

## Prevalence of Gingival Hyperplasia in Orthodontic patients

MOHAMMAD J ALZHRANI

Department of Dental & Oral Health, Prince Sultan College of Health Sciences, Dhahran- Saudi Arabia.

Correspondence to Dr. Mohammad Joman Al Zahrani, Email: jomaan@psmchs.edu.sa

### ABSTRACT

**Background:** Gingival hyperplasia is a disease that occurs as a response to various stimuli as well as different host-environment interactions.

**Study Design:** Cross-sectional study.

**Methodology:** Patients (n=100) receiving orthodontic treatment enrolled at orthodontic clinic, Dhahran, Saudi Arabia. The patients were informed and consent was taken. Data was analyzed by SPSS version 22. The distribution of the all-quantitative values of variables of samples were examined with descriptive statistics (chi square) and also frequency tables for other demographic variables among samples. Significant p-value was of  $\leq 0.05$ .

**Results:** Among 100 enrolled patients, 74 showed varying grades of gingival hyperplasia while 26 had no sign of gingival hyperplasia. Chi-square analysis revealed a statistically significant relationship between gingival hyperplasia and plaque presence, age, employment status and length of the treatment.

**Conclusion:** The accumulation of plaque showed statistically significant increase in gingival hyperplasia during orthodontic treatment. Hence, patients should maintain good periodontal health before and during orthodontic treatment in-order to minimize this issue.

**Keywords:** Gingival Hyperplasia, Orthodontic Treatment and Plaque Accumulation

---

### INTRODUCTION

Gingival hyperplasia is a multifactorial disease that occurs due to response to various stimuli as well as different host-environment interactions. It is associated with plaque-accumulation, systemic hormonal disturbances, several blood dyscrasias that include leukemia, thrombocytopenia or thrombocytopathy.<sup>1</sup> Altered speech, difficulty in mastication and psychological problems arise due to gingival enlargement ultimately causing functional disability<sup>2</sup>.

This chronic gingival enlargement is associated with marked inflammation. As a result, oral hygiene measures decline that is complicated by the presence of fixed orthodontic appliances resulting in more inflammation and further plaque accumulation. Thus beginning of a vicious cycle that creates periodontal pockets where plaque removal becomes impossible<sup>3</sup>.

Gingival enlargement is a more common sequel of orthodontic treatment than other manifestations.<sup>4</sup> Orthodontic treatment can lead to dental and skeletal problems while orthodontic appliances, as well as other mechanical procedures, trigger local soft tissue inflammation as well as injury in gingival tissue resulting in gingival hyperplasia.<sup>5</sup>

It has been revealed by literature review that dental plaque formation contributes in the pathogenesis of gingivitis that eventually leads to gingival hyperplasia. Gingival hyperplasia development depends on the balance between microbial biofilms, immune and inflammatory host responses.<sup>6,7</sup> It's a known fact that fixing of orthodontic appliances raise the amount of plaque accumulation that changes the subgingival ecosystem. All of these changes push host cells to liberate several inflammatory cytokines that include interleukin 1 $\beta$  (IL-1 $\beta$ ), interleukin 6 (IL -6) and interleukin 8, (IL-8) and several other growth factors like tumor growth factor (TGF). This results in inflammatory response in periodontal tissues to such appliances<sup>8-10</sup>.

There is increasing burden of gingival hyperplasia nowadays either due to orthodontic treatment or as a side effect of drugs but limited data is available regarding its prevalence. Therefore, we planned the current study to assess the prevalence of gingival hyperplasia in orthodontic patients undergoing orthodontic treatment.

### METHODOLOGY

Patients (n=100) receiving orthodontic treatment enrolled at orthodontic clinic, Dhahran, Saudi Arabia constituted our sample. Written consent following approval by the Hospital's Ethical Committee was taken. Inclusion criteria included individuals having fixed orthodontic treatment for at least 6 months and treatment involving both upper and lower arches. Patients under 10 years of age, individuals who had undergone antibiotic therapy within three months prior to the examination and lactating or pregnant females were excluded.<sup>11</sup>

**Statistical analysis:** Data was analyzed by SPSS version 22. Distribution of quantitative values of variables was examined with descriptive statistics (chi square) and also frequency tables for other demographic variables among samples. The difference in mean of gingival hyperplasia scores were tested by using t-test. Chi-square test was applied with p-value of  $\leq 0.05$  was considered significant.

