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Study on DMFT related factors in some adolescents.

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Abstract

Objective: The objective of this study is to analyze the effects of oral health care behaviors on decayed, missing and filled teeth (DMFT) in some Korean adolescents.

Methods: For this study, the data of the Korea National Health and Nutrition Examination Survey (KNHANES) VI-3 (2015) were used. The study subjects included a total of 463 adolescents aged 12 to 19 years. The data were analyzed with the SPSS program. For general and oral-related characteristics, descriptive statistics and for determination of the relationship, the correlation analysis and multiple regression analysis were performed.

Results: The DMFT index tended to change with age, income level which was found to be an important factor affecting DMFT. In addition, sex, age, BMI, income level, tooth brushing, floss, interdental brush, gargle was significant in the correlation analysis between DMFT and each items.

Conclusions: Dental caries, one of the major oral diseases, is active in adolescence and it is very important to form oral care habits at this time and develop oral care programs based on the findings.

Keywords: Adolescents, Age, DMFT, Oral health.

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Introduction

Adolescence is a time of transition from childhood to adulthood, with physical, psychological, and social characteristics. In particular, at this time, dietary habits and oral hygiene management are not controlled by the caregiver, and oral care is neglected by various problems such as peer relationship, study and appearance. Thus, it is known that adolescents become susceptible to oral diseases [1]. In adolescence, dental caries, which is known as one of the two major oral diseases, frequently occurs, and it is important to acquire the method to maintain oral health through education [2]. These backgrounds are supported by studies having reported that adolescents gradually have a perception of health and form health beliefs through behaviors or attitudes, which makes an influence throughout their lifetime [3,4].

Dental caries is a dental hard tissue disease, in which demineralization is caused, and organic matter is destructed, thereby resulting in the defect of tooth structure. It is also the largest cause of tooth loss in adolescence [5,6]. Once dental caries occurs, the tooth cannot be returned to the original condition, and it increases with age. To prevent this, there should be changes in the knowledge, attitude and behavior along with tooth brushing and use of oral hygiene aids [7].

WHO uses the DMFT index as a diagnostic criterion to assess the level of experience of dental caries, which is calculated by summing the numbers of teeth that experienced dental caries progression, dental loss by dental caries, and dental caries treatment [8]. It is the most commonly used and the most common standard in clinical practice. According to the National Oral Health Survey conducted in Korea, the DMFT index in 12 year old children tends to decrease gradually from 2.86 in 2000 to 2.16 in 2006 and 2.1 in 2010 [9]. In addition, dental caries has been reported to take 8th place in the frequent disease ranking in Korea in 2010, holding a high rank among dental diseases [10]. Dental caries is an important factor in evaluating oral health, and it is obviously one of the serious oral diseases.

Therefore, this study aimed to determine the effects of various behaviors for the oral health of adolescents on the DMFT index based on the Korea National Health and Nutrition Examination Survey (KNHANES) and to prepare fundamental data for the education on dental caries management for oral disease prevention of adolescents.

Materials and Methods

Study Subjects

The Korea National Health and Nutrition Examination Survey (KNHANES) VI-3 (2015) were used as law data. 463 adolescent samples aged 12 to 19 years old were extracted and were included without missing items in this study.

Study Method

This study was used sex, age, body mass index, income level, health insurance, tooth brushing, dental floss, interdental toothbrush, gargle solution, oral examination, visiting dental clinic and DMFT variables based on the data of KNHANES VI-3.

The data of Gender, age, use of oral health products were analyzed without conversion. Age was not divided individually, but 12 to 15 years old and 16 to 19 years old. 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. The data related to family income were separated by income quintiles. The data of DMFT index was calculated with based on the presence or absence simply.

Statistical Analysis

This study used the original data of the KNHANES VI-3, we conducted a composite sample analysis. And the composite sample design was made by applying the questionnaire and examination survey. Frequency analysis and descriptive statistics were performed to confirm the general characteristics and oral characteristics of the subjects, and chi - square tests were performed to confirm DMFT according to general characteristics and oral characteristics. Correlation analysis was performed to investigate the relationship of related variables and multiple logistic regression analysis was performed to identify the factors affecting DMFT. For statistical analysis of this study, SPSS ver. 24.0 (IBM corp., Armonk, NY, USA) was used.

