Setting oral health goals that include oral health-related quality of life measures: a study carried out among adolescents in Thailand

Incorporação da qualidade de vida relacionada à saúde bucal em metas de saúde bucal: estudo conduzido em adolescentes tailandeses

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Abstract

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The aim of this study was to assess the association between oral diseases and condition-specific oral health-related quality of life (CS-OHRQoL) as a basis for proposing OHRQoL-based goals for the population of 15-year-olds in Thailand. Oral examinations and OHRQoL interviews were conducted with 871 15-year-olds as part of the Sixth Thailand National Oral Health Survey. The severity of oral impacts was categorized using "intensity". Associations between oral diseases and CS-OHRQoL were analyzed using chi-square and logistic regression. Thirty-nine percent of 15-year-olds experienced moderate/higher levels oral impacts on quality of life. Compared to those individuals with no tooth decay, adolescents with one or four or more decaying teeth were three and seven times more likely to experience moderate/ higher impacts, respectively. Adolescents with extensive gingivitis in 3 or more mouth sextants were twice as likely to experience moderate/higher CS-impacts. Based on these findings, it is proposed that goals should focus on untreated decaying teeth and extensive gingivitis. Oral health goals for 15-year-olds should include specific OHRQoL measures.

Dental Caries; Adolescent; Gingivitis; Oral Health; Quality of Life

Introduction

The major goal of the dental profession is to improve peoples' quality of life [1]. Therefore, quality of life measures must be included in setting oral health goals for the profession. Incorporating quality of life measures into national oral health goals is vital because oral health is not the absence of oral diseases, but the physical, psychological and social well-being in relation to oral status [2]. The World Dental Federation (FDI)/ World Health Organization (WHO)/International Association for Dental Research (IADR) collaboration published guidelines recommending the development of broader oral health goals rather than only using oral disease goals [3]. The guidelines stressed the importance of oral health-related quality of life (OHRQoL). They stated that the goals of oral health services were "*to minimize the impact of diseases of oral and craniofacial origin on health and psychosocial development*" [3] (p. 286). They encouraged local actions to adopt such a broader approach to goal setting and oral health service planning. The FDI/ WHO/IADR guidelines also provided examples of goals for reductions in specific oral diseases that are known to cause impacts on quality of life. A number of OHRQoL indexes have been developed and applied to compliment clinical indices [4]. Although some countries have included OHRQoL measures in their national oral health surveys [5,6,7,8,9] and some studies have proposed

specific applications of OHRQoL to oral health service planning [10,11], no country had ever comprehensively included OHRQoL measures in setting oral health goals for the population.

Previous oral health goals for the Thai population were disease-based and typical of those set by many countries. The oral health goals for adolescents in the year 2000 stated that not less than 75% of 18-year-olds should retain all 28 permanent teeth, and all 18-year-olds should have at least two sextants, on average, with healthy periodontal tissues (Community Periodontal Index; CPI = 0) [12]. In 2007, the Thai government published its oral health goals for 2020 in accordance with the FDI/WHO/IADR guidelines and a theoretical framework for linking clinical status and quality of life was developed. The ultimate goal of the Thai Oral Health Service is: "*people of all ages should have oral health that enables good quality of life and social well-being*" [13] and clinical goals were set based on the assumption that a reduction in oral diseases would lead to better quality of life. Clinical data from previous National Oral Health Surveys [14,15] was used to provide a baseline and only one oral health goal was set for adolescents: not more than 60% of 17 to 19-year-olds should have periodontal disease (CPI = 1 or above) [13]. Although evidence suggests a positive association between oral status and OHRQoL, the defined clinical goal for Thai adolescents was theoretical and not supported by scientific evidence of an association.

