
GINGIVAL INFLAMMATORY CHANGES IN SCHOOL CHILDREN

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Abstract: Purpose. The aim of this paper was to evaluate the prevalence of gingival changes in schoolchildren.

Material and method: In order to achieve the goal set in the survey, 180 respondents were surveyed, including pupils aged from 6 to 14 of both sexes, with different national backgrounds. All respondents were divided into two groups: pupils with deciduous dentition from 6 to 10 years of age and schoolchildren with mixed dentition from 11 to 14 years of age. Given the fact that the respondents were juveniles, a written consent from the parents was requested, which ensured the permission to use the surveyed information for scientific - research purposes.

Results: According to Index of gingival inflammation (IGI) by Silness&Loe, there was a stronger impact of soft plaque on teeth after the Greene-Vermillion index (Beta=0.35 than hard dental plaque according to the Greene-Vermillion index (Beta=0.09).

Conclusion: In all of our respondents, the state of gingival health is at an unsatisfactory level. The intensity of the inflammatory changes of the gingiva is strongly influenced by the accumulation of soft plaque of the teeth (dental plaque).

Keywords: oral health, school children, oral hygiene, gingival inflammation, dental plaque

1. INTRODUCTION

Oral diseases (i.e. dental caries and periodontitis) are a major contributor to the global burden of chronic disease Bernabe E. et al.,(2020), Wen PYF. et.al.,(2022). Freiberg A. et al.,(2020), Hjern A. et al.,(2019). State that an important reason for the worsening of oral health is due to diet changing increased sugar consumption, affecting dental health. Dental pain and fear of dental procedures reduced the likelihood of going to the dentist Al-Ani A. et.al., (2021). Gingivitis is inflammation of the soft tissues without apical migration of the junctional epithelium. Redness, swelling and bleeding at palpation are characteristic symptoms of this inflammatory process. The gingival enlargement is known as gingival hyperplasia, which is clinically manifested by an increase in papillary and marginal gingiva. According to Grant DA et al.,(1988). Swelling is one of the cardinal signs of inflammation, and gingival edema is the result of the accumulation of fluid in the tissue. Significant increase and aesthetic disfiguration of the gingival tissue are common side-effects of some disorders in the body, such as leukemia, hormonal changes during puberty and pregnancy, the consumption of certain types of drugs, etc. Gingival fibromatosis may have familial etiology and undetermined genetic basis. If therapeutically gingivitis is treated, the condition is reversible without lasting consequences. Untreated cases can lead to more complex and destructive changes that result in chronic periodontal disease³. Untreated chronic periodontal disease is the main reason for decomposition and premature teeth loss. Recent reports have highlighted that the organization and moderation of oral health programs is very important in order to achieve a satisfactory condition Petersen PE. et.al.,(2005), Petersen PE. (2005,2003,2007). Study conducted by Høyvik AC. Et. al.,(2019) reports that parents were unwilling to adopt preventive approaches to oral health and only took their children to the dentist when they had pain.

2. PURPOSE

The purpose of this paper was to examine the relationship between the soft and hard deposits of Greene-Vermillion, as an independent phenomena and the occurrence of Index of gingival inflammation after Silness&Loe (IGI) as a dependent phenomenon.

3. MATERIAL AND METHODS

In order to achieve the goal set in the survey, 180 respondents were surveyed, including pupils aged from 6 to 14 of both sexes, with different national backgrounds. All respondents were divided into two groups: pupils with deciduous dentition from 6 to 10 years of age and schoolchildren with mixed dentition from 11 to 14 years of age. Given the fact that the respondents were juveniles, a written consent from the parents was requested, which ensured the permission to use the surveyed information for scientific - research purposes.

We determined the precipitate of oral hygiene using the index for determining soft and hard dental plaque (Greene-Vermillion) for soft plaque according to the following values: 0= no soft deposits, 1 = soft plaque that are localized to the gingival tissue of tooth, 2 = soft patches less than 2/3 of the tooth and 3 = soft plaque that covers more than 2/3 of the tooth. For determining the presence of hard plaque of teeth (tartar/dental calculi) the following index values were used: 0 = no tartar, 1 = dental calculi does not cover more than 1/3 of the tooth, 2 = dental calculi covers more than 1/3, and less than 2/3 and 3 = dental calculi covers more than 2/3.

