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KNOWLEDGE AND AWARENESS ON PREVENTING AND TREATING WHITE-SPOT LESIONS ASSOCIATED WITH FIXED ORTHODONTIC TREATMENT: A SURVEY AMONG GENERAL DENTISTS AND ORTHODONTISTS

Dr. Justin Eldho*[1], Dr N Shubhashini[2] and Dr Geeta IB[3]

[1]Postgraduate, Rajarajeswari Dental College and Hospital, Bangalore.
[2,3]Professor, Rajarajeswari Dental College and Hospital, Bangalore.

***Corresponding Author: Dr. Justin Eldho**
Postgraduate, Rajarajeswari Dental College and Hospital, Bangalore.

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ABSTRACT
Development of dental caries, specifically, white spot lesions continues to be a well-recognized and troubling side effect of orthodontic fixed appliance therapy. Improving facial aesthetics is an objective of orthodontic treatment. However, a frequent complication of fixed orthodontic therapy is the subsurface enamel porosity due to carious demineralization (also known as white spot lesions) which can arise in 25 to 97% of orthodontic patients and compromise the aesthetic outcome of their orthodontic treatment. After removing appliances, a natural improvement in WSLs may occur during the first 6 to 24 months; however, such natural remineralization is always limited and some WSLs can last for more than 10 years. There are many treatment modalities for the treatment of white spot lesions including the use of fluoride toothpaste, fluoride varnish, fluoridated mouthwashes, use of CPP-ACP, etc. This survey aims to check the knowledge on preventive measures and treatment of white spot lesions among Orthodontists and General dentists.

ABBREVIATION KEY
CPP-ACP: Casein phosphopeptide-amorphous calcium phosphate. RMGI: Resin-modified glass ionomer. GIC: Glass ionomer cement WSLs: White spot lesions.

INTRODUCTION
White-spot lesions (WSLs) have been defined as subsurface enamel porosities resulting from carious demineralization that appear as a milky white opacity on smooth surfaces. Changes in light scattering of the decalcified porous enamel cause the white appearance.[1] Orthodontic attachments in the oral cavity make the mechanical removal of plaque somewhat difficult resulting in rapid increase in the amount of dental plaque around orthodontic brackets, thereby lowering the Ph. As the pH drops below the threshold for remineralization, carious decalcification occurs.[2] The first clinical evidence of this demineralization is seen as a White Spot Lesion.[1,2]

MATERIALS AND METHODS
A cross-sectional survey was planned using multiple-choice questionnaire directed to evaluate the perspective, knowledge and awareness on preventing and treating white-spot lesions associated with fixed orthodontic treatment treatment among 247 Dentists (122 orthodontist & 125 General Dentist) of Bangalore. The questionnaire was prepared using google form and mailed to dentists across Bangalore

RESULTS
Results were statistically analyzed .34 % of orthodontists and 45.9 % of general dentists reported the prevalence of WSL to be between 10%-30 %.

50.4% of dentists had mentioned the occurrence of white spot lesions in non-Orthodontic patients as less than 10 %.

51.3% of Orthodontists and 54.5 % of general dentists have commonly observed White spot lesions within 6 months of commencement of orthodontic treatment.

Labial surface and around the braces have the highest incidence of white spot lesion.

Majority of Orthodontists and general dentists have not observed white spot lesions around fixed lingual retainers. 74 % of orthodontist and 69.6 % of general dentists advice preventive measures for their patients undergoing orthodontic treatment.

Encouraging use of fluoride rinses, and oral hygiene instructions were the main preventive strategies with 79.1 & 71.7% practitioners supporting it.

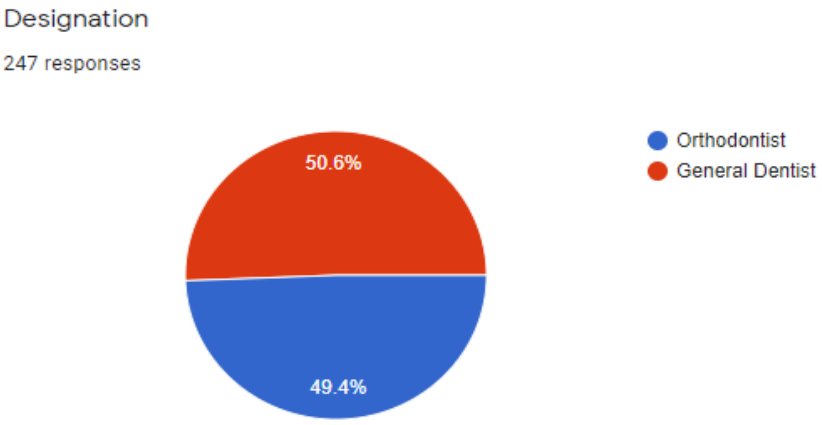
9.9 % of orthodontists suggested bonding of brackets with GIC.