Relatively few studies exist on the association between oral disease and OHRQoL in adolescent populations and their findings are inconclusive. Dental caries and progressive forms of periodontal disease were significantly associated with adolescents' OHRQoL [16,17,18], while findings regarding general periodontal disease, missing teeth and dental fluorosis were equivocal [16,17,19,20]. Moreover, most of the studies used generic OHRQoL measures that have poorer discriminative ability than condition-specific (CS) measures [21,22]. As the latest Thai oral health survey included condition-specific OHRQoL measures and Thai oral health goals for 2020 explicitly mention OHRQoL as the ultimate goal of the oral health service, it was considered important to assess the relation between clinical and OHRQoL measures using a CS-OHRQoL measure developed in Thailand. Findings from the Thai oral health survey regarding overall OHRQoL in 15-year-olds suggested that, although oral impacts in this age group were very common (83%), the prevalence of severe and very severe impacts was only 8%. In addition, oral ulcers and toothache were the main perceived causes of overall oral impacts [23]. In addition to the information from the above

study, data from Thailand is used to illustrate the broader principle of setting oral health goals as recommended by the FDI/WHO/IADR guidelines. The objectives of this study were therefore to assess the association between specific oral diseases and CS-OHRQoL and classify adolescents in terms of level of risk of adverse effects on quality of life. Finally, based on these findings, the study aimed to propose OHRQoL-based oral health goals for this age group in Thailand.

Methods

National Oral Health and OHRQoL Survey

The *Sixth Thailand National Oral Health Survey* was conducted in 2007 [15]. The total sample of 15-year-olds was 1,742. Full details of sampling procedures have been described elsewhere [15,23]. Two out of the four provinces/sub-districts selected by the national survey were randomly selected for this study resulting in a sample size of 871 individuals that represents half the national survey. All adolescents in the randomly selected provinces/sub-districts were recruited as study participants. The protocol was approved by the Ethics Committee of Chulalongkorn University.

Adolescents were orally examined by trained and calibrated community dentists using WHO criteria [24] for the diagnosis of caries and fluorosis. The CPI [25] was used to assess periodontal conditions of six mouth sextants: upper right, upper anterior, upper left, lower left, lower anterior and lower right. Components of the CPI were scored separately in the following manner: gingival bleeding without calculus (score one), calculus without gingival bleeding (score two), shallow pocket (score three), deep pocket (score four) and calculus with bleeding (score five). To assess OHRQoL, the adolescents were interviewed by trained and calibrated interviewers using the Thai version of the Oral Impacts on Daily Performances (OIDP) [26]. This index assesses oral impacts during the past six months in relation to eight daily performances: (1) eating, (2) speaking, (3) cleaning teeth, (4) emotional stability, (5) relaxing/sleeping, (6) smiling without feeling embarrassment, (7) studying, and (8) social contact. For each performance, a frequency and severity score, both ranging from zero to five, were recorded. When an impact was detected, the adolescent was asked to report the oral conditions that were perceived to be the main causes. Ten percent of adolescents were re-examined and re-interviewed. The Intraclass Correlation Coefficients (ICC) was 0.926 for the oral examinations and 0.862 for OHRQoL interviews. In addition,

socio-demographic information regarding sex, region, place of residence (municipal/rural) and school type (private/public) was recorded.

Data analysis

Stata 10.0 (Stata Corp., College Station, USA) was used for data analysis. To assess dental caries and fluorosis the DMFT score and its components (DT, MT and FT) were calculated. Periodontal disease was analyzed in terms of overall periodontal disease (codes one to five) and using the CPI components (gingivitis without calculus = score one, calculus without gingivitis = score two, periodontal pocket = score three to four and calculus with gingivitis = score five). In addition, an analysis of gingivitis without or with calculus (score of one or five), and calculus without or with gingivitis (score of two or five) was performed. OHRQoL was analyzed in relation to overall oral impacts and CS-impacts. CS-impacts were impacts caused by specific oral conditions, calculated by taking into account the oral conditions that adolescents perceived as the main causes of impacts. Eight groups of CS-impacts were calculated: (1) dental caries: main perceived causes of oral impacts were toothache, sensitive teeth, hole in a tooth, broken filling, toothache after filling, (2) periodontal disease: main perceived causes were inflamed gums, gum pain, tartar, bad breath, (3) edentulous area: main perceived cause was tooth space due to extracted permanent tooth, (4) oral lesions: main perceived causes were oral ulcer or other oral lesions such as herpes, dry/cracked lips, (5) discoloration: main perceived cause was tooth/teeth colour, (6) malocclusion: main perceived cause was tooth/teeth position, (7) traumatic dental injuries: main perceived cause was a ffractured tooth, and (8) natural process: main perceived causes were tooth space due to unerupted permanent tooth, exfoliating primary tooth and erupting permanent tooth.

