The effects of the oral care behaviors of adolescents on self-perceived oral health.

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Abstract

Objective: The purpose of the study is to investigate the relationship between oral health behaviors and Self- perceived oral health in Korean adolescents.

Methods: The survey data was extracted from Korea National Health and Nutrition Examination Survey (KNHANES) VI-3 (2015). The subjects of this study were 488 adolescent samples aged 13 to 18 years old. The data about gender, age and use of oral care supplies were analyzed without conversion. SPSS version 22.0 was used for the statistical analysis.

Results: The results were significant differences in the self-perceived oral health status according to the BMI, tooth brushing frequency, use of dental floss and use of mouthwash (p<0.05). Multiple logistic regression analysis revealed that the tooth brushing frequency and the use of mouthwash were found to significantly affect the self-perceived oral health status (p<0.05).

Conclusion: When the number of brushing times is large and oral hygiene auxiliary products are used, the interest in oral care is high and the oral hygiene is perceived as well because it is well known and practiced. In adolescence, basic and systematic oral health care education should be expanded and effective oral health care programs should be developed through diverse and interesting media.

Keywords: Adolescents, Tooth brushing, Obesity, Oral care behaviors, Oral health.

Introduction

Recently, modern people consider health to be very important and they have made various efforts to improve their quality of life. In particular, oral health is closely related to the quality of life, including the demographic factors, psychological factors, oral hygiene management, oral health behavioral factors and socioeconomic factors [1,2]. The teeth have an important part in oral health that should be emphasized, and continuous care is required to prevent oral diseases.

Adolescence is an imperfect transition period and it is a time of great physical, emotional, and social changes. However, the awareness of adolescents on the importance of health is low [3-5]. It has been reported that adolescents form behaviors and attitudes toward health during this period, which may last for a lifetime [6]. In addition, the beliefs or behaviors of adolescents on health are closely related to their lifelong quality of life [7]. Dental caries occurs frequently and periodontal disease may start during adolescence, thus active oral care is necessary. Tooth brushing is the basic oral care method at this time, and the use of oral hygiene care supplies is also known to be important [8]. Proper tooth brushing can prevent oral diseases, such as periodontal disease and dental caries, and foster the self-care ability for oral health through the changes in knowledge, attitude and behavior [9]. Therefore, adolescence is a time that requires the securement of the quality of life by understanding oral health care behaviors.

In regard to oral health awareness, many previous studies have reported that subjective oral health awareness is associated with objective oral health status [10-12]. In other studies, there was either no association between them or an opposite association was shown [13]. The reason for the varying opinions is that the item of oral health is not only related to the objective oral health status, but it is also complexly influenced by socio-cultural factors and the degree of oral health awareness [10].

Therefore, the purpose of this study was to investigate whether the adolescents' general characteristics and behaviors of tooth brushing and using oral hygiene aids affect their self-perceived oral health by using the raw data of the Korea National Health and Nutrition Examination Survey (KNHANES) to seek a systematic and prevention-oriented oral care plan. This study also aimed to use the findings as basic data for the development of various programs to promote the oral health of adolescents.

Materials and Methods

Study Subjects

For this study, the raw data of Korea National Health and Nutrition Examination Survey (KNHANES) VI-3 (2015) were used. Among the total of 7,380 samples, 488 adolescent samples aged 13 to 18 years old were extracted, excluding 6,892 samples aged below 13 years old and 19 years or older. Among them, 102 samples with a missing value in the major variable were excluded and 386 adolescents were finally included in this study.

Study Method

From the raw data of KNHANES VI-3, the gender, age, body mass index (BMI), tooth brushing before and after breakfast, lunch and dinner, tooth brushing after snacking, tooth brushing before bedtime, use of dental floss, use of interdental brush, use of mouthwash, and self-perceived oral health status were used as variables.

The data on gender, age and use of oral care supplies were analyzed without conversion. The body mass index was classified into 'underweight' for a BMI below 18.5, 'normal' for a BMI of 18.5 or higher and below 23.0, 'overweight' for a BMI of 23.0 or higher and below 25.0 and 'obesity' for a BMI of 25.0 or higher. In addition, the tooth brushing frequency was calculated by summing the timing of tooth brushing based on the tooth brushing status by timing of the subjects, while the calculated frequency was classified into 0-1 time, 2 times, 3 times and 4 times or more. For the self-perceived oral health status, 'very bad' and 'bad' were classified into 'bad', while 'average', 'good' and 'very good' were classified into 'good' for statistical testing.