53.9 % practitioners found these preventive measures useful and there was about 10-30% reduction in prevalence of white spot lesions.

Home fluoride rinses (46.4%) and use of remineralizing agents like CPP-ACP (Tooth mousse) (50.4%) are the popular treatment options practiced by general dentists. Where as 52 % orthodontists used tooth mousse for treating WSLs, 49.6 % of them referred patients to a conservative dentist / general dentist and 44.7 % of them waited for saliva to remineralize the lesion.

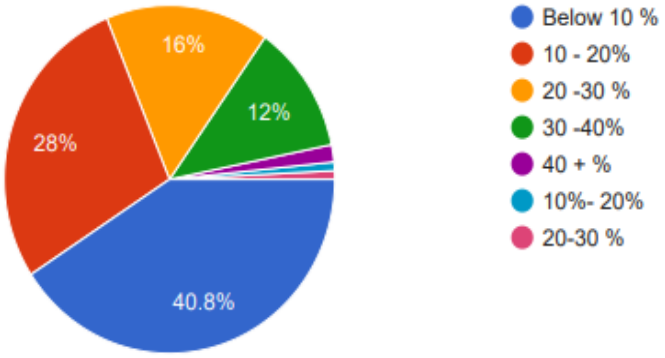
Majority of general dentists and orthodontists were unaware of treatment options like Resin infiltration using DMG ICON

Charts and tables Fig.1

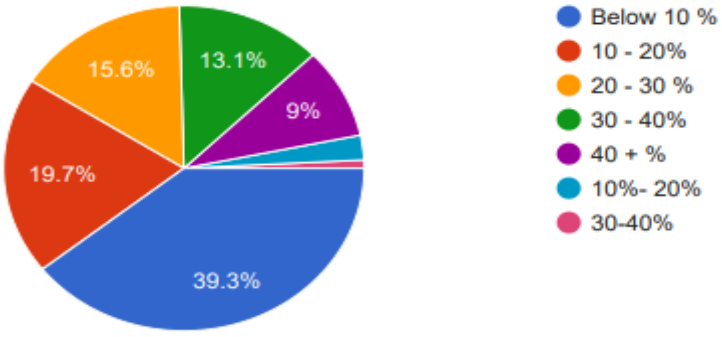


General Dentist

1)

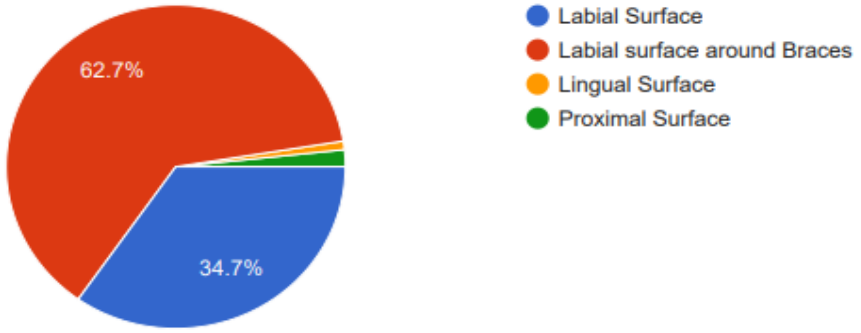


Orthodontist

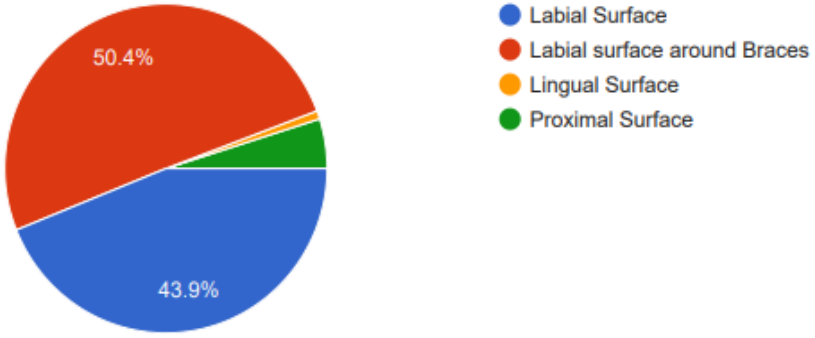


General Dentist

2) Fig 2.0: What percentage of your ortho patients developed white spot lesions?

