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Original Research Article

A Study to Investigate the Relationship between Gingival Health Status and Dental Caries in School Children

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Abstract

Aim: The purpose of this study was to investigate the relationship between gingival health status and dental caries in elementary school children.

Methods: One hundred children (50 boys and 50 girls) in attendance were enrolled in this study in the Department of Dentistry, RDJMMCH, Turki, Muzaffarpur, Bihar, India for one year. Consent to a dental check-up was obtained from both the participants and their parents.

Results: For the whole sample, the percentages of the A-group, B-group and C-group were 38 %, 35 % and 27 %, respectively. The percentages of children in the A-group aged 7, 8, 9, 10, 11 and 12 years were 50 %, 37.03 %, 30.76 %, 36.6 %, 33.33 % and 45.45 %, respectively. The percentages of the children in the B-group aged 7, 8, 9, 10, 11 and 12 years were 30 %, 29.62 %, 3846 %, 40 %, 44.44 % and 27.27 %, respectively. The percentages of the children in the C-group aged 7, 8, 9, 10, 11 and 12 years were 20 %, 33.33 %, 30.76 %, 23.33 %, 22.22 % and 27 %, respectively. The caries prevalence, caries experience and gingival status of elementary school children by gender were almost similar.

Conclusion: The results of the study suggested that oral hygiene instruction should be given to children beginning in their early school years in order to motivate self-care to prevent not only dental caries but also gingivitis. Although the presence of gingivitis cannot be used to predict periodontitis, management of gingivitis in elementary school children should be recommended.

Keywords: gingival health status, dental caries, elementary school children

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Introduction

The normal physical and psychological growth and development of the child follow a predetermined course. Each developmental stage has specific somatic and intellectual characteristics, which directly or indirectly are of importance for the child's periodontal health. Thus, the level of psychological maturity influences the motivation to take responsibility for oral hygiene, and the level of manual dexterity the ability to master oral hygiene measures. Along with general growth, the craniofacial skeleton increases in size, leading to significant changes in the oral environment. The dynamic course of events includes the eruption and exfoliation of primary teeth, followed by the establishment of the permanent dentition. This is accompanied by changes in the periodontal structures, both at a macroscopic and at a microscopic and functional level. In addition, the establishment and maturation of the oral microflora proceed gradually during childhood and adolescence, as does the development of the immune defence system, implying that the prerequisites for the development of periodontal disease vary with age.

The most common oral diseases, dental caries and periodontal disease, could well be seen as behavioral diseases, because the adoption of healthy behavior is crucial for their control [1]. Oral hygiene practices are those employed personally or professionally to prevent the establishment of pathogenic flora and their products that cause diseases in the oral cavity. The ultimate objective is to prevent disease initiation, progression, or recurrence [2]. For oral health promotion, one of the most effective practices is self-care performed by individuals themselves. Children who consciously try to maintain good oral health do in fact practice good health behavior, and thus a gingival condition reflecting a consistent commitment and ability to perform appropriate oral health activities (tooth brushing and flossing) would be correlated with the incidence of other dental conditions, such as the prevalence of dental caries.

Elementary school provides an effective forum for the delivery of health promotion programs. Schools have access to a large number of children and their teachers. Health promotion activities, including health education, can be integrated into the regular curriculum. School boards, administrators and teachers play important roles as decision makers, since they control the content of the curriculum, participation in health promotion activities and compliance with health regimens. Finances, manpower, public acceptance, attitudes of policy-makers and facilities are reported as the five most frequently mentioned barriers to program development [3].

Okada et al. [4] developed an Oral Rating Index for Children (ORI-C) as a system for screening children's gingival health and oral hygiene status. The system has the following characteristics: 1) requires a very short time to make a judgment (approximately 10 seconds), 2) is easy to understand by children and school teachers, 3) is readily available for screening gingival health status, and 4) uses standardized color photos. This scoring system is recommended for use in large-scale population surveys and as an educational and motivational method to improve children's gingival health status.

