	Self-perceived oral health ^a									
	Boys (n)	A (%)	B (%)	C (%)	P value [*]	Girls (n)	A (%)	B (%)	C (%)	P value [*]
Need for a filling					< 0.001					< 0.001
Yes	64	10	55	35		61	10	54	36	
No	179	32	53	15		149	37	46	17	
Gingival bleeding					0.108					< 0.001
Yes	124	23	51	26		81	18	43	39	
No	119	30	55	15		126	36	51	13	
Need for teeth straightening					0.514					0.254
Yes	49	24	49	27		60	22	50	28	
No	194	27	54	19		150	32	47	21	
[*] Chi-square test: ^a A = Excellent or very good B = Good C = Poor or very poor										

Excellent or very good, B = Good, C = Poor or very poor.

Table 3 Evaluation of self-assessed aspects of oral health as indicators of clinically determined oral health among 15-year-olds (N = 509) by means of Sn, Sp, PPV and NPV

Self-assessment	Sn (%)	Sp (%)	PPV (%)	NPV (%)	Sn + Sp (%)	PPV + NPV (%)
Boys (n = 260)						
Need for a filling	38	83	58	68	121	126
Gingival bleeding	53	78	96	11	131	107
Need for teeth straightening	36	84	41	81	120	122
Girls (n = 249) [*]						
Need for a filling	46	80	62	67	126	129
Gingival bleeding	44	82	96	13	126	109
Need for teeth straightening	38	78	42	75	116	117
*Data missing for 3 girls.						

Table 4 The OR for perceiving good or better^a oral health among 15-year-olds as explained by clinically determined indicators, and self-assessment of gingival and dental status and socioeconomic backgrounds, by means of a logistic regression model

Parameters in the model	Estimate of strength	SE	OR	CI 95%	P value
DMFT: 0 ≥ 0, 1 = 0	0.755	0.322	2.1	1.1-4.0	0.019
Clinical gingival bleeding: $0 = Bleeding$, $1 = No$ bleeding	0.180	0.558	1.1	0.4–3.5	0.748
IOTN: $0 = $ Yes, $1 = $ No	0.523	0.331	1.6	0.8–3.2	0.114
Need for a filling: $0 = $ Yes, $1 = $ No	0.770	0.300	2.1	1.1–3.8	0.010
Self-assessed gingival bleeding: $0 = Bleeding$, $1 = No$ bleeding	1.078	0.298	2.9	1.6-5.2	0.000
Need for teeth straightening: $0 = $ Yes, $1 = $ No	0.580	0.327	1.7	0.9–3.3	0.077
Gender: $0 = Boys$, $1 = Girls$	0.418	0.294	1.5	0.8–2.7	0.156
Parents' level of education	0.214	0.079	1.2	1.0-1.4	0.007
Location of the school: $0 = \text{Non-affluent}$ area, $1 = \text{Affluent}$ area	0.295	0.304	1.3	0.7-2.4	0.331
Wealth status of family ^b : $0 = Good$, $1 = Poor$	0.120	0.312	1.1	0.6–2.0	0.700
Constant	-2.815				
Goodness-of-fit ^c , <i>P</i> value = 0.301					

^aGood or better = Excellent, very good, good; ^bGood = living in own house, Poor = living in a rented house; ^cHosmer-Lemeshow test.

Self-perceiving one's own oral health as good or better was more likely for those with a sound dentition (OR = 2.1, P = 0.02), with no self-assessed need for a filling (OR = 2.1, P = 0.01), with self-assessed absence of gingival bleeding (OR = 2.9, P < 0.001) and with a high level of parental education (OR = 1.2, P = 0.007).

DISCUSSION

In the present study, more than two-thirds of the students were pleased with their oral health status (no gender differences). Self-assessed absence of gingival bleeding, no self-assessed need for a filling and intact teeth in the clinical evaluation were the most likely indicators for the students to report their selfperceived oral health as good or better.

In agreement with the present study, adolescents reporting high percentages of self-perceived oral health as good or better was a common finding in previous studies (Freeman et al, 1993; Chen et al, 1997; Östberg et al, 1999; Jiang et al, 2005). However, this result was unconfirmed with the clinical findings, and shows the students' low knowledge and awareness of their oral health problems. Previous studies have also reported a weak correlation between clinically based indices and self-perceived oral health. These indices usually reflect the providers' view rather than the patients' view (Kallio, 1996; Östberg et al, 2003; Goodman et al, 2004).

