

Access this article online

Quick Response Code:



Website:  
www.jehp.net

DOI:  
10.4103/jehp.jehp\_125\_16

# Assessment of Iranian orthodontists' practice with regard to the prevention and treatment of white spot lesions

Faezeh Eslamipour, Majid Shahmoradi<sup>1</sup>, Vashnad Farhadi<sup>2</sup>

## Abstract:

**INTRODUCTION:** White spot lesions (WSLs) are common adverse effect of orthodontic treatment, which can be prevented and treated by orthodontists. This study was conducted to assess Iranian orthodontists' practice regarding the prevention and treatment of WSLs in their patients.

**METHODS:** In this cross-sectional study, 109 Iranian orthodontists were selected from the Iranian Association of Orthodontists' directory by cluster sampling. For data collection, a questionnaire was designed and its validity and reliability was confirmed (Cronbach's  $\alpha = 0.85$ ). The questionnaire included eight general questions and eight questions about practice with regard to the prevention and treatment of WSL. Data were analyzed by descriptive tests, ANOVA test, and *t*-test in SPSS 20 software.  $P < 0.05$  was considered statistically significant.

**RESULTS:** The mean score of orthodontists' practice was 7.62 (range: 0–8), and 94.4% of the participants were rated as good, while 3.7% and 1.9% were rated as moderate and weak, respectively. Women's score was significantly higher than that of men ( $P = 0.001$ ). With increasing participants' age, their practice has been improved ( $P = 0.001$ ), but there was no significant relation between years of experience and their practice ( $P = 0.230$ ). Nearly 94.4% of the orthodontists prescribed fluoride products. Toothpastes and fluoride mouth rinses were the most common prescribed products (34%).

**CONCLUSIONS:** With regard to Iranian orthodontists' practice, it was fortunate to note that majority of the respondents were taking care of their patients with regarding to the prevention and treatment of WSLs. For enhancing their competencies, it is recommended to plan educational courses which are useful for promoting their knowledge and practice about new products and procedures used for the prevention and treatment of WSLs.

## Keywords:

Orthodontist, practice, prevention, treatment, white spot lesions

## Introduction

During fixed orthodontic treatment and in the absence of adequate oral health care, fixed orthodontic appliances induce accumulation of dental plaque around orthodontic brackets. Dental plaque causes pH decrease. As the pH drops below the remineralization threshold, carious decalcification occurs.<sup>[1-3]</sup> White spot lesions (WSLs) are the first clinical evidence of demineralization, which can form within 4 weeks.<sup>[4,5]</sup> WSLs are subsurface porosities which are caused by demineralization.<sup>[6]</sup> The milky white

appearance is due to changes in light scattering of the decalcified enamel.<sup>[7]</sup>

WSLs are more prevalent in orthodontic patients than others.<sup>[8]</sup> About 50% of patients receiving orthodontic treatment develop one or more WSLs during treatment, compared with 11%–24% of untreated control participants.<sup>[9]</sup> Richter *et al.*<sup>[10]</sup> reported that 72.9% of orthodontic patients had developed at least one WSL during orthodontic treatment, of which 2.3% of them were cavitated.

Appropriate oral health care such as toothbrushing and using fluoridated dentifrice (0.1% or more) can prevent

Department of Oral  
Public Health, Dental  
Research Center,  
School of Dentistry,  
Isfahan University of  
Medical Sciences,  
<sup>1</sup>Dental Students'  
Research Center, School  
of Dentistry, Isfahan  
University of Medical  
Sciences, <sup>2</sup>Private  
Practice, Isfahan, Iran

**Address for  
correspondence:**  
Dr. Faezeh Eslamipour,  
Department of Oral  
Public Health, School  
of Dentistry, Isfahan  
University of Medical  
Sciences, Isfahan, Iran.  
E-mail: eslamipour@  
dnt.mui.ac.ir

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

**How to cite this article:** Eslamipour F, Shahmoradi M, Farhadi V. Assessment of Iranian orthodontists' practice with regard to the prevention and treatment of white spot lesions. *J Edu Health Promot* 2017;6:42.

WSLs. Using fluoridated dentifrice alone is ineffective for patients who are not compliant, and dentists should encourage these patients to use fluoride mouth rinse daily.<sup>[11-13]</sup> O'Reilly and Featherstone<sup>[13]</sup> and Geiger *et al.*<sup>[14]</sup> reported that using fluoride mouth rinses significantly reduces the number of WSLs. However, <15% of orthodontic patients have rinsed daily, as instructed.

