

Prevalence of White Spot Lesions during Orthodontic Treatment with Fixed Appliances in Jammu City

Ritesh Gupta¹, Nanika Mahajan², Bhanu Kotwal³, Simran Kaur⁴, Sharad Kharyal⁵, Neetu Gupta⁶

¹Dental Surgeon, Department of Orthodontics, Indira Gandhi Government Dental College, Jammu, Jammu and Kashmir, India, ²Lecturer, Department of Pedodontics and Preventive Dentistry, Indira Gandhi Government Dental College, Jammu, Jammu and Kashmir, India, ³Lecturer, Department of Periodontics, Indira Gandhi Government Dental College, Jammu, Jammu and Kashmir, India, ⁴MDS, Orthodontics, Private Practitioner, Jammu, Jammu and Kashmir, India, ⁵MDS, Orthodontics, Private Practitioner, Jammu, Jammu and Kashmir, India, ⁶BDS, Private Practitioner, Jammu, Jammu and Kashmir, India

Abstract

Aim: To determine the prevalence of white spot lesions (WSLs) in orthodontic patients at three different points of time during orthodontic treatment using the visual examination method.

Materials and Methods: the prevalence of white spot lesions was found by examining the patients before starting orthodontic treatment, after 6 and 12 months into treatment. Upon clinical evaluation, teeth were given a visual score based on the extent of demineralization.

Results: The results of our study showed that majority of the males and females) did not show any white spot lesions before the start of the orthodontic treatment. There was no statistically significant relationship between the presence of white spot lesions and genders ($p = 0.9072$). The mean score before the start of orthodontic treatment was 1.20 ± 0.20 and in females it was 1.28 ± 0.18 which gradually increased with the increase in duration of the treatment.

Conclusion: This clinical study showed a sharp increase in the number of WSLs during the first 6 months of treatment and was more in maxillary teeth. WSL showed a significant correlation with oral hygiene status of the patient, which should be evaluated during the initial months of treatment so that implementation of various measures can be done to prevent demineralization.

Key words: White spot lesions, Prevalence, Demineralization, Jammu

INTRODUCTION

Apart from its beneficial effects, orthodontic treatment has certain risks and limitations. White spot lesions (enamel demineralization) is one of the most common and a significant risk associated with orthodontic treatment in patients with poor oral hygiene.

The various components of fixed orthodontic appliance such as brackets, bands and wires act as a site for plaque

accumulation. During fixed orthodontic therapy, a rapid shift in the bacterial flora of plaque occurs with increased levels of acidogenic bacteria, mainly *Streptococcus mutans* and *Lactobacilli* which results in demineralization and alteration in the appearance of the enamel surface by the production of acid by these bacteria in plaque.^[1-6]

Early lesions appear as opaque, white spots that leads to caries if left with any intervention and can be detected clinically as early as 1 to 2 months into treatment and their prevalence ranges from 2 to 96% in patients undergoing fixed orthodontic treatment.^[7,8]

White spot lesions are most commonly seen on the buccal surfaces of teeth mostly in the gingival region and around the brackets. Many relevant studies reported the presence of white spot lesions at the completion of orthodontic treatment.

Correspondence Author: Ritesh Gupta, Dental Surgeon, Department of Orthodontics, Indira Gandhi Govt. Dental College, Jammu, Jammu and Kashmir, India. E-mail: theritesh@yahoo.com

The prevalence of these lesions varies depending upon the examination method used. Gorelick *et al.*, in their study found that 50% of patients who underwent orthodontic treatment were having WSLs when examined with the visual examination technique.^[1,5,9]

Though it was stated in the past that WSLs could develop within 1 month, their formation and prevalence at different points of time during orthodontic treatment have not been investigated. Therefore, the aim of this study is to determine the prevalence of white spot lesions using the visual examination method in orthodontic patients before orthodontic treatment and at 6 and 12 months into treatment in Jammu city.

MATERIALS AND METHODS

The prevalence of white spot lesions was found by visual evaluation of teeth of the patients at three different points of time i.e. before starting orthodontic treatment, after 6 months and after 12 months into treatment were given a visual score based on the extent of demineralization. From a simple size of 343 patients coming to the Department of Orthodontics in Indira Gandhi Government Dental College, Jammu, a total of 240 subjects were taken who were willing to participate in the study and were fulfilling the inclusion criteria.

Inclusion Criteria

No previous history of orthodontic treatment,

Absence of Dental caries and Absence of any systemic condition.

Exclusion Criteria

Presence of any congenital anomaly.

The selected subjects were equally divided into three groups consisting of 80 subjects (40 males and 40 females). The study participants were also separated into 3 groups as; Group I consisted of subjects before the start of treatment, Group II comprised of subjects who had been undergoing orthodontic treatment for 6 months and Group III comprised of subjects who were undergoing treatment for 12 months.