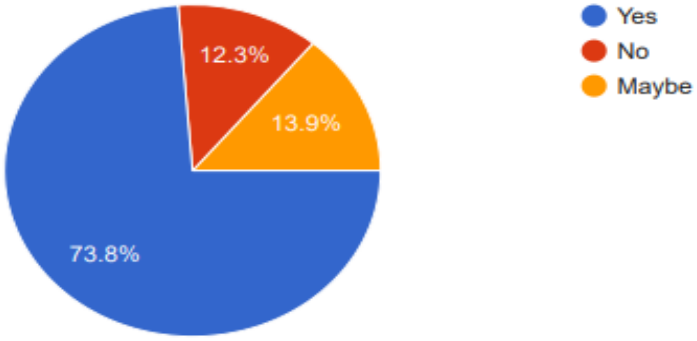


Orthodontist

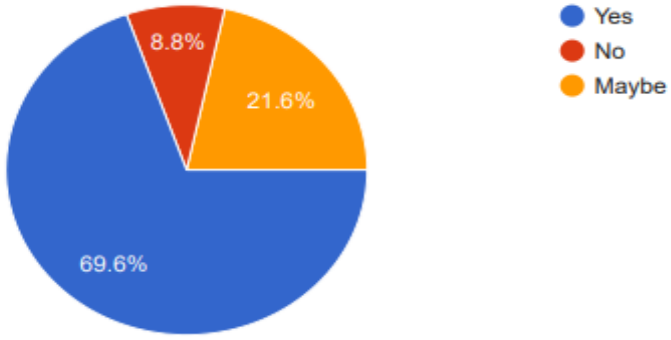


Orthodontist

3) FIG 3.0. Which surface has highest incidence ?