Consequently, more sustained fluoride supplementation is needed. Fluoride varnish is more independent of patients' cooperation.<sup>[12]</sup> It decreases the amount of enamel demineralization in orthodontic patients.<sup>[15,16]</sup> Bonding fixed orthodontic appliances with glass ionomer cements provides sustained fluoride release.<sup>[7]</sup> Hallgren *et al.*<sup>[17]</sup> found elevated fluoride concentrations in dental plaque adjacent to brackets bonded with glass ionomer compared with brackets bonded with resin composite.

Although fluoride supplementations are the most effective method for WSLs prevention,<sup>[18,19]</sup> there is no common approach for treating this lesion.<sup>[20]</sup> Recently, using fluoride and remineralization with calcium phosphate has demonstrated good results. More studies are needed for evaluating its clinical effects.<sup>[21,22]</sup>

Since orthodontists play an important role in preventing and treating WSLs which is an important clinical complication in orthodontic patients and due to the paucity of research about orthodontists' practice in preventing and treating WSLs, this study evaluates Iranian orthodontists' practice toward WSLs in their patients.

## Methods

This cross-sectional study was conducted on Iranian orthodontists in 2015 after obtaining approval by the Ethical Committee at Isfahan University of Medical Sciences, Faculty of Dentistry. The sample size was 120, which were selected by multistage sampling from five large cities of Iran as the clusters; Tehran, Isfahan, Shiraz, Tabriz, and Mashhad. Orthodontists in these cities were randomly selected from the Iranian Association of Orthodontists directory. The orthodontists who have no clinical practice were excluded from the study. By referring to the orthodontists' offices, data collection was done. Data collection was conducted by a questionnaire. The questionnaire was designed using literature.<sup>[7,14,20]</sup> Questionnaire validity was confirmed by a specialist team (four orthodontists and an operative dentistry specialist and an oral health specialist) and then it was given to ten orthodontists for checking face validity and their comments were applied. The reliability of questionnaire was tested in a pilot study by 25 orthodontists (Cronbach's  $\alpha = 0.85$ ).

The final questionnaire consisted of two parts; demographic part (three questions) and the second part with 13 questions about oral health care in orthodontic clinics. There were eight key questions which assessed orthodontists' practice regarding the prevention and treatment of WSLs. If six questions were answered true, the practice was evaluated good, if four were true, it was fair, and lower than four, it was weak.

For data analysis, SPSS 20 software (IBM Company, Armonk, NY, U.S.A) was used by applying *t*-test and ANOVA tests with the significant level of 0.05.

## Results

From 120 orthodontists who were participants in this study, 109 orthodontists had filled questionnaires completely, so the response rate was 91%. The group consisted of 63 (59.4%) females and 43 (40.6%) males. The average age was  $42.6 \pm 8.7$  years. The average years of experience were  $10.1 \pm 6.2$  years. Table 1 shows orthodontists' demographic characteristics.

For the second part of the questionnaire about orthodontists' practice regarding prevention and treatment of WSLs, 94.4% of orthodontists were categorized in good practice subgroup (6–8 score) [Table 2].

The relationship between practice score and gender, age, and years of practice was analyzed by *t*-test and ANOVA [Table 3].

The average practice score in women was significantly higher than that of men. In addition, the score in orthodontists aged over 50 years was significantly higher

**Table 1: Demographic profile of participants**

	Gender		Total
	Male, n (%)	Female, n (%)	
Age			
<50	49 (63.63)	28 (36.34)	77 (70.64)
>50	15 (46.8)	17 (53.2)	32 (29.36)
Years of practice			
>5	22 (68.75)	10 (31.25)	32 (29.36)
5-10	6 (40)	9 (60)	15 (13.76)
>10	35 (56.45)	27 (43.54)	62 (56.88)

**Table 2: Orthodontist's practice regarding prevention and treatment of white spot lesions**

	Practice		
	Good (6-8)	Fair (6-4)	Weak (under 4)
Male	64 (91.4)	4 (5.7)	2 (2.9)
Female	39 (100)	0	0
Total	103 (94.4)	4 (3.7)	2 (1.9)

than the orthodontists under the age of 50 years. There was no relation between the years of practice and the practice score.

Nearly 98.2% of the orthodontists instructed oral health care to their patients by themselves or by their staff [Figure 1].

Almost 94.4% of orthodontists had used fluoride products for their patients. Nearly 22.9% used only one type of fluoride product; others had used two or more types simultaneously to prevent dental caries. The most commonly prescribed fluoride product was toothpaste (77%) and the least was professional fluoride therapy (8.3) [Figure 2].