The "intensity" of impacts was used instead of impact score to reflect the severity of oral impacts. The OIDP score is the sum of eight performance scores, where each performance score is derived by multiplying the frequency score with the severity score. Thus, a score reflects both extent (the number of performances with impacts) and intensity (the severity of impacts on each performance)[27]. The concept of intensity focuses on the most severe impact on any performance regardless of the number of performances that are affected. For each performance, frequency and severity scores were recorded ranging from zero to five. There are therefore 15 possible performance scores (0, 1, 2, 3, 4, 5, 6, 8, 9, 10, 12, 15, 16, 20, 25). Intensity was defined as the high-

est performance score out of the eight performances, classified into six levels: none, very little, little, moderate, severe and very severe, where the highest performance scores were 0, 1-2, 3-5, 6-12, 15-16 and 20-25 respectively. Moderate or higher levels of impacts were defined by the highest performance score of six or over. The classification of intensity levels has been fully described elsewhere[23]. These measures were used instead of impact scores since scores are not a clear representation of the severity of impacts[28].

The association between oral diseases and OHRQoL was investigated using chi-square for trend and logistic regression. Oral diseases were analyzed as independent categorical variables predicting the presence or absence of CS-impacts. Socio-demographic variables and other possibly confounding oral diseases were controlled for multiple logistic regression. Multicollinearity existed for the three socio-demographic variables: region, place of residence (municipal/rural) and school type (private/public). Bangkok was considered municipal, while the other four regions consisted of municipal and rural areas. All private schools were in municipal areas while public schools were in both municipal and rural areas, therefore creating a variable of "region-place of residence" consisting of nine categories (e.g. Bangkok, central-municipal, central-rural, north-municipal, north-rural) that was used instead of the individual variables region, place of residence and school type. The stepwise technique was used and the goodness-of-fit test of the models using the log-likelihood and pseudo r2 revealed that the best fit models contained sex and region-place of residence as socio-demographic variables.

Panel of dental public health professionals

To propose OHRQoL-based oral health goals, dental public health professionals, academics and dentists employed by the Dental Health Division of the Department of Health of the Ministry of Public Health were asked to give their opinions and comments on the findings of this study. In addition to the SMART concept for goal setting (specific, measurable, attainable, realistic and time-bound)[29], compatibility with current strategies and plans for oral health services were also considered.

Results

Oral status and OHRQoL

A total of 811 15-year-olds (93.1% response rate) completed the OHRQoL interviews and had oral examinations, of which 48% were male, 43% resided in municipal areas and 89% were attending public schools (Table 1). Caries prevalence was 68.6%. The mean DMFT score was 2.4 (±2.7): DT = 1.2 (±1.9), MT = 0.1 (±0.4) and FT = 1.1 (±1.9). Prevalence of periodontal disease was 81.5% with an average of 2.9 (±2.1) diseased sextants per child. Most adolescents (53.1%) had gingivitis without calculus, while 46.1% and 39.2% had calculus without and with gingivitis respectively. None of the adolescents had periodontal pockets and only 1% had dental fluorosis (Table 1). Eighty-three percent of 15-year-olds reported experiencing oral impacts on quality of life during the past six months, 39% of which at a moderate/higher level of intensity. CS-impacts attributed to dental caries were the most prevalent impacts (40.7%), followed by CS-impacts attributed to oral lesions (36.4%) and periodontal disease (29.6%) (Table 1).