Statistical Analysis

In this study, a composite sample analysis was conducted because the raw data of KNHANES were extracted by using a stratified two-stage cluster sample design instead of a simple random sampling. The composite sampling design was made by using stratified and clustered variables, and applying the weights of the questionnaire and examination survey.

In order to investigate the general characteristics and oral health-related characteristics of the subjects, frequency analysis and descriptive statistics analysis were conducted. In order to examine the ratio of the subjects who perceived their oral health status as good or poor, the chi-square test

was performed. Meanwhile, an independent samples t-test was performed in order to compare the means of age and BMI of the subjects according to their self-perceived oral health status and a multiple logistic regression analysis was performed in order to determine the factors affecting the self-perceived oral health status of the subjects.

For the statistical analysis, SPSS version 22.0 (IBM corp., Armonk, NY, USA) was used.

Results

General Characteristics and Oral Health-Related Characteristics of the Subjects

In order to identify the general characteristics and oral health-related characteristics of the subjects, frequency and descriptive statistics were calculated.

As for the gender, 211 (53.0%) males and 175 (47.0%) females were included in this study. In terms of age, 13 years old consisted of 73 (15.6%) persons; 14 years old consisted of 67 (14.5%) persons; 15 years old consisted of 68 (18.8%) persons; 16 years old consisted of 66 (18.7%) persons; 17 years old consisted of 49 (14.3%) persons; and 18 years old consisted of 63 (17.9%) persons. The mean age was 15.55 years old. In terms of BMI, underweight consisted of 61 (15.4%) persons; normal consisted of 204 (53.6%) persons; overweight consisted of 49 (11.9%) persons; and obesity consisted of 72 (19.1%) persons. The mean BMI was 22.01 (Table 1).

As for the tooth brushing frequency, 0-1 time consisted of 37 (9.4%) persons; 2 times consisted of 157 (41.0%) persons; 3 times consisted of 143 (35.7%) patients; and 4 times or more consisted of 49 (14.0%) persons. As for the use of oral care supplies, dental floss was used on 37 (8.0%) persons; interdental brush was used on 42 (10.2%) persons; and mouthwash was used on 61 (15.4%) persons. In addition, the respondents who perceived their oral health status as good were 307 (77.3%) persons, and those who perceived their oral health status as poor were 79 (22.7%) persons (Table 2).

Table 1. *General characteristics*

Variables	Group	N (%)	M ± SE
Sex	Male	211 (53.0)	-
	Female	175 (47.0)	
Age	13	73 (15.6)	15.55 ± 0.09
	14	67 (14.5)	
	15	68 (18.8)	
	16	66 (18.7)	
	17	49 (14.3)	
	18	63 (17.9)	
BMI	Low weight	61 (15.4)	22.01 ± 0.22
	Normal	204 (53.6)	
	Overweight	49 (11.9)	
	Obesity	72 (19.1)	
Total		386 (100.0)	

Values are presented as number (weighted %) or mean ± standard error

***Table 2.** Oral characteristics*

Variables	Group	N (%)
Tooth brushing frequency	0-1	37 (9.4)
	2	157 (41.0)
	3	143 (35.7)
	4 or more	49 (14.0)
Use of floss	No	349 (92.0)
	Yes	37 (8.0)
Use of interdental brush	No	344 (89.8)
	Yes	42 (10.2)
Use of gargle	No	325 (84.6)
	Yes	61 (15.4)
Subjective oral health	Good	307 (77.3)
	Bad	79 (22.7)
Total		386 (100.0)

Values are presented as number (weighted %) or mean ± standard error

Self-Perceived Oral Health Status According to the General Characteristics and Oral Health-Related Characteristics

In order to verify if there was a significant difference in the self-perceived oral health status according to the general characteristics and oral health-related characteristics, the chi-square test and independent samples t-test were conducted.