Nearly 95.4% of orthodontists used to examine their patient's teeth for dental caries and the presence of WSLs at the beginning of the orthodontic treatment and 90% of them continue checking tooth caries during treatments [Table 4].

Nearly half of the orthodontists referred their patients to general practitioners for treating WSLs (40%) [Table 4].

### Discussion

WSLs are common complications of orthodontic treatment,<sup>[4,5]</sup> and nearly half of the orthodontic patients have one or more WSLs during treatment.<sup>[9]</sup> Orthodontists have an important role to prevent and manage this problem by instructing oral health care to their patients.<sup>[23]</sup> According to results of this study, 94.4% of orthodontists had good practice. Women's practice score was significantly higher than that of men. Researchers have found females to engage in better oral hygiene behavioral measures, possess a greater interest in oral health, and perceive their oral health to be good to a higher degree than males,<sup>[24]</sup> so

maybe, it is the reason that they pay more attention to patients' oral hygiene.

In 79% of cases, orthodontists or their staff instructed oral health care to their patients to prevent oral disease during the treatment. Hence, it shows that patient training and

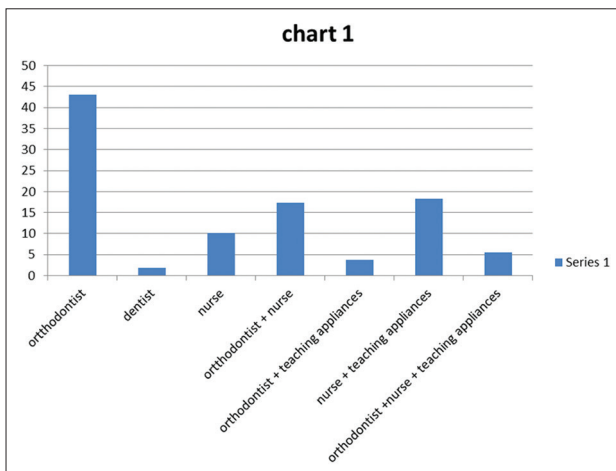
**Table 3: Mean score of orthodontists' practice among different genders, ages, and years of experience**

Variables	Average practice score	P
Gender		
Male	38.7	0.001
Female	94.7	
Age		
<50	56.7	0.001
>50	90.7	
Years of practice		
<5	19.7	0.230
5-10	92.7	
>10	67.7	

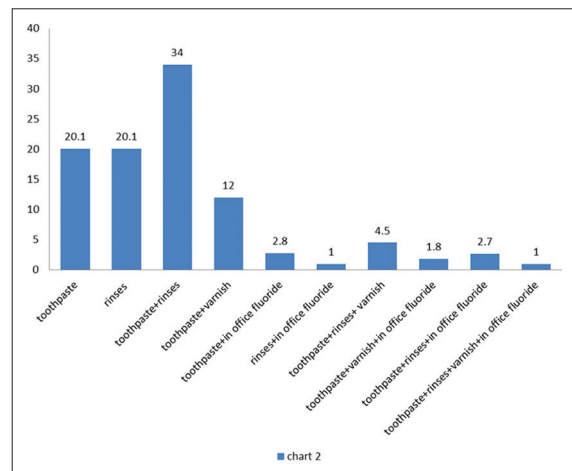
**Table 4: Frequency of patient dental checking for the presence of white spot lesions and treatment methods used by orthodontists**

Variables	n (%)
Evaluation period	
Every visit	66 (60.55)
Every 3 months	15 (13.76)
Every 6 months	18 (16.52)
Only at the end of treatment	4 (3.67)
Patient refers to general practitioners for every 3-6 months	4 (3.67)
Do not recognize	2 (1.83)
Treatment methods	
Refer to general practitioners	51 (39.8)
Home care prescription	24 (18.7)
Professional fluoride therapy	36 (28.1)
Using CPP-ACP*	17 (13.2)

\*Casein phosphopeptide-amorphous calcium phosphate



**Figure 1:** Persons who instructed oral health care in orthodontic clinics



**Figure 2:** Frequency of fluoride products prescription by orthodontists

increasing patient's motivation regarding prevention of WSLs is a common practice in Iranian orthodontists.

Rubak *et al.*<sup>[25]</sup> conducted a meta-analysis and they found that instructions to increase the patient's motivation to implement and maintain good oral health care habits are common among orthodontists. This is the same as the result of the present study.