Periodontal diseases in children have to be considered against this background of growth and development, and the possibilities of preventing and treating such diseases are largely contingent on basic knowledge of the various aspects of the growing individual.

The purpose of this study was to investigate the relationship between gingival health status and dental caries in elementary school children.

Material and Methodology

One hundred children (50 boys and 50 girls) in attendance were enrolled in this study in the Department of Dentistry, RDJMMCH,Turki, muzaffarpur, Bihar, India for one year. Consent to a dental check-up was obtained from both the participants and their parents. All elementary school children aged 7 to 12 years were examined with the exception of those children who were absent from school. The ORI-C as previously described (4) was employed for the assessment of the gingival condition of the children. The ORI-C uses a set of standard photographs to illustrate each level of the scale in order to maintain consistent standards. The ORI-C scores were recorded by a dentist (MO) with 12 years of experience. The examination was performed using natural light, with children seated in a chair. Each child's gingival health care level was judged and recorded according to an ordinal scale from -2 (very poor) to +2 (excellent). Next, each child was dentally examined by three well trained dentists using the WHO caries diagnostic criteria for DMFT (5). Between these three dentists, the percentage of agreement was more than 90 % for the inter-examiner reproducibility of the DMFT index. The dental examinations took place with the subjects in a supine position using an artificial light, a dental explorer and a dental mirror. To investigate the relationship between gingival condition and caries experience/prevalence, children were classified into three groups: a gingival healthier group (A-group) made up of those scoring +2 (excellent) or +1 (good), an equivocal group (B-group) made up of those scoring 0 and a less healthy group (C-group) made up of those scoring -2 (very poor) or -1 (poor). Mann-Whitney U-test was used for analysis of the DT, FT and DMFT scores for the three groups. Standard computer programs (StatView 4.02, Abacus Concepts, Inc., Berkeley, CA, U.S.A.) were used for the statistical analyses.

Results

Table 1 Number and percentage distribution of gingival status of elementary school children in each of the three groups by age

Age	N	A-group	B-group	C-group
7	10	5 (50%)	3 (30%)	2 (20%)
8	27	10 (37.03%)	8 (29.62%)	9 (33.33%)
9	13	4 (30.76%)	5 (38.46%)	4 (30.76%)
10	30	11 (36.66%)	12 (40%)	7 (23.33%)
11	9	3 (33.33%)	4 (44.44%)	2 (22.22%)
12	11	5 (45.45%)	3 (27.27%)	3(27.27%)
Total	100	38 (38%)	35 (35%)	27 (27%)

For the whole sample, the percentages of the A-group, B-group and C-group were 38 %, 35 % and 27 %, respectively. The percentages of children in the A-group aged 7, 8, 9, 10, 11 and 12 years were 50 %, 37.03 %, 30.76 %, 36.6 %, 33.33 % and 45.45 %, respectively. The percentages of the children in the B-group aged 7, 8, 9, 10, 11 and 12 years were 30 %, 29.62%, 3846 %, 40 %, 44.44 % and 27.27 %, respectively. The percentages of the children in the C-group aged 7, 8, 9, 10, 11 and 12 years were 20 %, 33.33 %, 30.76 %, 23.33%, 22.22 % and 27 %, respectively.