To determine this index, we used four representative teeth that were selected and thus this index was modified according to the purposes predetermined in this study, the upper first molar in the permanent dentition and the upper second molar in the primary dentition, and in the mandible: the first incisors in the permanent dentition, and if they were not erupted, the first primary incisors; and this assessment was performed on the vestibular and oral surfaces of the teeth.

The index consists of two parts: the first, also called the debris index, the presence of soft plaque (dental plaque, substantia alba, food residues and pigmentation) are found. The second part of this index is called a calculus index that determines the presence of solid plaque (tartar and sub-gingival concretes).

For determining the condition of the gingiva, we used the index (in Silness & Loe) according to the following index values: 0 = absence of inflammation - a normal gingiva 1 = for mild inflammation, slight change in color, minor swelling, no bleeding upon probing, 2 = moderate inflammation of moderate redness, swelling, bleeding in projection, hypertrophy, and 3= severe inflammation of redness and hypertrophy, ulceration, tendency to spontaneous bleeding⁸. With this index, the gingiva was estimated at the vestibular, mesial, oral and distal side of the four representative teeth chosen and thus modified the index in favor of the purpose of the study: the upper first permanent molar in the permanent dentition and the upper-second deciduous molar in the primary dentition, and the lower first incisors in permanent dentition, or if they are not erupted, the deciduous central incisors. The assessment was based on change of color, swelling and bleeding of gums.

4. RESULTS

Group 1. Students from 6-10 years of age

1. Soft and hard dental plaques according to the Greene-Vermillion / Index of gingival inflammation – IGI index after Silness&Loe

The results shown in Table 1. refer to the investigated relationship between the index of gingival inflammation following Silness&Loe as a dependent variable and soft and hard dental plaques according to Greene-Vermillion index as independent variables.

For $R = 0.29$ and $p < 0.05$ ($p = 0.01$), a moderately strong correlation was found in the examined relation.

Vermillion's index of Greene-Vermillion index ($Beta=0.22$) has a stronger impact on the IGI after Silness&Loe, rather than hard dental plaque according to Greene-Vermillion index ($Beta=0.15$).

With each increase in the single value of soft plaque on teeth in the Greene-Vermillion index, the Silness&Loe, gingival inflammation increases by 0.10 units ($B = 0.10$) significant for $p < 0.05$ ($p=0.03$), with unchanged values of hard tooth deposits according to the Greene-Vermillion index.

With each increase in the single value of hard teeth in the Greene-Vermillion index, the Silness&Loe index of gingival inflammation increases by 0.12 units ($B = 0.12$) insignificantly for $p > 0.05$ ($p=0.13$), with unchanged values of soft plaque on teeth according to the Greene-Vermillion index.

Table 1. Soft and hard dental plaques according to the Greene-Vermillion /

IGI after Silness&Loe

Regression Summary for Dependent Variable: Index of gingival inflammation after Silness&Loe R = 0.29; F (2.99) = 4.4126 p < 0.01

	Beta	Std.Err. of Beta	B	Std.Err. B	t (99)	p-level
Intercept			0.93	0.06	14.50	0,000
Soft deposits according to Greene-Vermillion index	0.22	0.10	0.10	0.05	2.25	0.03
Hard deposits according to Greene-Vermillion index	0.15	0.10	0.12	0.08	1.52	0.13

Source: author

Group 2. Students ages 11 -14

2. Soft and hard dental plaque on teeth according to the Greene-Vermillion / Index of gingival inflammation - IGI index after Silness&Loe

The results presented in Table 2. refer to the investigated relation between the index of gingival inflammation according to Silness&Loe as the dependent variable and soft and hard dental plaques according to Greene-Vermillion index as independent variables.

For R = 0.38 and p < 0.001 (p = 0.0007), an intermediate strong significant correlation was found in the examined relationship.

According to IGI by Silness&Loe, there was a stronger impact of soft plaque on teeth after the Greene-Vermillion index (Beta=0.35 than hard dental plaque according to the Greene-Vermillion index (Beta=0.09).

With each increase in the single value of soft plaque on teeth in Greene-Vermillion index, the Silness&Loe index of gingival inflammation increases by 0.28 units (B = 0.28) significantly for p < 0.001 (p = 0.000), with unchanged values of hard plaque on teeth according to the Greene-Vermillion index.

