Proper Range Decision for Each Level of the Individual Oral Health Index Score for Incremental Dental Care System in Adolescence and Young Adults

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Objective: Oral health means a dental condition and maxillofacial oral tissue condition that are not contracted by disease and do not provide obstacle to mental activity and social life and in order to maintain oral health promotion, sustained individual oral health care and periodic systematic preventive care by experts are required.

Methods: Two hundred of the subjected volunteers as 100 in adolescence as age 12 to 19 and 100 years for young adults as age 20 to 39 years who want to get a dental checkup among dental patients, were participated in this dental clinical study, to determine the oral health index for each age group. Oral examination, X-ray taking and some laboratory Snyder tests were performed for all subjects and decided 5 scale ranges through the average and standard deviation at each age group.

Results: It was estimated as over 95.6 points for A grade and 91.6 to 95.5 for B, 87.4 to 91.5 for C, 83.3 to 87.3 for D and under 83.2 for E grade in adolescence age group and over 96.9 points for grade A, 90.8, to 96.8 for B, 84.6 to 90.7 for C 78.5 to 84.5 for D and under 78.4 for E grade in young adults group.

Conclusion: Under this background, this study intends to provide a basic data in introducing, operating incremental dental care system by estimating oral health index by targeting youth who agreed on such system and presenting more reasonable grade by utilizing computer program.

Keywords: oral health index, incremental dental care system, computer program

Introduction

Incremental dental care system is one of European dental care system and it is an advanced type dental care system of maintaining the best oral condition of the patients in a way that periodic preventive intervention is performed by having patient visit dental clinic by designating a certain cycle by each target patient depending on dental condition and minimum intervention is provided at an early stage if treatment is required.

If patient desires, anybody could become a target and a person who signed a contract after paying yearly dental care fee as a membership fee could participate in this system. At this time, differentiated dental care fee is estimated based on oral health index of target patient and dental care is contracted after periodically paying dental fee or yearly dental care fee in a form of cap-

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itation fee system [1-3].

As dental caries of youth was suddenly increased, diversified risk factors were presented compared with infants and Bjarnason and Köhler [4] reported that early dental caries and already occurred dental caries would become an influential risk factor and if a few risk factors including this should be combined, it would become an important dental caries occurrence forecast index.

Youth could become socio-economic factor, saliva factor, periodontal health condition and various risk occurrence factors of dental caries [5], and in connection with this, Kidd reported that dietary control would be helpful for dental care of adult [6].

Under this background, this study intends to provide a basic data in introducing, operating incremental dental care system by estimating oral health index by targeting youth who agreed on such system and presenting more reasonable grade by utilizing computer program.

Materials and Methods

1. Subjects

Volunteers in this study no particular oral disease were selected from among patients at dental clinic in Incheon city from January 2015 to October 2015. Two hundred of the subjected volunteers as one hundred in adolescence as age 12 to 19 years and one hundred for young adults as age 20 to 39 years who want to get a dental checkup among dental patients, were participated in this dental clinical study, to determine the oral health index for each age group. Table 1 shows the classification by age and gender.

2. Method

This study intends to provide a basic data in introducing, operating incremental dental care system by estimating oral health index. All subjects' dental charts were recorded with calculating the average score of the oral health index, both in the age group of adolescent and young adults aged group with estimat-

ing the mean and standard deviation.

It calculates the mean and standard deviation of the sum of all oral health indices. The middle level of the level C is set as the average score. Level C sets the range by subtracting or adding half the standard deviation from the mean. Levels A and B are determined by adding the standard deviation value at level C, and levels D and E are determined by subtracting the standard deviation value at level C.

Level C is the lowest of level C by subtracting half the standard deviation from the mean, Level C is the highest of level C by adding half the standard deviation from the mean. In this way, adolescent and young adults are graded from A to E [7,8].

1) Institutional review (IRB) certification

IRB was achieved in Dental Clinical Trials of Dankook University Basic Science Committee. The Number as DKU 2014-12-0002 Collect the volunteers for participation in the study to X-ray taking and perform the oral examine order to obtain the average with the standard deviation of the oral health index for each age.

