

# Dental Hygienist's Perception of Oral Health Nutrition Policy

<sup>1</sup>SoYoung Park, YounSoo Shim, SoYoun An, JongBin Kim, JiSun Shin, SeungWoo Shin, JongSoo Kim

**Abstract: Background/Objectives:** The purpose of this study is to understand the perception of dental hygienist for oral health nutrition policy. **Methods/Statistical analysis:** The subjects of this study were 231 dental hygienists working at dental clinics. The sampling method was convenience sampling. Survey method was questionnaire and interview method. The data collection method consisted of a method of self-reporting the questionnaire to the subjects, a method of retrieving the questionnaires, and a method of interviewing the working places of the subjects. **Findings:** The most common items were 'Non-dental caries food tax cut policies' and 'Carbonated beverage consumer tax policies'. The most significant factor was whether to perform preventive dental treatment. The perception of overall oral health nutrition policy was positive when the age was older, the preventive dental treatment was performed, and the oral health nutrition education was conducted. Dental hygienists were more likely to eat vegetables and algae, fruits, milk and dairy products, and to eat less sugars, which was positive for oral health nutrition policy. The less cariogenic snack intake was, the more positive the oral health nutrition policy was. The less cariogenic drink intake was, the more positive the oral health nutrition policy was. The dental hygienist, who is a professional dental health professional, grasps the perception of nutritional policy for oral health and it is worth using as oral health guidelines for patients in dental clinics.

**Improvements/Applications:** The purpose of this study is to provide the necessary data to establish detailed legal system of nutrition policy for improving oral health quality.

**Keywords:** Cariogenic Snack, Cariogenic drink, Dental hygienist, Nutrition policy, Oral health policy, Sugar

## I. INTRODUCTION

There are several factors such as host factors, pathogen factors, and environmental factors in the development of oral diseases[1]. In addition to the biological factors directly related to the disease, social and environmental factors can

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**SoYoung Park**, Department of Dental Hygiene, Wonkwang Health Science University, 514, Iksan-daero, Iksan-si, Jeollabuk-do, 54538, Korea,

**YounSoo Shim**, Department of Dental Hygiene, Sunmoon University, 70, Sunmoon-ro 221beon-gil, Tangjeong-myeon, Asan-si, Chungcheongnam-do, 31460, Korea,

**SoYoun An**, Corresponding author, Department of Pediatric Dentistry, College of Dentistry, Wonkwang University, 460, Iksan-daero, Iksan-si, Jeollabuk-do, 54538, Korea,

**JongBin Kim**, Department of Pediatric Department, School of Dentistry, Dankook University, 119, Dandae-ro, Dongnam-gu, Cheonan-si, Chungcheongnam-do, 31116, Korea,

**JiSun Shin**, Department of Pediatric Department, School of Dentistry, Dankook University, 119, Dandae-ro, Dongnam-gu, Cheonan-si, Chungcheongnam-do, 31116, Korea,

**SeungWoo Shin**, Department of Pediatric Dentistry, School of Dentistry, Dankook University, 119, Dandae-ro, Dongnam-gu, Cheonan-si, Chungcheongnam-do, 31116, Korea,

**JongSoo Kim**, Department of Pediatric Dentistry, School of Dentistry, Dankook University, 119, Dandae-ro, Dongnam-gu, Cheonan-si, Chungcheongnam-do, 31116, Korea,

also be important determinants. Social and environmental factors include food, living environment, and health habits. Among them, food and nutrition are known to be important dietary factors in the development of oral disease. Sugar is the largest carotenoid sugar, a source of bacteria and germs that can make food on the surface of the teeth and become an energy source for bacteria to eat[2-3].

Sugar is called 'empty nutrient' without nutrients and only calories. Excess calories that are easily obtained from it are accumulated in body fat, which can cause obesity, diabetes, hyperactivity disorder as well as dental caries. Therefore, it is necessary to limit the content of sugar added to foods and to be able to distinguish consumers of high calorie and low nutrition foods. In order to promote oral health, nutrition labeling and legal sanctions are applied to the caries- A way to make it easy to recognize when you choose should be suggested. In addition, if necessary, the use of sugar should be actively restrained through administrative regulations or tax measures, such as introduction of sugar tax. In South Africa, the prevalence of dental caries has become a criterion for the selection of sugar intake recommendations to reduce tooth caries[4]. The World Health Organization (WHO) recommended a total sugar intake of less than 10% of total energy[5], and countries in Denmark, Finland, Germany, Greece, Poland, Spain, Sweden and the United Kingdom also quantified the sugar guidelines[6].