The following scale was used for the visual examination:

Score 0 = No visible white spots or surface disruption (no demineralization)

Score 1 = Visible white spot without surface disruption (mild demineralization)

Score 2 = Visible white spot lesion having a roughened surface but not requiring a restoration (moderate demineralization)

Score 3 = Visible white spot lesion requiring restoration (severe demineralization)

The examination was performed under direct illumination of chair light after drying the teeth with compressed air. All the participants were examined by the same examiner trained for the specific study to avoid intra examiner errors.

Data Analysis

SPSS version 20.0 (SPSS, Chicago, IL, USA) was used for analysis of data. Frequency, Mean and Standard Deviation was calculated. Chi-square test was used to analyze the data and the level of significance was at 0.05.

RESULTS

Table 1 showed that majority of the males and females (87.5% and 82.5% respectively) did not show any white spot lesions before the start of the orthodontic treatment. However the presence of white spot lesions increased more within first six months (52.5% males and 55% females) into treatment with a gradual increase till twelve months (57.5% males and 65% females) into treatment. There was no statistically significant relationship between the presence of white spot lesions and genders. Table 2 showed that in Group 1, the mean score of white spot lesions in males was 1.20 ± 0.20 and in females it was 1.28 ± 0.18 . In-group 2 the mean score for males was 1.33 ± 0.10 and in females it was 1.27 ± 0.09 . Group 3 showed that the mean score of WSLs was 1.52 ± 0.10 in males and 1.53 ± 0.09 in females.

DISCUSSION

The present study was conducted in Department of Orthodontics in Indira Gandhi Government Dental College, Jammu with a total of 240 subjects. The fixed orthodontic treatment reduces the patients efficiency to maintain oral hygiene which leads to increased plaque retention around the various components of fixed appliance which further leads to the development of white spot lesions and enamel demineralization. The findings of the present study showed that majority of the subjects did not show any white spot lesion before the start of orthodontic treatment however there was an increase in the number of subjects with white spot lesion present after 6 months and 12 months into the treatment which is in agreement with the studies done by Gorelick *et al.*^[1] and Tufekci E.^[10]

Fewer studies showed that white spot lesions were found to be more frequent on the gingival surfaces of premolar tooth because of gingival bracket placement and also lead to gingival enlargement in some cases. It was recommended

Table 1: Frequency of WSLs in different genders

Group	WSL absent		WSL present	
	Males (%)	Females (%)	Males (%)	Females (%)
Group I (before orthodontic treatment)	35 (87.5)	33 (82.5)	5 (12.5)	7 (17.5)
Group II (6 months into treatment)	19 (47.5)	18 (45)	21 (52.5)	22 (55)
Group III (12 months into treatment)	17 (42.5)	14 (35)	23 (57.5)	26 (65)
	$\chi^2=0.112, P=0.9457$		$\chi^2=0.195, P=0.9072$	

Table 2: Mean scores of patients with WSLs at different points of time

Group	Number of subjects		Mean score		Standard deviation	
	Males (%)	Females (%)	Males	Females	Males	Females
Group I (before orthodontic treatment)	5 (12.5)	7 (17.5)	1.20±0.20	1.28±0.18	0.447	0.487
Group II (6 months into treatment)	21 (52.5)	22 (55)	1.33±0.10	1.27±0.09	0.483	0.455
Group III (12 months into treatment)	23 (57.5)	26 (65)	1.52±0.10	1.53±0.09	0.510	0.508
Total	104 (43.3%)					

to perform gingivectomy by either means to create adequate space between gingival margin and the bracket.^[11]

According to the findings of our study the mean score of WSLs in Group I was 1.20, which gradually increased after 6 months (1.33) and 12 months (1.52) into treatment. The results were in accordance with the study done by Tufekci E *et al.*^[10,14]

The findings of our study showed that there was no significant gender difference associated with white spot lesions, which was contradictory to the studies done by various authors in the past.^[10,12-14]

In our study oral hygiene index was not considered which is also a limiting factor as some of the studies have stated that maintenance of oral hygiene status had a strong and significant correlation with the prevalence of white spot lesions. It is well known that poor oral hygiene was an important risk factor in the formation of WSLs. Julienna *et al.* found WSLs in only 17% of patients with good oral hygiene index, compared to 24% with fair and 38% with poor oral hygiene status.^[15]

CONCLUSION

This clinical study showed a sharp increase in the number of WSLs during the first 6 months of treatment and was more in maxillary teeth. WSL showed a significant correlation with oral hygiene status of the patient, which should be evaluated during the initial months of treatment so that implementation of various measures can be done to prevent demineralization.

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