2) Use the computer program for dental care system

In the DCS program (Dr. Prevent Co., Seoul, Korea), there are five factors such as residual tooth number, dental caries status index, periodontal status index, other oral disease index and hygiene ability/systemic condition index. To calculate the oral health index.

If you input your name, address, telephone number, personal information, registration number, age, and gender in the DCS computer program, you will automatically answer and answer each questionnaire by age group. After pressing the next page key, the second page inputs the oral image of the patient.

The second page of the DCS program puts oral pictures and analyzes x-rays. And, this page will enter the number of natural teeth and the state of the teeth. This page sets the state of the cavity and the state of the treated tooth. The condition of the occlusal surface, cervical abrasion, and TMJ are also checked.

On the third page, enter a panorama X-ray film. The panorama X-ray film shows the alveolar bone status and checks the depth of the periodontal pocket and records periodontal status such as alveolar bone absorption, gingivitis, malocclusion, tooth movement, and gingivitis.

The 4th, 5th page of the DCS, It is a laboratory test that amount and activity of oral bacteria, bacillus type, filamentous type, coccus type and spiral type, Snyder test, amount and viscosity of saliva, presence of bad breath.

On the sixth page, input a picture with dental plaque state, enter the S-PHP (simplified patient hygiene performance index) amount, and input the amount of calculus. And the last page

Table 1. Age and gender classification for adolescent and young adults

Age	Gender	Number	Percentage (%)	Total
Adolescent	Male	41	41.0	100
(12-19 years)	Female	59	59.0	
Young adults	Male	38	38.0	100
(20-39 years)	Female	62	62.0	
Total	Male	79	39.5	200
	Female	121	60.5	

was calculated and recorded to obtain an individual oral health score automatically.

After completing the record of all pages, the next page will show the results of the oral health index. The results of the oral health index score of the patient are summarized by adding the natural tooth , the dental caries status score, the periodontal status score, the oral disease score, and hygiene ability or systemic conditions.

According to the results of the DCS according to the oral health index, the DCS schedule required for the patient will come out, and sanitary products and management methods will be presented. The average oral health index of DCS for adolescent and young adults were estimated according to the detailed sub factors and divided into 5 degrees with the use of the standard deviation per section from the minimum to maximum of the average point calculated. The information was then used to divide oral health indices into 5 degrees.

3) Statistical analysis for oral health index

The average oral health index for adolescents and young adults were estimated according to the detailed factors and sepa-

rated into 5 degrees with the use of the standard deviation per section from the minimum to maximum of the average scores calculated. This information was the used to divide oral health indices into % degrees.

Pearson's co-relation co-influencing items as the numbers of natural teeth, periodontal state, caries state, hygiene ability, other oral state, systemic condition factor including the age factor together, in order to find the affect each item or related factors. Frequency study was performed for each group and statistical analysis was completed with SPSS version 23.0 (IBM Co., Armonk, Newyork, USA).

Results

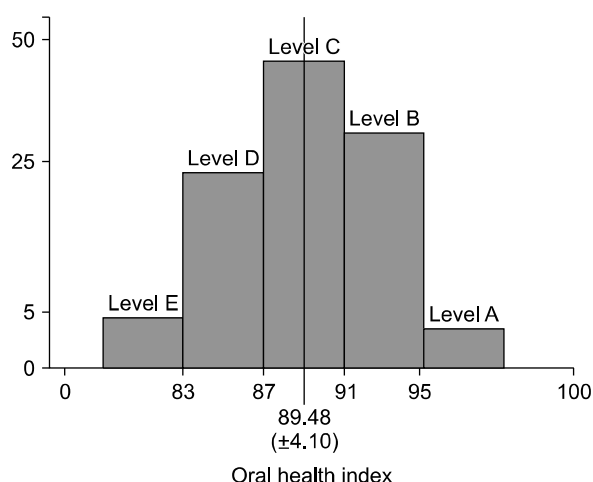### 1. Oral health index for adolescents

Oral health index score was estimated as 89.48±4.10 in adolescence age group and it was composed as 20.00±0.00 score for the number of residual teeth, 30.73±2.07 score for caries state, 11.25±0.59 score for Periodontal state, 14.96±0.20 score for other oral state, 12.54±2.06 score for hygiene ability/sys-