It is now argued that the problem of over-consumption of sugar should not be addressed only on an individual basis, but that intervention by social endeavor must be accompanied. Consumption tax on carbonated beverages is a policy that the state imposes a tax on carbonated beverages to promote the health of the people. As the global obesity becomes increasingly serious, many countries are implementing policies to impose consumption tax on carbonated beverages. In Mexico, some 80 percent of carbonated beverages are taxed per liter. In some states in the United States, carbonated beverages are taxed to lower carbonated beverages[7]. Forty states in the US have already imposed a small tax on sugar-added beverages and snack foods, but Maine and New York have proposed to levy significant taxes on sugar-added beverages. This taxation would imply consumers to switch to a healthier beverage, reduce caloric intake, reduce weight gain, and even reduce dental caries[8]. The social intervention method for the sugar consumption excess period can refer to the relatively successful example of the tobacco policy.



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Taxes on tobacco products were very effective in reducing tobacco consumption, and imposing taxation on sugar-containing foods would also have a positive effect[9].

In the previous study, the commercial fruit beverage analysis showed that the beverage containing unsweetened or natural sugars lowered the pH of the bacterial membrane to less than 5.5 in 5 minutes[10].

There is no clear criteria for how the sugars used in food should be listed in the label, which can cause confusion among consumers[11]. Developed in Switzerland under the scheme of "a friend of the teeth (AktionZahnfreundlich)" aims to distinguish safe foods in the teeth so that non-vegetable sweeteners such as sorbitol and xylitol can be added to food instead of sucrose have. Tooth-safe foods are validated by pH testing and are considered non-oozing, and can be labeled as easy to understand by the public. This idea was supported by oral associations and government agencies, and this movement has been extended to other countries[12]. The use of such a strong mark should be strengthened. The use of these marks should be strengthened. The author suggests that Danton should actively utilize the mark if it is difficult to select a hazard level indicator when performing a hazard labeling system for dental caries-induced foods. As suggested by the Korean Oral Health Association, "If you get a mark that is helpful to your oral health, you should create an active nutrition policy that takes into account your oral health by inserting a statement that you can submit a copy of the certificate.

Also, it can be said that the policies that can increase the social security, education, The detailed nutrition policy for promoting oral health is a task that must be solved by the government, food companies and households in cooperation. Nonetheless, most studies have focused on passive claims that they should reduce sugar for oral health[13-18]. In a longitudinal study, children at schools where candy was not sold were reported to have a low incidence of dental caries for two years compared to children at school selling candy [19].

Among the detailed items of the caries prevention nutrition policy, there are countries that apply the caries prevalence rate to the standard index of sugar intake. In South Africa, the prevalence of dental caries has been used as a criterion for choosing the right amount of sugar to reduce tooth caries[20]. In South Africa, sugar is a risk factor for major diseases in the population, and in particular, 90% of adults with dental caries have become public health problems. In order to reduce the cause of dental caries, the standard of sugar intake was set at 40 g / day for fluoridated water and 55 g / day for fluoridated area. And sugar consumption was actively suppressed. In the UK, it is recommended that safe sugar intake be limited to a maximum of 15 kg per person on an annual basis and to a maximum of 10 kg in areas where fluoride is not available. Therefore, nutritional policy considering the prevalence of tooth caries in Korea should be implemented.

Therefore, the authors propose a national nutritional policy direction that can reduce sugar intake by analyzing the perceptions and attitudes of children's dental hygienists about oral health nutrition policy, and the details of nutrition policy for improvement of oral health I would like to provide the necessary data to build a legal system.

## II. MATERIALS AND METHODS

### 2.1 Research subject and method

The subjects of this study were 231 dental hygienists working at dental clinics. The sampling method was convenience sampling. Survey method was questionnaire and interview method.

The data collection method consisted of a method of self-reporting the questionnaire to the subjects, a method of retrieving the questionnaires, and a method of interviewing the working places of the subjects. In the questionnaire response, 250 of 300 dental hygienists responded, and 231 of them except for 19 missing parts were used for the final analysis. The sampling method was convenience sampling.