With each increase in the single value of hard plaque on teeth in Greene-Vermillion index, the Silness&Loe index of gingival inflammation increases by 0.09 units (B = 0.09) insignificantly for p > 0.05 (p = 0.36), with unchanged values of soft plaque on teeth according to the Greene-Vermillion index.

Table 2. Soft and hard dental plaques according to Greene-Vermillion index /

IGI after Silness&Loe

Regression Summary for Dependent Variable: Index of gingival inflammation after Silness&Loe R = 0.38; F (2.93) = 7.96 p < 0.0007

	Beta	Std.Err. of Beta	B	Std.Err. B	t (99)	p-level
Intercept			0.81	0.10	8.21	0,000
Index of soft plaque on teeth according to Greene-Vermillion	0.35	0.10	0.28	0.08	3.50	0,000
Index of hard plaque on teeth according to Greene-Vermillion	0.09	0.10	0.09	0.10	0.92	0.36

Source: author

5. DISCUSSIONS

Gingivitis is the most common oral disease in childhood. If the gingivitis is treated, the condition is reversible without lasting consequences. On the other hand, untreated cases can lead to more complex and destructive changes that result in chronic periodontal disease, with ultimate consequences - premature decomposition and loss of teeth. Good oral health disrupts the quality of life, and reduced food intake due to the presence of oral pain can cause low growth in children and worsen their nutritional status.

The presence of soft and hard plaques of teeth is a direct consequence of poor oral hygiene and the improper and bad tooth-brushing, which enables the accumulation of dental plaque with too many bacterial colonies.

The presence of hard deposits on teeth is a result of mineralization of the dental plaque with inorganic substances from saliva produced by the small and large salivary glands in the mouth. The differences for the presence of hard plaque among our respondents are considered to be the consequence of their age. In younger patients, the mineralization of dental plaque is poorly expressed, but with the increase in age, it is more pronounced, and the presence of tartar in elderly patients is more evident.

Gingivitis is an inflammation of the gingiva, with the other parts of the periodontal teeth not affected. The main cause of this type of the inflammation are the microorganisms found in the soft and hard plaque of the teeth.

The high prevalence of soft plaque and the presence of inflammation of the gingiva in our examinees from both examined groups is a result of poor oral hygiene.

It is especially important to understand that gingivitis can completely cure and restore gingival health if good oral hygiene is applied which will prevent the recurrence of this disease. Such behavior is of great importance, since after a long persistence, the surface inflammation of the gingiva can extend into the deeper layers of the tooth tissue and lead into periodontal disease.

The prevention of the periodontal disease should be carried out at the earliest age, from the appearance of permanent teeth and lasts for a lifetime. The primary prevention of the periodontal disease covers all measures that stop the occurrence of inflammation of the gingiva, and to preserve the health of the gingiva.

The results shown in Table 2 relate to the relationship between soft and hard dental plaques according to the Greene-Vermillion index as independent occurrences and Gillian inflammation index after Sillnes&Loe as a dependent variable. In the examined relationship, a strong correlation was established $p < 0.001$ ($p = 0.0007$). The soft plaques have stronger impact on the index of gingival inflammation than the hard plaques of the teeth. With each increase in the unit value of soft plaques, the index of gingival inflammation increases by 0.28 units significantly, and the values for hard plaques stay unchanged. While with each increase in the unit value of hard plaques, the index of gingival inflammation increases by 0.09 units insignificantly, with unchanged values in the unit values for the soft plaques.

Our results coincide with those of Motohashi M. et. al.,(2009) indicating that the high average gingivitis is due to poor dental plaque control (soft plaque) due to poor oral hygiene. Also correspondent with the results obtained by Shidara EK. Et. al.,(2007) ($p < 0.003$), hard plaque ($p < 0.0001$) and gingival inflammation ($p < 0.0001$) in permanent dentition in subjects aged 6 to 16 years.

6. CONCLUSIONS

The analysis of the obtained results, point to the following conclusions:

1. In all of our respondents, the state of gingival health is at an unsatisfactory level. The intensity of the inflammatory changes of the gingiva is strongly influenced by the accumulation of soft plaque of the teeth (dental plaque);
2. The implementation of the health strategy for the provision of preventative and dental care through a well-organized dental network means prevention of oral infections and diseases at the earliest age and approximation to the international standards for oral health and quality of life proposed and accepted by the Member States of the European Union and the World Health Organization.

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