**Table 2.** Oral health index for adolescents age group (12-19 years age)

Item	Number	Full score	Oral health index (mean ± standard deviation)
Number of residual teeth	100	20	20.00 ± 0.00
Caries state	100	35	30.73 ± 2.07
Periodontal state	100	12	11.25 ± 0.59
Other oral state	100	15	14.96 ± 0.20
Hygiene ability/systemic condition	100	18	12.54 ± 2.06
Comprehensive score	100	100	89.48 ± 4.10

Table 3. Oral health index for young adults age group (20-39 years age)

Item	Number	Full score	Oral health index (mean ± standard deviation)
Number of residual teeth	100	15	14.83 ± 0.66
Caries state	100	30	25.75 ± 2.31
Periodontal state	100	20	17.59 ± 2.22
Other oral state	100	15	14.30 ± 1.10
Hygiene ability/systemic condition	100	20	15.19 ± 2.31
Comprehensive score	100	100	87.62 ± 6.14

Figure 1. Suggestion for the range of each level on oral health index in adolescent age group (12-19 years).
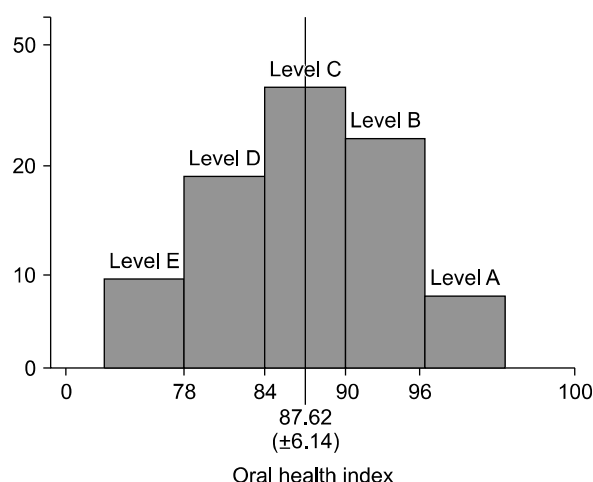
Figure 2. Suggestion for the range of each level on oral health index in young adults aged group (20-39 years).

temic condition, show in Table 2 and Figure 1.

2. Oral health index for young adults

Oral health index score was estimated as 87.62±6.14 in young adults group and it was composed as 14.83±0.66 score for the N. of residual Teeth, 25.75±2.31 score for caries state, 17.59±2.22 score for Periodontal state, 14.30±1.10 score for Other oral state, 15.19±2.31 score for Hygiene ability/systemic condition, show in Table 3 and distributed as shown in Figure 2.

3. Suggestion for the degree divided according to oral health index for adolescents and young adults

Five score range of oral health state were suggested: A (very health), B (healthy), C (moderate), D (poor), E (very poor) state, shown in the individual oral health index for adolescents age and young adults age group. In case of oral health index grade of adolescent being represented by using incremental dental care computer program, level A was over 95.6, level B 95.5-91.6, level C 91.5-87.4, level D 87.3-83.3 and level E below 83.2, respectively. In case of young adult, level A was over 96.9, level B 96.8-91.6, level C 91.5-87.4, level D 87.3-83.3 and level E below 83.2, respectively (Table 4).

Discussion

Adolescence is a transition period from childhood to adulthood in which physical, mental transformation is taken place most significantly and as oral health act being formed in this adolescence is hard to be modified as it becomes a habit or life style in a process of socialization and it affects chronic disease contraction during adulthood, it is an important time of determining lifetime health. Therefore, prevention of oral disease prevention is considered to be important more than anything else [9].