### 2.2 Data analysis

The subjects of this study were the population sociological characteristics and awareness of oral health related nutrition policy. The question about demographic characteristics was "Age, Work experience, Dietary counseling, Preventive dental treatment, Oral Health Nutrition Education". The awareness of oral health nutrition policy is based on the following criteria: "Sugar content labeling policies, Sugar types labeling policies, Carbonated beverage consumer policies, Sugar consumer tax policies, Dental caries risk level labeling policies, Toothfriendly sweets labeling policies, "which included 10 items such as dental caries, food safety safety zones, and policies for food that cause dental caries. The items were surveyed on three points of 'Agree' (3 points), 'Neutral' (2 points) and 'Disagree' (1 point). The perceived degree of oral health nutrition policy by dental hygienist's food intake was selected. Food intake variables were composed of 9 items including Cereal and starch, Meat, Fish, and beans, Vegetable and seafood, Fruit, Milk and other dairies, Sugar, Fat and oils, Cariogenic snack and Cariogenic drink. The acceptance rate of oral health nutrition policy of the subjects was calculated as frequency and percentage. Multiple regression analysis was conducted to investigate the demographic characteristics and factors affecting oral health nutrition policy of food intake. The explanatory power of the model was determined through multiple decision factors (R<sup>2</sup>). The collected data were analyzed using SPSS 19.0 statistical program.

## III. RESULTS AND DISCUSSION

### 3.1 Acceptance of oral health nutrition policy implementation

The results of the study were as follows<Table 1>. The most common items were 'Non-dental caries food tax cut policies' (81.8%) and 'Carbonated beverage consumer tax policies' (80.5%). The next consensus was 'Traffic light labeling policies for food dental caries' (75.3%), 'Policies to restrict sales of food that cause dental caries in food safety protection zones' (69.3%) and 'Sugar consumer tax policies' (67.1%), 'Toothfriendly sweets labeling policies' (61.5%), 'Policies to limit advertising for food cause cause dental caries' (54.5%), 'Sugar content labeling policies' and 'Dental caries risk level labeling policies' (25.1%).



The highest level of non-consensus was 'Dental caries risk level labeling policies' (63.6%) followed by 'Sugar types labeling policies' (57.1%), 'Sugar content labeling policies' (55.4%), 'Policies to limit (29.4%), 'Toothfriendly sweets labeling policies' (26.8%), 'Sugar consumer tax policies' (17.7%), 'Policies to restrict sales of food that cause dental caries in food safety protection zones' (14.7%), 'Carbonated beverage consumer tax policies' (9.1%) and 'Non-dental caries food tax cut policies' (6.1%).

TABLE 1. Acceptance of oral health nutrition policy implementation

| Variable   | Agree | Neutral | Dis-agree |
|--|-------|---------|-----------|
| 1. Sugar content labeling policies   | 28.1  | 16.5    | 55.4      |
| 2. Sugar types labeling policies   | 25.1  | 17.7    | 57.1      |
| 3. Carbonated beverage consumer tax policies   | 80.5  | 10.4    | 9.1       |
| 4. Sugar consumer tax policies   | 67.1  | 15.2    | 17.7      |
| 5. Dental caries risk level labeling policies  | 25.1  | 11.3    | 63.6      |
| 6. Non-dental caries food tax cut policies   | 81.8  | 12.1    | 6.1       |
| 7. Traffic light labeling policies for food that cause dental caries                           | 75.3  | 10.0    | 14.7      |
| 8. Policies to limit advertising times for food that cause dental caries                       | 54.5  | 16.0    | 29.4      |
| 9. Policies to restrict sales of food that cause dental caries in food safety protection zones | 69.3  | 15.6    | 15.2      |
| 10. Toothfriendly sweets labeling policies   | 61.5  | 11.7    | 26.8      |

### 3.2 Factors affecting total oral health nutrition policy

The results of multiple regression analysis on factors influencing overall oral health nutrition policy are as follows. The explanatory power of the model was 42.7%. The perception of overall oral health nutrition policy was positive ( $P < 0.05$ ) when the age was older, the preventive dental treatment was performed, and the oral health nutrition education was conducted. The most significant factor was whether to perform preventive dental treatment. <Table 2>.