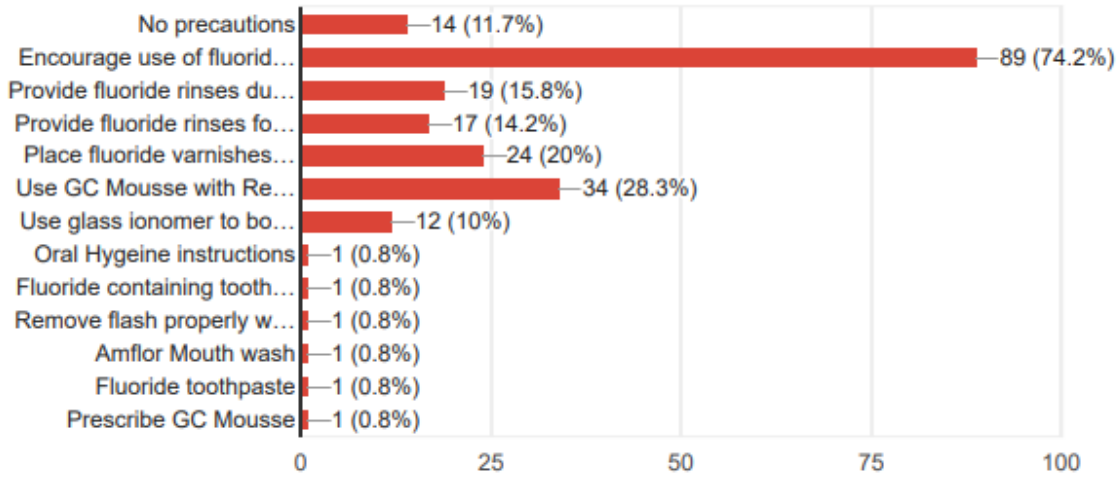


General Dentist

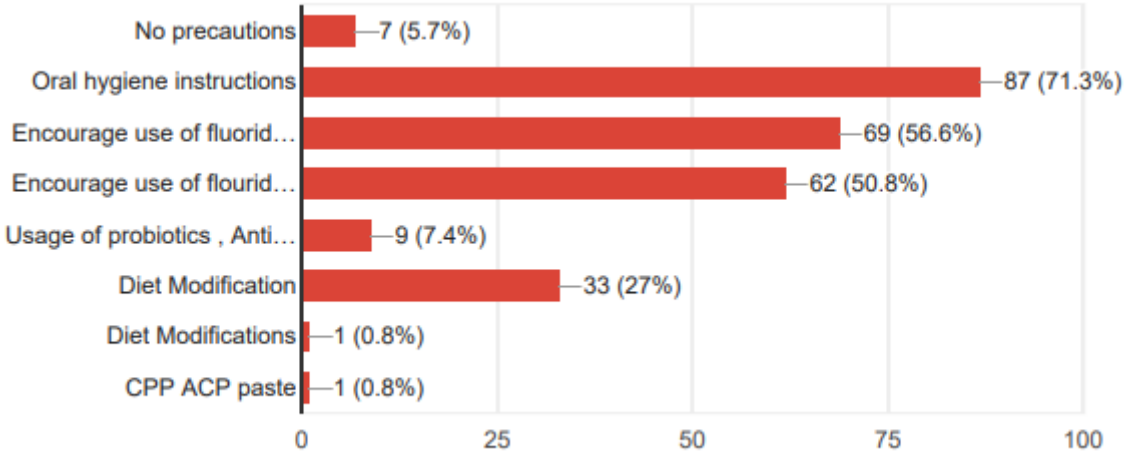


Orthodontist

4) FIG 4.0. Do you advice any preventive measures for patients undergoing orthodontic treatment?