Ogaard *et al.*<sup>[26]</sup> reported that visible white spots on the facial surfaces of teeth increase during orthodontic therapy. In this study, nearly 60% of orthodontists reported that they had observed WSLs on patients' teeth during treatment, which is similar with Ogaard's study.

In another study, Ogaard<sup>[27]</sup> recommended that clinicians provide a more continuous fluoride supplementation independent of patient cooperation, which would decrease the risk of fixed orthodontic appliances' cariogenic effects. In this study, 94.4% of orthodontists used fluoride products to prevent and treat WSLs which demonstrated responsible practice of these orthodontists.

There are various methods for preventing and treating WSLs. Benson *et al.*<sup>[28]</sup> reported that daily usage of fluoride mouth rinse significantly decreases WSLs in orthodontic patients. In this study, 57% of orthodontists prescribed fluoride mouth rinses for preventing WSLs. Fluoridated toothpastes and fluoride mouth rinses were the most common prescribed products by orthodontists. According to Bergstrand and Twetman's<sup>[29]</sup> review study, fluoride varnish is the best product for preventing WSLs. It seems that using varnish fluoride is not routine because patients are more familiar with using toothpaste or mouth rinse and also patients have to pay more for varnish fluoride.

Bishara *et al.*<sup>[11]</sup> recommended that clinicians must document all WSLs by obtaining intraoral photographs before beginning treatment. In this study, 95.4% of orthodontists evaluated WSLs before starting treatment and 92.7% checked the presence of WSLs during treatment and 61% checked WSLs at every visit.

Tufekci *et al.*<sup>[23]</sup> reported at least one WSL in 38% of orthodontic patients during the first 6 months and in 46% of them during the first 12 months of treatment. In this study, orthodontists were checking the presence of WSLs 3 months after starting treatment procedures. Nearly 62% observed few WSLs and 28% observed WSLs among half of their patients. The different period of time for evaluating WSLs between two studies could be the reason of these differences.

The survey showed significant relation between age of orthodontists and the practice score. Orthodontists with age of 50 years or above had better practice. The

reason could be due to the role of age in preventing complications and orthodontists' tendency to do perfectly. However, Charalambous *et al.*<sup>[30]</sup> did not find any significant relation between the age of dentists and their efficiency. This can be due to different elements which were assessed in these studies.

This research clarified that orthodontists do their responsibility in the prevention of WSLs. Hence, it is recommended to assess other possible factors in producing tooth caries in these patients.

## Conclusions

Iranian orthodontists had good practice regarding the prevention and treatment of WSLs. Women's practice was significantly better than that of men. The most common method for preventing WSLs was in-home instructions. The most common prescribed product is fluoride-containing toothpastes. Against orthodontists' good performance with regard to caries prevention, WSL is still the common problem in orthodontic patients. Hence, it is recommended to assess other possible factors in producing tooth caries in these patients.

## Financial support and sponsorship

This study was financially supported by Isfahan University of Medical Sciences as a thesis.

## Conflicts of interest

There are no conflicts of interest.

## References

1. Gwinnett AJ, Ceen RF. Plaque distribution on bonded brackets: A scanning microscope study. *Am J Orthod* 1979;75:667-77.
2. Chatterjee R, Kleinberg I. Effect of orthodontic band placement on the chemical composition of human incisor tooth plaque. *Arch Oral Biol* 1979;24:97-100.
3. Scheie AA, Arneberg P, Krogstad O. Effect of orthodontic treatment on prevalence of *Streptococcus mutans* in plaque and saliva. *Eur J Oral Sci* 1984;92:211-7.
4. Proffit WR, White RP, Sarver DM. *Contemporary Treatment of Dentofacial Deformity*. St. Louis, MO: Mosby; 2003.
5. Ogaard B, Rølla G, Arends J. Orthodontic appliances and enamel demineralization. Part 1. Lesion development. *Am J Orthod Dentofacial Orthop* 1988;94:68-73.
6. Robbins JW, Hilton TJ, Schwartz RS. *Fundamentals of operative dentistry: A contemporary approach*. Summitt JB, editor. Quintessence Pub.; 2006.
7. Hamdan AM, Maxfield BJ, Tüfekçi E, Shroff B, Lindauer SJ. Preventing and treating white-spot lesions associated with orthodontic treatment: A survey of general dentists and orthodontists. *J Am Dent Assoc* 2012;143:777-83.
8. Øgaard B. Prevalence of white spot lesions in 19-year-olds: A study on untreated and orthodontically treated persons 5 years after treatment. *Am J Orthod Dentofacial Orthop* 1989;96:423-7.
9. Gorelick L, Geiger AM, Gwinnett AJ. Incidence of white spot formation after bonding and banding. *Am J Orthod* 1982;81:93-8.