TABLE 2. Factors affecting total oral health nutrition policy

| Variables                           | B      | $\beta$ | P     |
|-------------------------------------|--------|---------|-------|
| Constant                            | 3.507  |         | 0.000 |
| 1. Age(yrs)                         | 0.365  | 0.180   | 0.028 |
| 2. Work experience(yrs)             | -0.270 | -0.169  | 0.213 |
| 3. Dietary counseling               | -0.053 | -0.018  | 0.780 |
| 4. Preventive dental treatment(day) | 0.608  | 0.198   | 0.005 |
| 5. Oral Health Nutrition Education  | 0.810  | 0.267   | 0.035 |
| $R^2=0.446$                         |        |         |       |
| $AdR^2=0.427$                       |        |         |       |

F=7.706

B : Unstandardized Coefficients,  $\beta$  : Standardized Coefficients.

Statistically significant differences by multiple regression analysis at  $\alpha=0.05$ .

### 3.3 Factors affecting total oral health nutrition policy-Food intake

The results of multiple regression analysis on factors influencing overall oral health nutrition policy of food intake are as follows. Dental hygienists were more likely to eat vegetables and algae, fruits, milk and dairy products, and to eat less sugars, which was positive for oral health nutrition policy. The less cariogenic snack intake was, the more positive the oral health nutrition policy was. The less cariogenic drink intake was, the more positive the oral health nutrition policy was, and the explanatory power of the variables was 69.9 <Table 3>.

TABLE 3. Factors affecting total oral health nutrition policy -Food intake

| Variables                 | B      | $\beta$ | P     |
|---------------------------|--------|---------|-------|
| Constant                  | 0.199  |         | 0.595 |
| 1. Cereal and starch      | 0.065  | 0.055   | 0.625 |
| 2. Meat, fish, and beans  | 0.097  | 0.071   | 0.412 |
| 3. Vegetable and seafood  | 0.230  | 0.164   | 0.003 |
| 4. Fruit                  | 0.126  | 0.016   | 0.021 |
| 5. Milk and other dairies | 0.149  | 0.112   | 0.003 |
| 6. Sugar                  | -0.327 | -0.301  | 0.041 |
| 7. Fat and oils           | -0.006 | -0.004  | 0.262 |
| 8. Cariogenic Snack       | -0.306 | -0.301  | 0.002 |
| 9. Cariogenic drink       | -0.221 | -0.236  | 0.021 |
| $R^2=0.609$               |        |         |       |
| $AdR^2=0.699$             |        |         |       |
| $F=4.612$                 |        |         |       |

B : Unstandardized Coefficients,  $\beta$  : Standardized Coefficients.

Statistically significant differences by multiple regression analysis at  $\alpha=0.05$ .

## IV. CONCLUSION

Korea has entered the era of sugar consumption, and it should no longer be neglected as a matter of individual effort. Sugar intake can increase the risk of dental caries as well as chronic diseases such as diabetes and obesity in modern people. Therefore, nutritional policy for oral health and overall health promotion should be prepared urgently. To promote oral health, an institutional and policy approach to reducing social and environmental factors, sugar intake, is needed. In addition, an integrated nutrition policy considering oral health as well as whole body health should be established. Oral health nutrition management should naturally permeate in total nutritional management.



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It is not easy for consumers to recognize the sugar content based on the standard value. This is because the nutrient content of sugar-containing foods is expressed as the total sugar content, not added sugars and sugars. This indication is due to the fact that the added sugars in the sugar components of food are chemically identical to the natural sugars and can not be separated and quantified, so it is common to state the total sugar content. However, the content, type, degree, physical properties, and frequency of ingestion of sugars in foods are closely related to the development of caries. Even if the same amount of sugar is consumed, the incidence of dental caries Foods with high sugar content and high viscosity should be reduced as much as possible. Therefore, it would be more ideal if the total amount of food and the degree of adhesion to teeth were measured and the index of dental caries induction index, which is an indicator of the dental caries inducing ability, is presented together with the indication of nutritional requirements. The type of sugar should also be added as an item of nutrition labeling. Because starch and exogenous saccharides have diverse effects on systemic and oral health, the type of carbohydrate (starch or sugar) and the type of sugar (sucrose, glucose, fructose, Lactose, maltose, or other) to be made mandatory. Knowledge of nutritional information is crucial for proper selection of food. Instead of simple sugars, it is recommended to use alternative sweeteners that can prevent dental caries and avoid the provision of sweetened beverages.