Associations between oral diseases and moderate/higher level of oral impacts on quality of life

Following discussions with dental public health professionals, academics and dentists from the Ministry of Public Health, it was decided that only oral impacts of moderate to very severe levels of intensity should be considered when setting oral health goals, since the majority of impacts reported were of very little or little level of intensity. With a moderate threshold, CS-impacts attributed to dental caries, periodontal disease, tooth discoloration and edentulous area were 18.4%, 11.3%, 3.1% and 0.1%, respectively. The association between moderate/higher CS-impacts and dental caries, periodontal disease and fluorosis with actual oral diseases was investigated. The percentage of adolescents experiencing moderate/higher CS-impacts attributed to caries increased significantly with increasing number of decayed teeth ($p < 0.001$) (Table 2). Significant differences in moderate/higher CS-impacts attributed to caries were also observed among adolescents with and without missing teeth due to caries ($p < 0.05$) but not for filled teeth.

Table 1

Socio-demographic characteristics, oral health status and oral impacts on quality of life of 15-year-old Thai adolescents (N = 811).

Variables	Frequency (%)
Socio-demographic characteristics	
Sex	48.2
Boy	
Place of residence	43.3
Municipal	
School type	89.3
Public	
Region	
Bangkok	14.2
Central	17.8
North	19.6
South	18.3
Northeast	30.1
Oral health status	
Caries experience (DMFT > 0)	68.6
Range DMFT scores	0-16
Mean (sd) DMFT score	2.4 (2.7)
Untreated decay (DT > 0)	48.5
Range DT scores	0-16
Mean (sd) DT score	1.2 (1.9)

(continues)

Table 1 (continued)

Socio-demographic characteristics, oral health status and oral impacts on quality of life of 15-year-old Thai adolescents
(N = 811).

Variables	Frequency (%)
Oral health status	
Missing teeth due to caries (MT > 0)	9.0
Range MT scores	0-4
Mean (sd) MT score	0.1 (0.4)
Filled teeth (FT > 0)	40.4
Range FT scores	0-16
Mean (sd) FT score	1.1 (1.9)
Periodontal disease (CPI = 1, 2, 5)	81.5
Range sextants	0-6
Mean (sd) sextants	2.9 (2.1)
Gingivitis without calculus (CPI = 1)	53.1
Range sextants	0-6
Mean (sd) sextants	1.0 (1.3)
Calculus without gingivitis (CPI = 2)	46.1
Range sextants	0-6
Mean (sd) sextants	0.9 (1.3)
Calculus with gingivitis (CPI = 5)	39.2
Range sextants	0-6
Mean (sd) sextants	0.9 (1.5)
Periodontal pocket	0
Fluorosis	1.0 *
Oral impacts on quality of life	
Overall oral impacts	83.2
Moderate/Higher intensity	39.0
Condition-specific impacts attributed to	
Caries	40.7
Moderate/Higher intensity	18.4
Periodontal diseases	29.6
Moderate/Higher intensity	11.3
Edentulous area	0.4
Moderate/Higher intensity	0.1
Oral lesions	36.4
Moderate/Higher intensity	15.7
Discoloration	7.9
Moderate/Higher intensity	3.1
Malocclusion	12.8
Moderate/Higher intensity	7.2
Traumatic dental injuries	1.0
Moderate/Higher intensity	0.4
Natural process	2.1
Moderate/Higher intensity	0.9

CPI: Community Periodontal Index (1 = gingivitis without calculus, 2 = calculus without gingivitis, 5 = calculus with gingivitis);
DMFT: number of decayed, missing due to caries and filled teeth; DT: number of decayed teeth; FT: number of filled teeth;
MT: number of missing teeth due to caries.
* Data on fluorosis available for only 314 children.

Table 2

Percentage of 15-year-old Thai adolescents with moderate to very severe condition-specific impacts (CS-impacts), by different levels of oral diseases (N = 811).