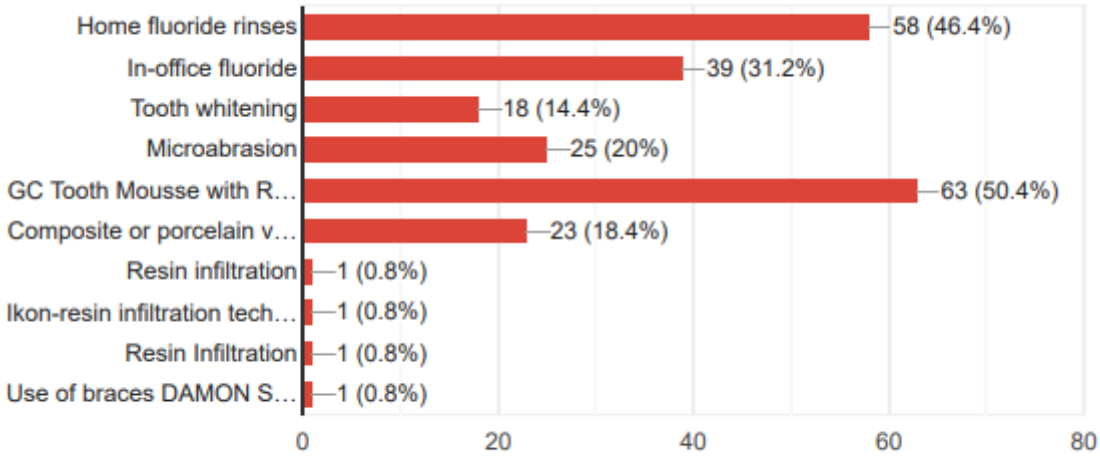


Orthodontists

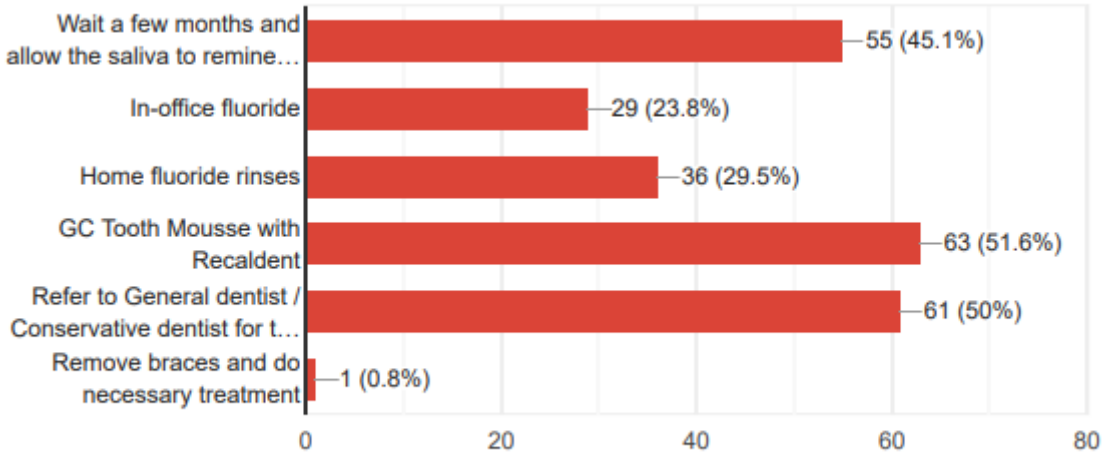


General Dentists

5) FIG 5.0.Trends in prevention



General dentists



Orthodontists

6) FIG 6.0. Trends in treatment.

DISCUSSION

The frequency of WSLs has been reported to be widely variable, from 2% to 97% in different epidemiological studies.[1,3]

Geiger et al found a 30% reduction in the number of patients and a 25% reduction in the incidence rate of WSLs on patients using fluoride.[2] O'Reilly and Featherstone reported that fluoride rinses significantly reduced the number of WSLs in patients who complied with their prescribed use.[4]

15.1 % & 21.1 % of orthodontist and general dentists respectively, noticed WSLs in first month itself. In next three months there was an increase of around 28%. Tufekci *et al*. reported a sharp increase in the number of WSLs during the first 6 months of treatment, increasing at a slower rate up to 12 months.[5]

The highest incidence of WSL is reported (90 % +) in Labial surface and around braces. It is mostly due to difficulty in mechanical plaque removal under the appliance.[1,2,6]

According to *Frank A. Driscoll et al* the cause of the damage is the massive acid etching of the labial and buccal enamel surfaces as part of the bracket-bonding procedure.[6]

Incidence of WSLs in lingual area and around fixed lingual retainers is lesser than 5 %. Gorelick et al found that occurence of WSLs on the retainers on lingual surface as NIL. He pointed reason to be free flow of saliva in the region avoiding decalcification of enamel surface.[7]

Effective oral hygiene is the bedrock of prophylactic measures in fixed orthodontic patients.79.5 % of orthodontists and 71.7% general dentist recommended fluoride as preventive measure. The fluoride ion prevents dental caries, by modifying bacterial metabolism in dental plaque through inhibition of some enzymatic processes, by inhibiting production of acids by altering the composition of bacterial flora and/or the metabolic activity of microorganisms, and by decreasing demineralization and promoting remineralization of carious lesions at early stages through a remineralization effect, especially at low concentrations.[8]

10.2 % of orthodontists suggested use of GIC to bond brackets. *Sudjalim and colleagues* conducted an in vitro study, the results of which showed that bonding brackets with resin-modified glass ionomer (RMGI) instead of composite reduced enamel demineralization significantly.[9]

50.4%, 52 % of General dentist and orthodontist respectively, has suggested usage of CPP-ACP agents like Tooth mouse with Recaldent. There is evidence with varying degrees of success in the dental literature about these agents. Bishara SE et al, in his study has found these methods effective in treatment of WSLs.[4]

44.7 % of Orthodontists left WSLs without treatment and waiting for saliva to remineralize it. Ogaard and colleagues examined 40 participants in a clinical trial of the effectiveness of a caries-preventive program six years after debonding. The results showed that about 75 percent of the small WSLs had become smaller and 25 percent of the severe lesions remained visible on tooth surfaces.[1]

20.% suggested Micro abrasion as treatment option. Acc to *Yetkiner E, Wegehaupt F and colleagues it is* relatively more invasive in nature, it was believed that delayed application was beneficial given improvements of lesions through saliva-based remineralization and spontaneous surface abrasion subsequent to debonding.

14.4 % of dentists recommended tooth whitening. Most of the literature against usage of bleaching to mask the WSL. *KimY et al* showed that bleaching incipient enamel caries with 10% carbamide peroxide could camouflage WSLs with no effect on the chemical and mechanical properties of the enamel.[1.2]

Only 13.2 % of Gen Dentist and 11.6 % of orthodontist has advocated the use of resin infiltration to the practice. It is a new micro-invasive approach introduced for treatment of incipient lesions. Its mechanism is by blocking out the diffusion pathways for acids in the enamel.[10] The use of minimally invasive "Infiltrant resin technique" to treat teeth with hypoplastic lesions allow significant improvement in the appearance and color uniformity of teeth in a relatively short working time with least discomfort to the patient.[12]

CONCLUSION

No amount of satisfactory occlusion, alignment and appearance of the orthodontic result can be admired if the esthetics of the teeth are spoiled by WSLs. To prevent the development of WSLs in patients, general dentists and orthodontists should work together. Treating patients with fluoride supplements and motivating and training them to practice good oral hygiene will help attain this goal.