Results

General Characteristics of the Subject

In order to identify the general characteristics of the subjects, the frequencies and descriptive statistics were calculated.

Of the total 463 subjects, there were 253 males (52.2%) and 210 females (47.8%). In terms of age, 287 subjects (56.7%) were between 12 and 15 years old, and 176 subjects (43.3%) were between 16 and 19 years old. Income level was the highest among the fourth quintile as 159 (32.1%). Most of the subjects were covered by work type of health insurance. In terms of BMI, 87 subjects (17.6%) were low weight, 240 subjects (53.2%) were normal, 57 subjects (11.5%) were overweight and 79 subjects (17.6%) were obese (Table 1).

Oral-Related Characteristics of the Subject

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

The number of tooth brushing was 0-1 time in 49 subjects (10.0%); 2 times in 182 subjects (39.9%); 3 times in 173 subjects (35.8%), and 4 times or more in 63 subjects (14.3%). In terms of the yesterday tooth brushing status, 16 subjects (3.0%) did not brush their teeth, while 451 subjects (97.0%) brushed their teeth. As for the use of dental floss, 422 subjects (91.7%) did not use dental floss, and 45 subjects (8.3%) did. As for the use of interdental brush, 419 subjects (90.3%) did not use interdental brush, and 48 subjects (9.7%) did. In terms of the use of mouthwash, 396 subjects (85.0%) did not use mouthwash and 71 subjects (15.0%) did.

215 subjects (45.0%) who received oral examination for one year were slightly less than half. A total of 261 subjects (55.4%) visited the dental clinic during the year.

Additionally, as for the dental caries experience in permanent teeth, among the 467 adolescents, 190 subjects (38.6%) did not experience dental caries and 277 subjects (61.4%) experienced dental caries (Table 2).

Comparison of DMFT According to General Characteristics

The chi-square analysis was performed to test whether there was a difference in the presence of DMFT depending on the general characteristics of the subjects. The result is presented in Table 3.

The age and Income level were both higher in the group with DMFT than in the group without DMFT. Among them, there was a significant difference in the DMFT between the age groups of 12 to 15 years old and 16 to 19 years old (p=0.000). Comparisons the fourth quartile of income, the results are also significant (p=0.005).

Table 1. *General characteristics*

Variables	Group	N (%)
Sex	Male	253 (52.2)
	Female	210 (47.8)
Age	12-15	287 (56.7)
	16-19	176 (43.3)
Income level	Low	55 (13.8)
	Middle low	112 (25.4)
	Middle high	159 (32.1)
	High	137 (28.6)
Health insurance	Regional type	129 (30.5)
	Work type	300 (61.2)
	Medicaid	29 (7.4)
	No	5 (0.9)
BMI	Low weight	87 (17.6)
	Normal	240 (53.2)
	Overweight	57 (11.5)
	Obesity	79 (17.6)

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

Comparison of DMFT According to Oral Characteristics

The chi-square analysis was performed to test whether there was a difference in the presence of DMFT depending on the oral-related characteristics. The result is presented in Table 4. In the result of comparison for the presence of DMFT according to the use of dental floss, interdental brush, and mouthwash, the subjects who did not use oral hygiene aids were more likely to experience DMFT than those who used them. Among them, there were statistically significant differences in tooth brushing for a day (0.008), the use of mouthwash (0.009).

Table 2. *Oral characteristics*

Variables		N (%)
Tooth brushing frequency	0-1	49 (10.1)
	2	178 (39.3)
	3	173 (36.1)
	4 or more	63 (14.4)
Tooth brushing/1 day	No	16 (3.0)
	Yes	447 (97.0)
Use of floss	No	418 (91.6)
	Yes	45 (8.4)
Use of interdental brush	No	416 (90.4)
	Yes	47 (9.6)
Use of gargle	No	392 (84.9)
	Yes	71 (15.1)
Oral examination/1 year	No	248 (55.0)
	Yes	215 (45.0)
Visiting dental clinic/1 year	No	202 (44.6)
	Yes	261 (55.4)
DMFT	No	187 (38.2)
	Yes	276 (61.8)

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

Correlation between DMFT and Related Variables

The analysis result for determining the relationship between related variables is shown in Table 5. As a result of correlation analysis between 12 general and oral-related characteristics and DMFT, significant correlations were shown in 10 items. Among them, the income level showed a negative correlation.