Oral disease	%	Moderate to very severe CS-impacts (%)
Caries		
Untreated decay		
None	51.5	8.4
1 tooth	19.9	24.8
2 teeth	11.1	25.6
3 teeth	6.5	30.2
4 teeth	4.0	37.5
5/more teeth	7.0	40.4 *
Missing teeth		
None	91.0	17.3
1/more teeth	9.0	28.8 **
Filled teeth		
None	59.6	15.9
1 teeth	16.0	22.3
2 teeth	10.6	19.8
3/more teeth	13.8	23.2 ***
Periodontal disease		
None	18.5	6.0
1-2 sextants	26.4	10.3
3/more sextants	55.1	13.6 #
Gingivitis		
None	31.4	5.9
1-2 sextants	33.2	11.2
3/more sextants	35.4	16.4 *
Calculus		
None	36.1	9.9
1-2 sextants	28.9	12.0
3/more sextants	35.0	12.3 ***
Gingivitis without calculus		
None	46.9	7.6
1-2 sextants	39.3	13.8
3/more sextants	13.8	17.0 #
Calculus without gingivitis		
None	53.9	13.0
1-2 sextants	31.7	10.9
3/more sextants	14.4	6.0 ***
Calculus with gingivitis		
None	60.8	8.5
1-2 sextants	23.7	15.6
3/more sextants	15.5	15.9 #
Fluorosis ##		
No	99.0	3.2
Yes	1.0	0.0 ***

Note: Periodontal codes: periodontal disease = 1, 2, 5; gingivitis = 1, 5; calculus = 2, 5; gingivitis without calculus = 1; calculus without gingivitis = 2; calculus with gingivitis = 5.

Chi-square test for missing teeth and fluorosis. Chi-square for trend test for untreated decayed, filled teeth and periodontal diseases.

* $p < 0.001$; ** $p < 0.05$; *** non-significance; # $p < 0.01$; ## Data on fluorosis available for only 314 adolescents.

Moderate/higher CS-impacts attributed to periodontal disease were significantly associated to increasing numbers of sextants with periodontal disease (p < 0.01), gingivitis (p < 0.001), gingivitis without calculus (p < 0.01) and calculus with gingivitis (p < 0.01), whereas having more sextants with calculus or calculus without gingivitis was not significantly associated to moderate/higher CS-impacts attributed to periodontal disease. Moderate/higher CS-impacts attributed to tooth discoloration were not significantly associated with dental fluorosis (Table 2).

Multivariate logistic regression was performed to ascertain the association between oral diseases and moderate/higher CS-impacts (Table 3). After adjusting for sex and region-place of residence, the likelihood of experiencing moderate/higher CS-impacts attributed to caries increased with the number of decayed teeth. When compared to adolescents with no decayed teeth, adolescents with one decayed tooth were 3.3 times (95%CI: 1.90-5.5) more likely to experience moderate/higher impacts. This likelihood increased to 6.5 (95%CI: 2.9-15.0) and 7.6 (95%CI: 3.8-15.0) times in adolescents with four and five or more decayed teeth respectively. The association between missing teeth and moderate/higher CS-impacts attributed to caries, after adjusting for socio-demographic variables and decayed teeth, was not significant. These findings reveal the confounding role of decayed teeth. For moderate/higher CS-impacts attributed to periodontal disease, adjusted analyses revealed a non-significant association with periodontal disease and calculus with gingivitis. Gingivitis and gingivitis without calculus occurring in one to two sextants did not significantly increase the likelihood of experiencing moderate/higher CS-impacts. However, when present in three or more sextants, the likelihood of experiencing these impacts increased almost twofold (Table 3).

Classification of the risk of adverse effects on quality of life and proposals for OHRQoL-based oral health goals in Thailand

Based on an increased likelihood of experiencing moderate/higher impacts found by this study, four levels of risk of adverse effects on quality of life due to oral diseases were identified: Small Risk, Great Risk, Greatest Risk and No Risk (Figure 1).

"Small Risk" refers to adolescents with gingivitis in three or more sextants. Currently, 35.4% of 15-year-olds are in this category and are approximately two times more likely to experience moderate/higher oral impacts on quality of life.

"Great Risk" refers to adolescents with one to three untreated decayed teeth. Currently, 37.5% of 15-year-olds are in this category and are three to four times more likely to experience moderate/higher oral impacts on quality of life.