Table 2 Caries prevalence, caries experience and gingival status of elementary school children by gender

Sub group	ORI-C	N	DT	FT	DMFT	FT/DMFT (%)	DMFT (%)
Boys	A	25	0.51±1.10	1.09±1.62	1.60±2.00	63	42.2
	B	13	0.76±1.64	1.06±1.43	1.82±2.17	59	39.2
	C	12	0.75±1.17	1.43±1.75	2.18±2.13	60	38.2
	Subtotal	50	0.63±1.25	1.19±1.63	1.82±2.09	61.1	40.4
Girls	A	20	0.57±1.29	1.99±2.16	2.56±2.40	73	31.7
	B	17	0.92±2.18	1.82±2.05	2.73±2.95	63	25.5
	C	13	1.30±2.81	1.93±2.06	3.22±3.40	63	23.9
	Subtotal	50	0.88±2.08	1.93±2.10	2.80±2.87	67.5	27.9
Total	A	34	0.54±1.19	1.49±1.93	2.03±2.23	68	37.6
	B	34	0.84±1.92	1.44±1.80	2.27±2.61	61	32.4
	C	32	1.01±2.11	1.66±1.91	2.67±2.85	62	31.5
	Subtotal	100	0.74±1.69	1.53±1.89	2.27±2.53	67	34.6

The caries prevalence, caries experience and gingival status of elementary school children by gender were almost similar.

Discussion

The periodic oral health examinations, including gingival examinations, are performed in elementary and secondary schools near the beginning of each academic year. These oral examinations are done at school, not at a dental clinic. In actual practice, the number of children, the available dental staff, medical costs, etc. usually limit the time devoted to gingival examination. Currently, school dentists, who are usually part-time dentists, are instructed to record only obvious cases of gingivitis and these only as "gingivitis present" As a result, little emphasis is placed on gingival health. From the clinician's view point, it seems that he/she is not just faced with a single tooth, the shape of the bone around a tooth surface, pocket depth, etc., but also with the variety of variation in the patients' levels of self-care. [5]

In the study, oral hygiene education, such as tooth brushing and flossing instructions, were needed in approximately 30 % of children (C-group). Overall, the present study showed that gingival condition worsened in proportion to age. This result was similar to that of Hugoson et al. [6], in which the percentage of tooth surfaces with gingivitis was higher among 10-year-olds than among any other age group between 3 to 15-years in both 1973 and 1978. In a review by Matsson [7], it was suggested that factors predisposing to gingival inflammation might include tooth eruption and puberty.

Peretz et al. [8] also suggested that during the mixed dentition stage of children, exfoliation and eruption of teeth might impair oral hygiene measures and might result in increased dental plaque and gingivitis. Gingivitis becomes more chronic and more frequent with increasing age [9].

Gingival reactivity increases gradually from early childhood to adulthood [10] and thus more attention should be paid to the oral self-care of children, including gingival self-care, in order to maximize it at an early age. With increasing age, there was generally an increase in experience of dental caries. The result of the present study indicated that caries experience and caries prevalence increased in proportion to age. Children with good gingival condition had lower DT and DMFT indices than those with poor gingival condition. Gingival condition was related not to past caries experience (FT) but to the current prevalence of caries (DT). The effect of this on the value of the DT created a significant difference in the DMFT between the H and L groups. This suggested that oral cleanliness might be related to gingivitis and dental caries.

There has been little epidemiological study on the relation between the degree of oral hygiene and gingivitis and dental caries in children. Ratka-Kruger et al. [11] reported that in 4- and 5-year old children there was clearly a correlation between the degree of oral hygiene and caries and gingivitis. It is important for children not only to be treated for dental caries and gingivitis but also for them to achieve good self-care for preventing these conditions.

Conclusion

Apparently a variety of biological changes take place during childhood which has an impact on the development of gingival inflammatory disease. While during certain periods the risk of developing gingivitis is relatively low, in other periods the gingival tissues are more susceptible and react to bacterial irritation with inflammation. To the factors responsible for these variations in disease susceptibility should be added psychological maturation and the development of motor skills in the growing child, factors which have a great impact on the child's motivation and ability to master different oral hygiene measures.

The results of the study suggested that oral hygiene instruction should be given to children beginning in their early school years in order to motivate self-care to prevent not only dental caries but also gingivitis. Although the presence of gingivitis cannot be used to predict periodontitis, management of gingivitis in elementary school children should be recommended.

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