The traffic light indication system is a system that can be classified according to the content of nutrients such as total fat, saturated fat, sugar, sodium in children's symbol food (chocolate, ice cream, bakery, confectionery, sausage, hamburger etc.) In the form of a color and a circle, food labeling should be mandatory for improving dietary habits. However, there is concern that consumers will unconditionally have negative perceptions of products marked in red on a traffic light labeling system, Level. However, if some large-scale food companies voluntarily implement their recommendations, it is likely that other food companies will do it themselves. This is because, if food items are enlarged so that consumers prefer products with nutrient colors, products that do not display nutrient colors may have a negative impact on sales. In order for the nutrition labeling system to be effectively implemented in Korea, it is necessary to set the nutrition labeling standard considering the dietary pattern, nutrient intake, and obesity of the people of Korea. In addition, Should be developed and utilized.

It was thought that a labeling system for dental caries induced foods should be prepared urgently. To achieve this, the dental caries induction index of the food should be calculated and recommended to be displayed on the product. The Caries potentiality index is a formula calculated by measuring the sugar content and viscosity of foods that are likely to cause dental caries. That is, it means the sum of the sugar content and the degree of stickiness, and the food-induced food is selected by estimating the possible time (minutes) for the occurrence of the caries by the composition of the food. In general, caramel, candy, and jelly are high in both sugar content and viscosity, and milk and vegetables are all low in food. In the case of Japan, it is labeled as "Health Food for Health and Welfare" and actively utilizes the

evaluation method of dental caries induction of processed foods. Currently, Toothfriendly Sweets Mark is used as a food labeling method to promote dental health in Korea. The majority of respondents said that they did not know about Mark, which was a major part of the survey. The 'Danton Lee Mark' uses oral sweeteners such as xylitol instead of sugar in sweets, gum, candy, It is exercise. It is necessary to prevent the sales of foods that are dangerous to the health of the child positively by grasping the content of nutrients in details. Especially, a large amount of sugar-containing foods and highly adhesive foods which can hinder the oral health It should prevent the sale of food with a lot of caries inducing factors.

Methods to limit sucrose intake, an important factor in dental caries development, should be performed in parallel. Proper nutritional policy must be supported to reduce sucrose intake. However, as mentioned above, nutritional policy to reduce dental caries is not well established in Korea. In order to establish a nutrition policy to reduce dental caries, related experts' perceptions and attitudes about oral health nutrition policy should be changed first. In addition, consideration of oral health is essential in the current system and policies.

Korea has entered the era of sugar consumption, and it should no longer be neglected as a matter of individual effort. Dietary intake of sugar can increase the risk of chronic diseases such as diabetes and obesity as well as inducing dental caries. Therefore, nutritional policy for oral health and overall health promotion should be prepared urgently. In order to promote the oral health of elementary school aged children, it is necessary to take an institutional and policy approach to reduce the social and environmental factors, that is, sugar consumption. In addition, an integrated nutrition policy considering oral health as well as whole body health should be established. Oral health nutrition management should naturally permeate in total nutritional management. Limitations of this study were limited to represent the entire population because the study selected some dental hygienists. In addition, it is regrettable that the content of sugar in processed foods was measured and the exposure level was not quantified. Therefore, in a subsequent study, a more diverse range of occupational groups (teachers, community groups, and oral health workers) to realize oral health nutrition policies were selected as the population, and the sugar content of the raw foods was calculated, To provide detailed statistical data in order to establish the nutrition policy statute.

In Korea, there is also a need for a government-supported governmental organization such as the Food and Nutrition Service (FNS) of the United States Department of Agriculture's government, the school, and the community to develop a standardized nutrition education program It is also necessary to increase the number of school nutrition teachers. And Oral health professionals should understand the perception of oral health nutrition policy and establish systematic oral health guidelines for patients visiting dental clinics.

It is necessary to establish and enforce nutritional policies considering oral health and establish a legislative system for effective caries



preventive nutrition policy by establishing provisions to promote oral health in food and nutrition laws. When the research subjects synthesized a positive perception about most oral health nutrition policies, nutrition policy considering oral health should be established and enforced, and a clause to promote oral health in food and nutrition law was newly established. And it is considered that a legislative system should be established for the effective implementation of preventive nutrition policy.

The dental hygienist's perception and attitude will be important to establish oral health nutrition policy for oral health promotion. The dental hygienist's attitude about oral health nutrition policy which is in charge of oral health education and preventive treatment of patients in clinical field is very meaningful. This study suggests the direction of national nutrition policy to reduce sugar intake and it will be useful data for establishing detailed regulation of nutrition policy for improving oral health quality.

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