As a result, there were significant differences in the self-perceived oral health status according to the BMI, tooth brushing frequency, use of dental floss, and use of mouthwash (p<0.05).

In regard to the BMI, the ratio of the subjects who perceived their oral health status as poor tended to decrease in the order of underweight (21.5%), normal (20.8%), and overweight (14.4%). However, in the case of obesity (34.2%), the ratio of the subjects who perceived their oral health status as poor was very high.

In terms of tooth brushing frequency, the ratio of the subjects, who perceived their oral health status as poor, tended to decrease as the tooth brushing frequency increased: 0-1 time, 38.4%; 2 times, 25.2%; and 3 times, 15.2%. In the case of 4 times or more, the ratio of the subjects who perceived their oral health as poor was higher than the case of 3 times.

As for the use of dental floss, the ratio of the subjects who perceived their oral health status as poor was much lower in the case of using dental floss (8.4%) than in the case of not using dental floss (23.9%).

As for the use of mouthwash, the ratio of the subjects who perceived their oral health status as poor was much lower in the case of using a mouthwash (10.8%) than in the case of not using a mouthwash (24.9%).

Factors Affecting the Self-Perceived Oral Health Status

In order to verify the factors affecting the self-perceived oral health status of adolescents, the multiple logistic regression analysis was performed. Gender, age, BMI, tooth brushing frequency, use of dental floss, use of interdental brush and use of mouthwash were entered as independent variables. The self-perceived oral health status was entered as a dependent variable. For the dependent variable, self-perceived oral health status, the reference category was set to 'poor'.

As a result, the tooth brushing frequency and the use of mouthwash were found to significantly affect the self-perceived oral health status (p<0.05).

When the tooth brushing frequency was 3 times, the probability that the person perceived his or her oral health status as good increased by 3.709 times, as compared to the reference category, 0-1 time (OR=3.709, p<0.01).

In regard to the use of mouthwash, the probability that the person perceived his or her oral health status as good increased by 2.793 times when the person used a mouthwash, as compared to the reference category, not using mouthwash (OR=2.793, p<0.05) (Tables 3-5).

Discussion

Adolescence is a time when continuous oral management is required in order to maintain proper oral health. Essential habits for a lifetime of good oral health can be formed during this period; therefore, a systematic oral health management program should be developed and operated.

In most cases, the body mass index of adolescents was found to be in the normal weight range. However, the ratios of overweight and obesity were 31.0%. Adolescent obesity is one of the most serious health problems of modern society [14]. It is known that the persistence of wrong life habits or behaviors that causes obesity may lead to adult obesity and chronic diseases [15]. In this study, obesity was found to affect the self-perceived oral health. However, the study findings that obesity directly exacerbates oral health conditions are not particularly known. A study reported that obesity was associated with periodontal disease, and another study showed that oral care behaviors could be reduced due to obesity [16,17]. Previous studies have suggested that there is an association between weight and oral health. During adolescence, the excessive intake of snacks and lack of exercise due to stress and study may cause obesity and worsen oral health, as it leads to the deterioration of oral hygiene management ability.

In terms of the tooth brushing frequency of the subjects, 2 times a day was most common, followed by 3 times a day. In addition, the result of the self-perceived oral health based on the tooth brushing frequency per day was 1.8 times and 3.7 times higher when it was 2 times a day and 3 times a day, respectively, as compared to once a day or less. Many studies have reported dental caries and subjective oral health status in adolescents [18-21] and showed that

the prevalence of dental caries was significantly different according to the tooth brushing frequency during the day, thereby informing the importance of proper oral health care and tooth brushing education. In response to the use of oral hygiene supplies, dental floss was 8%, interdental toothbrush, 10.2%, and mouthwash, 15.4%, therefore, revealing that the use of mouthwash was most common. This finding was consistent with the results of the previous studies [22,23]. In general, the frequency of using oral hygiene aids was low in adolescents, thereby indicating the need for oral care education in order to encourage them to use oral hygiene supplies. The study result on the association between the use of oral hygiene supplies and self-perceived oral health showed that the self-perceived oral health increased by 2.8 times in the case of using a mouthwash, as compared to the case of not using a mouthwash. This finding implies that subjective oral health is good for people who brush their teeth and use

oral hygiene aids more often because they usually have a higher interest in proper oral care, management, and practice. For the adolescents, basic and systematic oral health care education should be expanded, and effective oral health care programs should be developed through diverse and interesting media.

