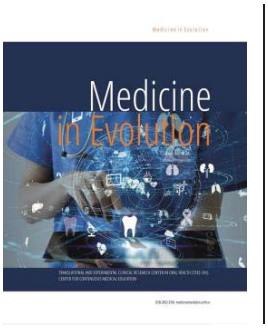
How dental restorations influence plaque-induced gingivitis (a cross-sectional study)?



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Abstract

Aim and objectives: This study aims to establish if oral distribution of dental restorations in close contact to gingiva can influence the risk, severity or distribution of gingivitis. Material and methods: The data presented in this study are part of the PAROGYM cross-sectional study developed on a sample of 1595 Bucharest schoolchildren aged 11 to 14 years. The students were clinically examined and gingival scores were recorded. The Löe GRI index (gingival restoration index) was used for the assessment of dental restorations in close contact to gingiva. Results: The first molars are the teeth that have most often dental restorations in relation to gingiva and can provide some reasons for the prevalence value of gingivitis from this area.

Keywords: gingivitis, dental restorations, children

INTRODUCTION

Dental caries and plaque-induced gingivitis and are the most prevalent oral diseases among children [1]. Caries and gingivitis have a prevalence more than 70% and 90% respectively, among schoolchildren from Bucharest, Romania [2], [3].

Gingivitis may be influenced by many factors besides dental plaque, such as caries, tartar, hormonal background or dental restorations.

Löe retention index GRI (gingival restoration index) was used in previous studies for measuring the effect of dental restoration in the pathology of gingivitis. The GRI scores from Bucharest schoolchildren population prove that dental restauration may influence the prevalence of gingivitis [3]. When a part of a dental restoration is close to gingiva, dental plaque may be attached faster to the tooth (restoration) and be present in a larger amount. However, if the restauration has a good designed and it is polished enough having a smooth surface, this risk is minimum.

Aim and objectives

The main role of this study is to "map" the dental restorations which are near or in a close contact with the gingival tissue and may increase the amount of local dental plaque and gingival inflammation.

MATERIAL AND METHODS

The data presented in this paper are part of the PAROGYM study developed between 2008 and 2009 on Bucharest gymnasium schoolchildren population. 1595 students aged 11 to 14 years from 56 different schools were investigated in order to establish their oral health status. Some of the data related to caries and gingivitis were previously published [2], [3].

EpiInfo software (Centers for Disease Control and Prevention, Atlanta, GA, USA) was used to estimate the proper length of the sample from the total of 58,000 schoolchildren population from 5th to 8th grade (data from 2008). The sample was built for an assumed prevalence of gingivitis of 50%, a 95% confidence interval and a 2.4 estimation error. We used classes as clusters in a single-stage cluster sampling method. The students were also stratified by city regions, grades, and the presence (or not) of a dental unit in school.

The dental examinations were performed in school dental or medical units by one experienced examiner who was calibrated prior to this study. The role of dental restorations in relation to gingiva was measured using GRI – *gingival restoration index* [4]:

- "0": no dental restoration margin closer than 1 mm to the gingival margin (supragingival restoration)
- "1": supragingival margin of a dental restoration extending less than 1 mm below the gingival margin
- "2": subgingival margin of a dental restauration extending more than 1 mm below the gingival margin
- "3": grossly insufficient marginal fit of a dental restoration in a supra and/or subgingival location

GRI and other indexes used for gingival condition assessment (GI – *gingival index,* PlI – *plaque index,* GCI – *gingival caries* index) were scored in this study counting all the teeth surfaces except occlusal.

The study was approved by the Ethics Committee of "Carol Davila" University of Medicine and Pharmacy and every student enrolled in the study had to have an informed consent sign by one of the parents.

The data presented in this paper were processed using the SPSS software, version 24 (IBM, Armonk, NY, USA).

RESULTS

The distribution of dental restorations in relation to gingiva (GRI scores) are exposed on teeth surfaces in tables I and II and graphically shown in figure no. 1.