Factors Affecting the Presence or Absence of DMFT

Multiple regression analysis was performed for general characteristics and oral characteristics and only corrected values were shown as follows. The age group was a factor that significantly affected the presence of DMFT (P=0.000). As for gargle solution, the OR of unused gargle (95% CI) was 2.40 (1.30-4.42) compared to used gargle, though it was significant. As for income level, compared to high, the OR of middle high (95% CI) was 0.52 (0.32-0.84), the OR of middle low was 0.35 (0.18-0.66) and the OR of low was 0.41 (0.17-0.97) (Table 6).

Discussion

In adolescence, the permanent dentition is completed after the mixed dentition period. It is important to manage the permanent teeth that are erupted at this time, and as an oral-related emotional characteristic, it is essential to have knowledge, attitude and behavior about oral health. The factors causing dental caries that frequently occurs at this time are very complex and multiple and multidimensional analysis is required for prevention [11].

In terms of the number of tooth brushing of the subjects, twice a day accounted for the highest proportion at 39.3% and 3% of the subjects answered that they did not brush yesterday for the whole day. With regard to the use of oral hygiene aids, dental floss was 8.4%, and mouthwash was 15.1%. The result of the frequency of tooth brushing was

Table 3. *DMFT according to general characteristics*

Variables		DMFT		p*
		No	Yes	
Sex	Male	107 (39.7)	146 (60.3)	0.535
	Female	80 (36.6)	130 (63.4)	
Age	12-15	139 (48.2)	148 (51.8)	0.000**
	16-19	48 (25.1)	128 (74.9)	
Income level	Low	14 (24.6)	41 (75.4)	0.005*
	Middle low	40 (30.9)	72 (69.1)	
	Middle high	64 (39.0)	95 (61.0)	
	High	69 (50.5)	68 (49.5)	
Health insurance	Regional type	46 (35.2)	83 (64.8)	0.096
	Work type	134 (42.6)	166 (57.4)	
	Medicaid	5 (15.4)	24 (84.6)	
	No	2 (27.5)	3 (72.5)	
BMI	Low weight	36 (40.2)	51 (59.8)	0.395
	Normal	101 (40.9)	139 (59.1)	
	Overweight	20 (35.6)	37 (64.4)	
	Obesity	30 (30.0)	49 (70.0)	

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

Table 4. *DMFT according to oral characteristics*

Variables		DMFT		p*
		No	Yes	
Toothbrushing frequency	0-1	26 (49.0)	23 (51.0)	0.346
	2	63 (35.2)	115 (64.8)	
	3	74 (36.7)	99 (63.3)	
	4 or more	24 (42.8)	39 (57.2)	
Toothbrushing/ 1 day	No	11 (71.6)	5 (28.4)	0.008*
	Yes	176 (37.2)	271 (62.8)	
Use of floss	No	171 (38.7)	247 (61.3)	0.538
	Yes	16 (33.3)	29 (66.7)	
Use of interdental brush	No	167 (38.4)	249 (61.6)	0.809
	Yes	20 (36.5)	27 (63.5)	
Use of gargle	No	169 (40.7)	223 (59.3)	0.009*
	Yes	18 (24.2)	53 (75.8)	
Oral examination / 1 Year	No	94 (35.7)	154 (64.3)	0.261
	Yes	93 (41.3)	122 (58.7)	
Visiting dental clinic / 1 Year	No	84 (39.9)	118 (60.1)	0.562
	Yes	103 (36.9)	158 (63.1)	