Since this was a cross-sectional study that used the raw data of the Korea National Health and Nutrition Examination Survey (KNHANES) VI (2015), the study subjects were unable to represent all of the adolescents, and there was a limitation in identifying various variables and information that may exist. In addition, only the tooth brushing frequency was evaluated, effective brushing time was not taken into consideration, and new products introduced recently were not reflected in the type of oral health aids. Therefore, a more in-depth basic research on school oral health should be done.

Table 3. Subject oral health according to general characteristics

Variables		Subject oral health		p*
		Good	Bad	
Sex	Male	166 (77.0)	45 (23.0)	0.911
	Female	141 (77.6)	34 (22.4)	
Age	Mean ± SE	15.50 ± 0.10	15.72 ± 0.19	0.307
BMI	Low weight	49 (78.5)	12 (21.5)	0.043
	Normal	166 (79.2)	38 (20.8)	
	Overweight	41 (85.6)	8 (14.4)	
	Obesity	51 (65.8)	21 (34.2)	
	Mean ± SE	21.79 ± 0.25	22.75 ± 0.52	0.094
Total		307 (77.3)	79 (22.7)	

Values are presented as number (weighted %) or mean ± standard error
* calculated by chi-square test or independent sample t-test

Table 4. Subject oral health according to oral characteristics

Variables		Subject oral health		p*
		Good	Bad	
Tooth brushing frequency	0-1	22 (61.6)	15 (38.4)	0.049
	2	122 (74.8)	35 (25.2)	
	3	125 (84.8)	18 (15.2)	
	4 or more	38 (76.1)	11 (23.9)	
Use of floss	No	274 (76.1)	75 (23.9)	0.022
	Yes	33 (91.6)	4 (8.4)	
Use of interdental brush	No	273 (77.6)	71 (22.4)	0.741
	Yes	34 (74.7)	8 (25.3)	
Use of gargle	No	253 (75.1)	72 (24.9)	0.017
	Yes	54 (89.2)	7 (10.8)	
Total		307 (77.3)	79 (22.7)	

Values are presented as number (weighted %) or mean ± standard error
* calculated by chi-square test or independent sample t-test

Table 5. *Factors affecting subject oral health of the adolescents*

Variables		OR	95% CI	p*
Sex	Female	(Reference)		
	Male	1.154	(0.639-2.083)	0.633
Age		0.939	(0.797-1.106)	0.447
BMI	Normal	(reference)		
	Low weight	0.946	(0.505-1.772)	0.861
	Overweight	1.715	(0.766-3.837)	0.188
	Obesity	0.532	(0.279-1.014)	0.055
Toothbrushing frequency	0-1	(reference)		
	2	1.825	(0.719-4.634)	0.205
	3	3.709	(1.452-9.470)	0.006
	4 or more	1.664	(0.562-4.926)	0.357
Use of floss	No	(reference)		
	Yes	2.830	(0.895-8.950)	0.076
Use of interdental brush	No	(reference)		
	Yes	0.674	(0.253-1.795)	0.428
Use of gargle	No	(reference)		
	Yes	2.793	(1.119-6.975)	0.028

* obtained by multiple logistic regression analysis

Conclusion

This study aimed to identify the oral health behaviors in Korean adolescents by using the raw data of the Korea National Health and Nutrition Examination Survey (KNHANES) VI-3 (2015), and to evaluate whether such behaviors affected their subjective oral health perception. A total of 386 adolescents aged 13 to 19 years old were selected as the study subjects. The general characteristics and oral health-related characteristics of the subjects were researched, and their associations with the self-perceived oral health status were investigated. As a result, the adolescents who brushed their teeth 2 to 3 times a day or used a mouthwash had good self-perceived oral health. This study only evaluated the tooth brushing frequency in one dimension, and there was a limit in the type of oral hygiene aids. Therefore, a more extensive analysis is deemed necessary in the future.

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