"Greatest Risk" refers to adolescents with four or more untreated decayed teeth. Currently, 11% of 15-year-olds are in this category and are up to seven times more likely to experience moderate/higher oral impacts on quality of life.

"No Risk" refers to adolescents with no untreated tooth decay and with gingivitis in less than three sextants, regardless of the number of sextants with calculus. Currently, 35.6% of 15-year-olds are in this category and do not experience moderate/higher oral impacts on quality of life.

The above results were discussed by a panel of dental public health professionals who, based on these findings agreed that goals should focus on reducing the number of untreated decayed teeth and extensive gingivitis in order to improve the quality of life of Thai adolescents. A panel of dental public health professionals proposed a reduction in the percentage of adolescents subject to Small, Great and Greatest Risk. In addition to existing oral health goals for 15-year-olds, the following OHRQoL-based goals are recommended: (1) "no more than 25% of 15-year-olds should have untreated decayed teeth and none should have more than three untreated decayed teeth", and (2) "no more than 25% of 15-year-olds should have extensive gingivitis occurring in three or more sextants".

Discussion

The integration of OHRQoL with clinical measures provides a theoretical framework for oral health goal-setting for 2020 where oral disease is linked to the ultimate goal of quality of life [13]. However, the OHRQoL-based oral health goals proposed by this study differ from the official oral health goals for adolescents in Thailand. Dental caries was considered the most important oral problem by this study because the likelihood of experiencing moderate/higher impacts on quality of life is greatest in the case of untreated tooth decay. An adolescent with one to three untreated decaying teeth was three to four times more likely to experience moderate/higher oral impacts, while an adolescent with four or more untreated decaying teeth is seven times more likely. This study categorized these groups (one to three and four or more untreated decaying teeth) as Great Risk and Greatest Risk, respectively, in terms of adverse effects on quality of life, and therefore

Table 3

Logistic regression of moderate to very severe condition-specific impacts (CS-impacts) on oral diseases in 811 15-year-old Thai adolescents.

Oral disease	Moderate to very severe CS-impacts (%)			
	Caries		Periodontal disease	
	Unadjusted OR (95%CI)	Adjusted OR (95%CI)	Unadjusted OR (95%CI)	Adjusted OR (95%CI)
Untreated decay				
None	1.0	1.0		
1 tooth	3.6 (2.2-6.0) *	3.3 (1.9-5.5) *		
2 teeth	3.8 (2.1-6.8) *	3.4 (1.8-6.2) *		
3 teeth	4.7 (2.4-9.3) *	3.9 (1.9-8.3) *		
4 teeth	6.6 (3.0-14.5) *	6.5 (2.9-15.0) *		
5/more teeth	7.4 (3.9-13.9) *	7.6 (3.8-15.0) *		
Missing teeth				
None	1.0	1.0		
1/more teeth	1.9 (1.1-3.3) **	1.3 (0.7-2.4)		
Periodontal disease				
None			1.0	1.0
1-2 sextants			1.8 (0.8-4.0)	1.4 (0.6-3.1)
3/more sextants			2.5 (1.2-5.1) **	1.9 (0.9-4.2)
Gingivitis				
None			1.0	1.0
1-2 sextants			2.0 (1.1-3.8) **	1.6 (0.8-3.1)
3/more sextants			3.1 (1.7-5.8) *	2.4 (1.3, 4.5) ***
Gingivitis without calculus				
None			1.0	1.0
1-2 sextants			1.9 (1.2-3.2) ***	1.5 (0.9-2.5)
3/more sextants			2.5 (1.3-4.6) ***	2.1 (1.1-4.2) **
Calculus with gingivitis				
None			1.0	1.0
1-2 sextants			2.0 (1.2-3.3) ***	1.5 (0.9-2.5)
3/more sextants			2.0 (1.1-3.6) **	1.7 (0.9-3.3)

OR: odds ratio; 95%CI: 95% confidence interval.

Note: Periodontal codes: periodontal disease = 1, 2, 5; gingivitis = 1, 5; gingivitis without calculus = 1; calculus with gingivitis = 5.