Sociocultural factors, individual expectations, methods and type of questions (Blicher et al, 2005), and adolescents' attitudes and beliefs (Östberg et al, 2001) are the factors that affect self-perceived oral health. The effects of socioeconomic status are well recognised for both general and oral health outcomes (Locker, 2000). In the present study, higher percentages of good or better self-perceived oral health are also related to a high level of parental education. This result shows that in Iran, a developing country, high level of parental education plays a positive role in the oral health outcomes of adolescents. Students with a low parental education level should receive a higher priority than other students in the oral health programme.

In line with the previous studies on different groups (Gilbert and Nuttall, 1999; Buhlin et al, 2002; Blicher et al, 2005; Dietrich et al, 2005), the low sensitivity and high specificity found in the present study were a common result regarding the selfassessment of oral health indicators among students. This result shows that students can detect healthy conditions more accurately than disease conditions. Therefore, self-assessment can be a useful method for detecting students with healthy conditions. Intermediate dental manpower such as a dental hygienist, a dental nurse or even a schoolteacher can help identify students with healthy conditions by using self-assessment questions. After this stage, students with unhealthy conditions could be referred for a professionally executed clinical examination that is a necessity for proper treatment planning.

Some have questioned the efficiency of the prevailing DMF indices for the epidemiological index registrations within dentistry (Birch, 1986; Lewis, 1996). In the present study, dental caries was found more often in the clinical evaluation than in the students' self-assessment and the students utterly failed to detect symptomless dental caries lesion. However, no self-assessed need for a filling and intact teeth in the clinical evaluation were the predictors for reporting self-perceived oral health as good or better.

In the present study, the percentage of selfassessed gingival bleeding was less than that of the clinical finding. There are some explanations for this difference. Detecting minor gingival bleeding during probing is easy for clinicians, but reporting minor gingival bleeding seems difficult for students. A healthy person often has some gingival bleeding that does not indicate disease (Buhlin et al, 2002). Any correlation between self-assessed gingival bleeding and clinical findings is usually weak (Kallio, 1996; Östberg et al, 2003), and subjects' evaluations are usually lower than the clinical findings. Clinical measurements of periodontal status are difficult to standardise due to probing strength, angulations, patient pain and the degree of inflammation (Pihlstrom, 1992). Self-assessed gingival bleeding can, however, be a useful method for monitoring the gingival health of a population, and this monitoring improves gingival health (Kallio, 1996). In the present study, self-assessed absence of gingival bleeding was the strongest predictor for reporting self-perceived oral health as good or better.

The lowest sensitivity was found for the need for teeth straightening. Self-perception of one's need for orthodontic treatment is usually lower than the clinical finding (Sheats et al, 1998; Chestnutt et al, 2006). Occlusal features that are believed to indicate a need for orthodontic treatment in the clinical evaluation may have no aesthetic implications for students, who easily accept their teeth condition at this age (Chestnutt et al, 2006).

Based on the sum of sensitivity and specificity (Blicher et al, 2005), the validity of students' selfassessments in the present study was good except for the need for teeth straightening. Validity is likely

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to vary depending on the type of question asked; the idea and wording are important factors in such questions. The methods of measurement and population characteristics are the other important factors for validity. The form of the questionnaire, disease status, socioeconomic status and dental care utilisation are likely to influence the validity (Blicher et al, 2005). Placing special emphasis on factors that affect the test validity could enhance the validity of self-assessments, but further research is needed.

Low assessments of dental caries, gingival bleeding and the need for teeth straightening in the present study may influence one's oral health care seeking behaviours (Atchinson and Gift, 1997; Yeh et al, 2000), especially in a country such as Iran with few clinicians in proportion to the population (Bayat et al, 2006). Educating the students about the signs of dental and gingival problems could help them make more precise self-assessments. In this way, the accuracy of self-assessment can be improved (Buhlin et al, 2002).

CONCLUSIONS

With limited or diminishing resources for dental care, identifying those for whom health resources will produce the maximum health gain may be more important. In this case, the use of self-assessment indicators for screening, monitoring and reporting oral conditions in the population level can be a useful method. Educating the students on the signs of dental diseases could increase reliability of selfassessment to provide a useful method for such reporting, especially in countries with developing oral health care systems.

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