As periodontal disease started to be occurred suddenly during puberty, that is, adolescence and progressed slowly, in most cases, it is left unattended without detecting it and it provides a main cause of tooth extraction during old and late middle age [10].

In this study, more reasonable oral health index grade is intended to be suggested in order to ensure easy use of incremental

dental care computer program. In case of oral health index grade of adolescent being represented by using incremental dental care computer program, level A was over 95.6, level B 95.5-91.6, level C 91.5-87.4, level D 87.3-83.3 and level E below 83.2, respectively. In case of young adult, level A was over 96.9, level B 96.8-91.6, level C 91.5-87.4, level D 87.3-83.3 and level E below 83.2, respectively.

When comparing average and SD of total age, as it was represented in the order of preschoolers (3-5 years old) 85.10±4.70, children (6-11 years old) 88.00±4.70, adolescents (12-19 years old) 89.48±4.10, young adults (20-29 years old) 87.62±6.14, male adults (41-59 years old) 76.89±9.99, senile (over 60 years) 72.58±8.90. It could be realized that oral health index were increased from children to young adults and it was decreased from young adults to old age. During preschoolers and childhood, weight degree of retained tooth number was represented to be nil and additionally as it is deciduous dentition, its score is forecasted to be low and periodontal condition index accounts for relative low weight. During adolescence, as dental caries index is higher than other index, it is considered that total oral health index are represented to be high.

In case of male adult age and senile, it is presumed that this result was represented as age is increased, prevalence of periodontal disease is increased as well and weight degree of periodontal condition index is high.

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In case of male adult age and senile, it is presumed that this result was represented as age is increased, prevalence of periodontal disease is increased as well and weight degree of periodontal condition index is high.

This study has limitation as a survey was performed by limiting its target to some adolescents and young adults and as patients visiting for the purpose of not only preventive intervention but also general intervention were included, it is consid-

Table 4. Score range for oral health index in adolescents age and young adults age group

Age	Number	Level A	Level B	Level C	Level D	Level E
Adolescents (12-19 years)	100	≥95.6	95.5-91.6	91.5-87.4	87.3-83.3	≤83.2
Young adults (20-39 years)	100	≥96.9	96.8-90.8	90.7-84.6	84.5-78.5	≤78.4

ered that they affected the result of this survey.

In particular, in correlation analysis of adolescents by each factor, as retained tooth score of adolescents was entirely same, it was hard to estimate its correlation as a matter of course.

Therefore, in future research, it is considered that a research on grade change of patients in wide area by extending range, not a certain dental clinic would be required. If incremental dental care program should be clinically utilized and commercialized as it is progressed more systematically and consistently, it would become a good starting point in generalizing preventive oral care.

Conclusion

Oral health means a dental condition and maxillofacial oral tissue condition that are not contracted by disease and do not provide obstacle to mental activity and social life and in order to maintain oral health promotion, sustained individual oral health care and periodic systematic preventive care by experts are required.

Two hundred of the subjected volunteers as one hundred in adolescence as age 12 to 19 years and another one hundrer100 for young adults as age 20 to 39 years who want to get a dental checkup among dental patients, were participated in this dental clinical study, to determine the oral health index for each age group. Oral examination, X-ray taking and some laboratory Snyder tests were performed by use of Incremental Dental Care System computer program for all subjects and decided 5 scale ranges through the average and standard deviation at each age group. It was estimated as over 95.6 points for A level and 91.6 to 95.5 for B, 87.4 to 91.5 for C, 83.3 to 87.3 for D and under 83.2 for E level in adolescence age group and over 96.9 points for level A, 90.8, to 96.8 for B, 84.6 to 90.7 for C 78.5 to 84.5 for D and under 78.4 for E level in young adults group.

Under this background, this study intends to provide a basic data in introducing, operating incremental dental care system by estimating oral health index by targeting youth who agreed on such system and presenting more reasonable grade by utilizing computer program.

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