* $p < 0.001$; ** $p < 0.05$; *** $p < 0.01$. All adjusted analyses were controlled for sex and region-place of residence. Adjusted analyses for untreated decay were additionally controlled for missing teeth, adjusted analyses for missing teeth were additionally controlled for untreated decay, adjusted analyses for gingivitis without calculus (code 1) were additionally controlled for calculus with gingivitis (code 5), and adjusted analyses for calculus with gingivitis (code 5) were additionally controlled for gingivitis without calculus (code 1).

urges oral health services to reduce the percentage of adolescents belonging to these groups, particularly the Greatest Risk group. Our findings suggest that early treatment is needed for adolescents with untreated dental caries and that oral health promotion is necessary to further reduce the number of adolescents with dental caries. Further investigations are necessary to identify the geographic concentration of the Great and Greatest Risk groups and the underlying social causes of dental caries in vulnerable populations that need to be addressed. Population-based interventions targeting all adolescents in deprived areas are recommended [30,31,32].

The difference between the published oral health goals in Thailand and those proposed by this study reflects the different concepts of oral health and oral disease. Although oral diseases may have adverse affects on quality of life, the impacts of some levels of oral diseases can be insignificant. Studies on overall periodontal disease found no significant association between adolescents with and without disease [19,20]. Although generally consistent with the findings of the current study, it was shown that acute necrotizing ulcerative gingivitis and periodontal attachment loss were significantly associated with poor OHRQoL [18]. In the present study, although exten-

Figure 1

Proportions of 15-year-old Thai children at different levels of risk of adverse effects on quality of life due to oral diseases (N = 881).
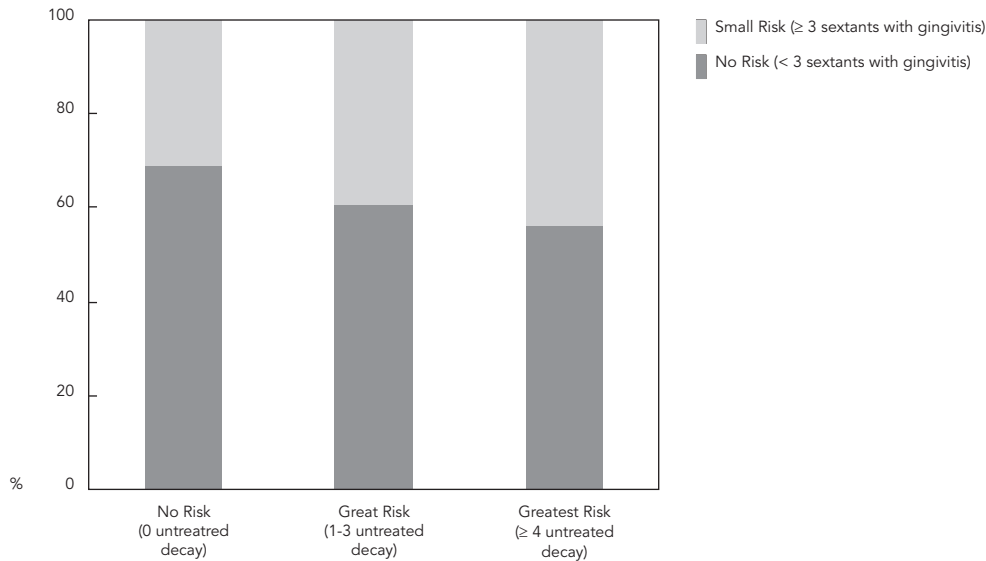
sive gingivitis was significantly associated with OHRQoL, no association was found between calculus and OHRQoL, even in more severe cases. These findings are similar to those from Tanzania that show that there is no significant positive association between severe calculus and overall oral impacts. It is also interesting to note that the same study showed a positive association with high levels of dental plaque [17]. In contrast, Mbawalla et al. [17], applying different clinical measures to those used by this study, found that CS-impacts attributed to periodontal disease were not significantly associated with high levels of plaque or calculus. Therefore, further studies using CS-OHRQoL measures are recommended, particularly in relation to periodontal disease, in order to ascertain the degree or extent and form of disease and define the focus of dental public health interventions since attempts to reduce high disease prevalence with limited resources is impractical. Although the findings of this study show that overall periodontal disease and calculus in adolescents were not associated with oral impacts and gingivitis and calculus did not invariably progress to periodontitis [33], longitudinal studies are recommended to investigate the long-term impacts of such forms of periodontal disease. This study's findings regarding untreated