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

Table 5. *The relevance among variables*

Variables	DMFT
Sex	0.099**
Age	0.255**
Income level	-0.042*
Health insurance	-0.007
BMI	0.346**
Tooth brushing frequency	0.053**
Tooth brushing/1 day	0.045**
Use of floss	0.086**
Use of interdental brush	0.027*
Use of gargle	0.064**
Oral examination/1 year	-0.002
Visiting dental clinic/1 year	0.037**

**p<0.01; *p<0.05 by Pearson's correlation coefficient

Table 6. *Factors affecting the presence or absence of DMFT*

Variables		OR (95% CI)	p*
Age	12-15	(Reference)	0.000*
	16-19	2.81 (1.71-4.62)	
Gargle	Yes	(Reference)	0.005*
	No	2.40 (1.30-4.42)	
Income level	High	(Reference)	0.004*
	Middle high	0.52 (0.32-0.84)	
	Middle low	0.35 (0.18-0.66)	
	Low	0.41 (0.17-0.97)	

F=11.32, p<0.001, Nagerkerke R^2=0.192
OR: Odds Ratio; 95% CI: 95% Confidence Interval

consistent with that of Ma et al. [12] and the result of the use of oral hygiene aids was similar to that of Kim et al. [13] in the use of mouthwash. In addition, Lim et al. [14] reported that the use of oral hygiene aids was effective in inhibiting bleeding and tartar formation.

In this study, in terms of the relationship between general characteristics and the presence of DMFT, there was a significant difference in DMFT depending on age. Dental caries continues to increase since the permanent teeth first erupt at age 6 and more than 80% of adults experience it. It is reported that the DMFT index also increases with age [12]. This result seems to be consistent with the result that dental caries in permanent teeth also increases with age in adolescence. Moreover, there was a significant difference depending on the yesterday's tooth brushing status. This result supports the previous studies having reported that adolescents have a high intake of sugar, which affects dental caries, and nonfulfillment of tooth brushing, which is the most basic of oral hygiene management, leads to dental caries [15]. The use of mouthwash, one of oral hygiene aids, was found to affect DMFT and it has been reported that the effect of the mouthwash is exhibited due to the control of microbial activity that causes many diseases in the mouth [16]. Proper use of these oral hygiene aids can manage dental plaque in the areas where it is difficult to remove dental plaque by general tooth brushing, thereby reducing dental caries.

As a result of the correlation analysis with DMFT, it was confirmed that dental caries is not caused by one factor as described above. The multiple regression analysis on DMFT showed that the DMFT index was 2.81 times higher in 16~19 years old compared to 12~15 years old. This was similar to the report of the Ministry of Health and Welfare that as age increases, the DMFT index increases, which is statistically significant [5,17]. On the other hand, Kim [18] reported that gender was a related factor, and male students had a higher DMFT index than female students, but this was not consistent with the result of the present study. In this study, DMFT is lowered as the income level is lowered. The results of other studies show that the lower

the income level was found to have a poor oral health status and this is in contrast to the results of this study [19,20]. These results were unexpected, probably because the subject of this study is adolescents and not a subject of direct economic activity. Therefore, it is interpreted that there are various and complex factors affecting DMFT in addition to economic income level.

DMFT-related studies have been performed not only domestically but also internationally, and the present study is also expected to provide data to evaluate the trend of dental caries [19-21].

The proper management of dental caries is to remove the risk factors and one of them is proper tooth brushing and use of oral hygiene aids. This study was also conducted to identify the relationship between oral care behaviors and DMFT. It is thought that oral hygiene should be thoroughly managed through education about oral care by identifying the characteristics of adolescents.

Conclusion

This study was conducted to investigate the relationship between oral health behaviors and the presence of DMFT in adolescents aged 12 to 19 years old using the raw data of the Korea National Health and Nutrition Examination Survey (KNHANES) VI-3 (2015). As a result, the following conclusion was obtained. First, the DMFT index increased significantly with age and the use of oral hygiene aids led to more effective dental caries prevention compared to brushing teeth without using them. Therefore, it was confirmed that dental caries can be sufficiently prevented if appropriate oral hygiene management is carried out.

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