### RESULTS

Gender distribution among enrolled subjects is described below in table-1.

Among 100 enrolled patients, 74 showed varying grades of gingival hyperplasia while 26 had no sign of gingival hyperplasia. Plaque accumulation status and start of orthodontic treatment among enrolled patients are also shown in Table-2.

Table 3 reveals association between plaque accumulation level and gingival hyperplasia that was found significant (P value=0.000).

Significant association (P value = 0.002) was also found between age groups & gingival hyperplasia by applying chi square test and is shown in table-4.

Orthodontic treatment and gingival hyperplasia showed significant association (P value=0.02) in table-5.

Table-1: Gender distribution among enrolled patients (n=100)

Gender	Frequency	%age
Males	49	49
Females	51	51
Total	100	100.0

Table-2: Distribution of parameters among enrolled patients (n=100)

Gingival Hyperplasia Status	Frequency	%age
Negative	26	26
Positive	74	74
Plaque Accumulation Status		
Negative	15	15
Positive	85	85
Orthodontic treatment		
>6Months	39	39
>12Months	39	39
>18Months	7	7
>24Months	15	15
Total	100	100

Table-3: Plaque Accumulation Level & Gingival Hyperplasia Cross tabulation

Plaque accumulation~	Gingival Hyperplasia--	Gingival Hyperplasia+	P-value
Plaque accumulation +	12	03	0.000*
Plaque accumulation -	14	71	

\*Statistically Significant.

Table-4: Age Groups & Gingival Hyperplasia Cross tabulation

AgeGroups	Gingival Hyperplasia--	Gingival Hyperplasia+	P-Value
10-14 years	4	10	0.002*
15 and above	22	64	

\*Statistically Significant.

Table-5: Orthodontic Treatment & Gingival Hyperplasia Cross tabulation

Orthodontic Treatment	Gingival Hyperplasia--	Gingival Hyperplasia+	P-Value
>6Months	11	28	0.02*
>12Months	4	35	
>18Months	0	6	
>24Months	0	15	

\*Statistically Significant

## DISCUSSION

The present study confirmed previous observations that within few months after treatment with fixed appliances, generalized hyperplastic gingivitis develops. Regarding factors associated with the impact of oral condition on the gingival health, the most frequent variables in the literature where the presence of plaque, age group and the length of orthodontic treatment<sup>1</sup>.

Literature review revealed that orthodontic treatment is linked with increase in plaque accumulation.<sup>12</sup> Similar observation was demonstrated by the present study as our results revealed that there was an increase in plaque accumulation and gingival inflammation in majority (74%) of enrolled patients. Our findings were in line with findings of other studies that showed plaque accumulation was associated with gingival hyperplasia.<sup>13,14</sup> Plaque accumulates in these patients because of change in cleaning habits of the individuals having appliances and secondly due to formation of pockets filled with plaques that are difficult to clean.

While our study had 51% female patients which is almost similar to a previous study project that enrolled 190 patients with 53% females to determine changes in periodontal pathogen levels before, during, and after orthodontic treatment in adolescent.<sup>1</sup> In contrast, one study carried on the Brazilian population included 16 female patients to observe gingival hyperplasia<sup>14</sup>.

In our project, patients above 15 years of age, showed the highest percentage of gingival hyperplasia 84.5%. Teenagers commonly struggle with orthodontics since their diet is loaded with sugar and carbohydrates exhibiting higher rates of tooth decay. Previous studies revealed that gingival inflammation and gingival bleeding was higher in children at puberty due to hormonal changes. At puberty, the production of sex hormones both in males (testosterone) and females (estrogen and progesterone) increase reaching a level that remains constant throughout the normal reproductive life. This results in gingival hyperplasia. Our findings were in line with previous study to determine juvenile gingival hyperplasia<sup>15,16</sup>.

Lastly studies suggested that prevalence of gingival enlargement was related to length of orthodontic treatment<sup>17</sup>. Similar results were shown by one study that compared gingival hyperplasia in patients during and after 3-12 months treatment<sup>18</sup>. Our findings proved similar results -the longer the orthodontic treatment, the greater the gingival hyperplasia.