tooth decay corroborate the findings of all previous studies and confirmed that adolescents with untreated tooth decay were significantly more likely to have poor OHRQoL [16,17,19,20].

A limitation of the present study was the lack of clinical data on oral lesions and malocclusion since these factors were not included in *Thai National Oral Health Survey* [15,23]. Due to the absence of such clinical data, it was not possible to perform an analysis of the relationship between OHRQoL and oral conditions. Therefore, it was not possible to assess the importance of clinical oral lesions and malocclusion in terms of their effect on significant oral impacts on adolescents' quality of life. To accurately set OHRQoL-based oral health goals for adolescents, it is suggested that oral examination of these conditions should be included in national oral health surveys.

This study has important implications for oral health service planning. Using a disease-based approach results in high levels of normative oral health needs and unrealistic oral health goals [10,11]. The OHRQoL approach follows the FDI/WHO/IADR guidelines [3], provides evidence of the type and extent of oral diseases in the country that should be considered as real dental public health problems, and therefore leads to more appropriate and realistic oral health goals

and services. The findings of this study are not a universal representation of the association between oral diseases and OHRQoL since individuals' perceptions of oral health vary from one social context to another [34]. Moreover, the classification of levels of risk of the adverse effects on quality of life is relative to a population's perception and therefore may vary between countries. Nevertheless, all countries are recommended to integrate the conceptual ideas of the FDI/WHO/IADR guidelines into their oral health service planning to assure that attempts to reduce oral diseases lead to improvements in the quality of life of the population.

Resumo

O objetivo deste estudo foi avaliar a associação entre doença bucal e a condição específica de qualidade de vida associada à saúde bucal (CS-OHRQoL), como base para propor OHRQoL metas para adolescentes tailandeses. Exame clínico bucal e entrevista foram realizados em 871 adolescentes na faixa etária de 15 anos, como parte da 6ª Pesquisa Nacional Tailandesa de Saúde Bucal. *A severidade do impacto bucal foi categorizada usando-se a "intensidade". A associação entre doença bucal e CS-OHRQoL foi investigada usando-se o teste qui-quadrado e regressão lógica. Trinta e nove por cento da amostra reportaram impactos bucais de grau moderado/elevado. A probabilidade de reportar um impacto bucal de grau moderado/elevado dos adolescentes com um dente cariado e aqueles com 4 ou mais foi 3 e 7 vezes maior, respectivamente, quando comparada à dos adolescentes sem dentes cariados. A presença de gengivite severa em 3 ou mais sextantes dobrou a probabilidade de ocorrência do CS-impacto de grau moderado/elevado. Metas de saúde bucal para adolescentes devem incluir instrumentos específicos de OHRQoL.*

Cárie Dentária; Adolescente; Gengivite; Saúde Bucal; Qualidade de Vida

Contributors

S. Krisdapong contributed to study conception, the literature review, research design, data collection, input, validation, analysis and interpretation, drafting of the manuscript and final approval of submitted manuscript. P. Prasertsom contributed to research design, data collection and input, critical revision of the manuscript for important intellectual content and final approval of the submitted manuscript. K. Rattanarangsima contributed to research design, data collection and input, critical revision of the manuscript for important intellectual content and final approval of submitted manuscript. S. Adulyanon contributed to study conception, research design, critical revision of the manuscript for important intellectual content and final approval of the submitted manuscript. A. Sheiham contributed to study conception, interpretation of data, critical revision of the manuscript for important intellectual content and final approval of the submitted manuscript.

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