10. Richter AE, Arruda AO, Peters MC, Sohn W. Incidence of caries lesions among patients treated with comprehensive orthodontics. *Am J Orthod Dentofacial Orthop* 2011;139:657-64.
11. Bishara SE, Ostby AW. White spot lesions: Formation, prevention, and treatment. In *Seminars in Orthodontics*. Vol. 14. US: Elsevier: WB Saunders; 2008. p. 174-82.
12. Øgaard B. White spot lesions during orthodontic treatment: mechanisms and fluoride preventive aspects. In: *Seminars in orthodontics*. Vol. 14. U.S.A.: WB Saunders; 2008. p. 183-93.
13. O'Reilly MM, Featherstone JD. Demineralization and remineralization around orthodontic appliances: An *in vivo* study. *Am J Orthod Dentofacial Orthop* 1987;92:33-40.
14. Geiger AM, Gorelick L, Gwinnett AJ, Benson BJ. Reducing white spot lesions in orthodontic populations with fluoride rinsing. *Am J Orthod Dentofacial Orthop* 1992;101:403-7.
15. Todd MA, Staley RN, Kanellis MJ, Donly KJ, Wefel JS. Effect of a fluoride varnish on demineralization adjacent to orthodontic brackets. *Am J Orthod Dentofacial Orthop* 1999;116:159-67.
16. Farhadian N, Miresmaeili A, Eslami B, Mehrabi S. Effect of fluoride varnish on enamel demineralization around brackets: An *in-vivo* study. *Am J Orthod Dentofacial Orthop* 2008;133 4 Suppl: S95-8.
17. Hallgren A, Oliveby A, Twetman S. Fluoride concentration in plaque adjacent to orthodontic appliances retained with glass ionomer cement. *Caries Res* 1993;27:51-4.
18. Benson PE, Parkin N, Millett DT, Dyer F, Vine S, Shah A. Fluorides for the prevention of white spots on teeth during fixed brace treatment. London: The Cochrane Library; 2004.
19. Stecksén-Blicks C, Renfors G, Oscarson ND, Bergstrand F, Twetman S. Caries-preventive effectiveness of a fluoride varnish: A randomized controlled trial in adolescents with fixed orthodontic appliances. *Caries Res* 2007;41:455-9.
20. Bergstrand F, Twetman S. Evidence for the efficacy of various methods of treating white-spot lesions after debonding of fixed orthodontic appliances. *J Clin Orthod* 2003;37:19-21.
21. Reynolds EC. Calcium phosphate-based remineralization systems: Scientific evidence? *Aust Dent J* 2008;53:268-73.
22. Reynolds EC, Cai F, Cochrane NJ, Shen P, Walker GD, Morgan MV, et al. Fluoride and casein phosphopeptide-amorphous calcium phosphate. *J Dent Res* 2008;87:344-8.
23. Tufekci E, Dixon JS, Gunsolley JC, Lindauer SJ. Prevalence of white spot lesions during orthodontic treatment with fixed appliances. *Angle Orthod* 2011;81:206-10.
24. Ostberg AL, Halling A, Lindblad U. Gender differences in knowledge, attitude, behavior and perceived oral health among adolescents. *Acta Odontol Scand* 1999;57:231-6.
25. Rubak S, Sandbaek A, Lauritzen T, Christensen B. Motivational interviewing: A systematic review and meta-analysis. *Br J Gen Pract* 2005;55:305-12.
26. Ogaard B, Rølla G, Arends J, ten Cate JM. Orthodontic appliances and enamel demineralization. Part 2. Prevention and treatment of lesions. *Am J Orthod Dentofacial Orthop* 1988;94:123-8.
27. Ogaard B. Effects of fluoride on caries development and progression *in vivo*. *J Dent Res* 1990;69:813-9.
28. Benson PE, Shah AA, Millett DT, Dyer F, Parkin N, Vine RS. Fluorides, orthodontics and demineralization: A systematic review. *J Orthod* 2005;32:102-14.
29. Bergstrand F, Twetman S. A review on prevention and treatment of post-orthodontic white spot lesions – Evidence-based methods and emerging technologies. *Open Dent J* 2011;5:158-62.
30. Charalambous C, Maniatakis N, Polyzos N, Fragoulakis V, Theodorou M. The efficiency of the public dental services (PDS) in Cyprus and selected determinants. *BMC Health Serv Res* 2013;13:420.