## CONCLUSION

We conclude that accumulation of plaque showed statistically significant increase in gingival hyperplasia during orthodontic treatment. Hence, patients should maintain good periodontal health before and during orthodontic treatment in-order to minimize this issue.

**Acknowledgements:** I would like to express my gratitude to Dr. Areej for her support and guidance during this research and the orthodontists in KFMMC, dental clinic, Dr. Mohammed Ali and Dr. Rida Abdullah for their cooperation with regards to data collection.

**Limitations:** In our study, the length of orthodontic treatment for the majority of the sample was less than 1 year which did not enable the investigators to address prevalence of gingival hyperplasia in patients undergoing longer treatment.

**Conflict of interest:** None

**Funding:** None

## REFERENCES

1. Thornberg MJ, Riolo CS, Bayirli B et.al., Periodontal pathogen levels in adolescents before, during, and after fixed orthodontic appliance therapy. *Am J Orthod Dentofacial Orthop.* 2009;135(1):95-8.
2. Devi PK, Kumar GP, Bai YD et.al., Ipsilateral idiopathic gingival enlargement and it's management using conventional gingivectomy and diode laser: A recurrent case after 15 years. *J Indian Soc Periodontol.* 2013;17(3):387.
3. Boke F, Gazioglu C, Akkaya S et.al., Relationship between orthodontic treatment and gingival health: A retrospective study. *Eur J Dent.* 2014;8(3):373.
4. Buddiga V, Ramagoni NK, Mahantesh H. Gingival enlargement-a case series. *Ann Essence Dent.* 2012 Jan 1;1:73-6.
5. Willmot D. Orthodontic treatment and the compromised periodontal patient. *Eur J Dent.* 2008;2:1.
6. Socransky SS, Haffajee AD. Evidence of bacterial etiology: a historical perspective. *Periodontol 2000.* 1994;5(1):7-25.
7. Socransky SS, Smith C, Haffajee AD. Subgingival microbial profiles in refractory periodontal disease. *J Clin Periodont.* 2002;29(3):260-8.
8. Gong Y, Lu J, Ding X. Clinical, microbiologic, and immunologic factors of orthodontic treatment-induced gingival enlargement. *Am J Orthod Dentofacial Orthop.* 2011;140(1):58-64.
9. Teles R, Sakellari D, Teles F et.al., Relationships among gingival crevicular fluid biomarkers, clinical parameters of periodontal disease, and the subgingival microbiota. *J Periodonto.* 2010;81(1):89-98.
10. Alves AC. The impact of orthodontic treatment on periodontal support loss. *Dental Press J Orthod.* 2012;17(1):18-20.
11. Silamniku-Dalipi Z, Dragidella F, Mrasori S et.al., Effect of Periodontal Treatment of Patient with Orthodontic Fix Appliance-long Term Follow-up, Case Report. *J Int Dent Med Res.* 2020;13(1):351-4.
12. Brightman LJ, Terezhalmly GT, Greenwell H et.al., The effects of a 0.12% chlorhexidine gluconate mouthrinse on orthodontic patients aged 11 through 17 with established gingivitis. *Am J Orthod Dentofacial Orthop.* 1991;100(4):324-9.
13. Ericsson I, Thilander B, Lindhe J. Periodontal conditions after orthodontic tooth movements in the dog. *Angle Orthod.* 1978;48(3):210-8.
14. Cardoso MD, Saraiva PP, Maltagliati LÁ et.al., Alterations in plaque accumulation and gingival inflammation promoted by treatment with self-ligating and conventional orthodontic brackets. *Dental press journal of orthodontics.* 2015;20(2):35-41.
15. Chang JY, Kessler HP, Wright JM. Localized juvenile spongiotic gingival hyperplasia. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2008;106(3):411-8.
16. Tevatia S. Puberty induced gingival enlargement. *Biomed J Sci & Tech Res.* 2017;1(1):103-4.
17. Pinto AS, Alves LS, do Amaral Zenkner JE et.al., Gingival enlargement in orthodontic patients: Effect of treatment duration. *Am J Orthod Dentofacial Orthop.* 2017;152(4):477-82.
18. Kouraki E, Bissada NF, Palomo JM et.al., Gingival enlargement and resolution during and after orthodontic treatment. *N Y State Dent J.* 2005;71(4):34