Table I. GRI scores distribution on upper teeth

Upper teeth					
Tooth	**Surface**	**GRI**	**Tooth**	**Surface**	**GRI**
17	V	0.00	27	V	0.00
17	M	0.00	27	M	0.00
17	D	0.00	27	D	0.00
17	P	0.00	27	P	0.00
16	V	0.01	26	V	0.01
16	M	0.02	26	M	0.02
16	D	0.01	26	D	0.02
16	P	0.01	26	P	0.02
15	V	0.00	25	V	0.00
15	M	0.00	25	M	0.00
15	D	0.01	25	D	0.00
15	P	0.00	25	P	0.00
14	V	0.00	24	V	0.00
14	M	0.00	24	M	0.00
14	D	0.01	24	D	0.00
14	P	0.00	24	P	0.00
13	V	0.00	23	V	0.00
13	M	0.00	23	M	0.00
13	D	0.00	23	D	0.00
13	P	0.00	23	P	0.00
12	V	0.00	22	V	0.00
12	M	0.01	22	M	0.00
12	D	0.00	22	D	0.00
12	P	0.00	22	P	0.00
11	V	0.00	21	V	0.00
11	M	0.01	21	M	0.01
11	D	0.01	21	D	0.01
11	P	0.00	21	P	0.00

Table II. GRI scores distribution on lower teeth

Lower teeth					
Tooth	**Surface**	**GRI**	**Tooth**	**Surface**	**GRI**
37	V	0.00	47	V	0.00
37	M	0.00	47	M	0.00
37	D	0.00	47	D	0.00
37	L	0.00	47	L	0.00
36	V	0.01	46	V	0.02
36	M	0.02	46	M	0.02
36	D	0.03	46	D	0.02
36	L	0.02	46	L	0.01
35	V	0.00	45	V	0.00
35	M	0.01	45	M	0.00

35	D	0.01	45	D	0.00
35	L	0.00	45	L	0.00
34	V	0.00	44	V	0.00
34	M	0.00	44	M	0.00
34	D	0.00	44	D	0.00
34	L	0.00	44	L	0.00
33	V	0.00	43	V	0.00
33	M	0.00	43	M	0.00
33	D	0.00	43	D	0.00
33	L	0.00	43	L	0.00
32	V	0.00	42	V	0.00
32	M	0.00	42	M	0.00
32	D	0.00	42	D	0.00
32	L	0.00	42	L	0.00
31	V	0.00	41	V	0.00
31	M	0.00	41	M	0.00
31	D	0.00	41	D	0.00
31	L	0.00	41	L	0.00

(mean values)
D – distal, M – mesial, V – buccal, P – palatal

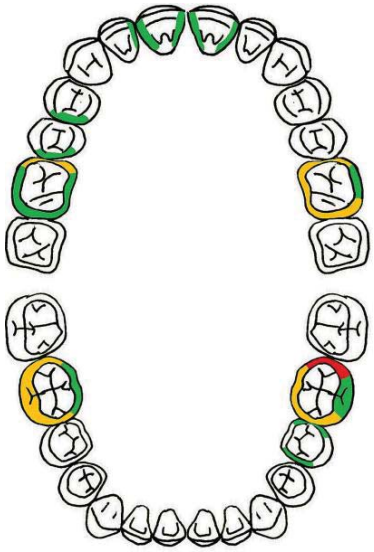

Figure 1. Distribution of GRI mean scores: red – GRI = 0.003, yellow – GRI = 0.002 and green – GRI = 0.001

DISCUSSIONS

The previously results of this study shown there it is a link between gingivitis and dental plaque, caries and dental restorations [3]. This paper shows the oral distribution of dental restorations in contact to gingiva, in this way being able to compare to oral distribution of gingivitis.

This study shown that first molar presented the most dental restorations with margins extended under gingival margins. However, the first permanent molar is tooth considered to be most affected by caries due to its period of mineralization coinciding with early childhood diseases and being one of the first teeth to erupt [5], [6]. We also can see dental restorations on upper incisors and premolars. Comparing to "map" of gingivitis [3] there are some similarities: First of all, dental restorations and gingivitis seems to be located generally on/near interdental surfaces. Secondly, they are most prevalent on the upper teeth. One big

different is that dental restorations are generally located on first molars and the gingivitis is located mostly on the upper anterior teeth. However, the dental restorations in relation to gingiva are not the only factor which can influence the frequency and the extent of gingivitis. Dental plaque is the main cause for gingivitis and the way children brush and floss may give the main model for the oral distribution of plaque-induced gingivitis.

It is obvious that dental restorations rise the risk for gingivitis or increase its extent. The differences appear when we deal with a well-designed dental restoration or with an overhanging dental restoration. Both cases lead to more dental plaque accumulation and provide high risk for gingivitis. However, while a well-designed dental restoration close to the gingival margin increase the risk for gingivitis, an overhanging dental restauration rise in addition the extent of gingivitis and may be positively related to the severity of periodontal disease [7], [8].

CONCLUSIONS

The dental restorations in close contact to gingiva may influence the risk and prevalence of gingivitis especially increasing the rate of plaque accumulation. However, they are not the only risk factor for the gingivitis, dental plaque and oral hygiene quality and routine remaining the most important issues.

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