After debonding, treatment of WSLs should include topical application of low concentrations of fluoride and use of various other remineralizing agents. More training should be given regarding Resin Infiltration as it is a good treatment option for WSL.

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Questionnaire

SURVEY TO GENERAL DENTISTS

1. How long have you been practicing? *
a. 0-5 years
b. 5-10 years
c. 10-20 years
d. 20-30 years
e. More than 30 years

2. Place of practice? *

Your answer

3. How would you describe the location of your practice? *
a. Urban
b. Suburban
c. Rural

4. Do you know that braces can cause white spot lesions? *
a. Yes
b. No

5. What is the percentage of your ortho patients who have developed white spot lesions after braces? *
a. Below 10 %
b. 10 - 20%
c. 20 -30 %
d. 30 -40%
e. 40 + %

6. Approximately what percentage of your non ortho patients have white spot lesions? *
a. Below 10 %
b. 10 - 20%
c. 20 - 30 %
d. 30 - 40%
e. 40 + %

7. In which gender white spot lesions are more common? *
a. Male
b. Female
c. Can't specify

8. When have you commonly noticed the first incidence of white spot lesion after commencement of orthodontic treatment? *
a. Within a month
b. 1 -3 months
c. 3 - 6 months
d. 6 months and above

9. In which surface was the highest incidence of lesion found? *
a. Labial Surface
b. Labial surface around Braces
c. Lingual Surface
d. Proximal Surface

10. Have you noticed white spot lesions around fixed lingual retainers? *
a. Yes
b. No
c. Sometimes

11. Do you advice any preventive measures for patients undergoing orthodontic treatment? *

a. Yes
b. No
c. Maybe

12. What precautions do you take to prevent white spots caused by braces ?
a. No precautions
b. Oral hygiene instructions
c. Encourage use of fluoride rinses
d. Encourage use of fluoride tooth paste
e. Usage of probiotics , Antiseptics and Lasers
f. Diet Modification

Other:

13. Have you found these preventive measures effective in reduction of white spot lesions ?
a. Yes
b. No
c. Sometimes

14. If preventive measures are found to reduce occurrence of white lesions, what percentage was the subsequent reduction ?
a. 0 - 10 %
b. 10 - 20 %
c. 20 - 30%
d. 30 + %

15. Recently, how often have you noticed white spot lesions in patients undergoing orthodontic treatment? *
a. Never
b. Rarely
c. Sometimes
d. Often

16. How often have an orthodontist referred a patient with white spot lesion to you ?
a. Very often
b. Often
c. Rarely
d. Never

17. What treatment do you prefer for patients with white spot lesions ? *
a. Home fluoride rinses
b. In-office fluoride
c. Tooth whitening
d. Micro abrasion
e. GC Tooth Mousse with Recaldent
f. Composite or porcelain veneers

Other:

18. If you use in-office fluoride for severe white spots from braces, when do you recommend it? *
a. During Orthodontic treatment
b. Immediately after the braces are removed
c. Wait a few months after the braces are removed
d. Do not use fluoride for white-spot lesions

19. Are you aware of the latest development in treatment of white spot lesions such as Resin infiltration with DMG Icon? *
a. Yes. I have adopted such practices .
b. Yes. I'm aware of these practices.
c. No

20. If your patient has multiple white spots at the end of orthodontic treatment, does this negatively affect your perception of the orthodontist? *
a. Yes
b. No
c. Sometimes

SURVEY TO ORTHODONTISTS

1. How long have you been practicing as an orthodontist? *
a. 0-5 years
b. 5-10 years
c. 10-20 years
d. 20-30 years
e. More than 30 years

2. Place of practice ? *

Your answer

3. How would you describe the location of your practice ? *
a. Urban
b. Suburban
c. Rural

4. Approximately what percentage of your patients have white spots after braces? *
a. Below 10 %
b. 10 - 20%
c. 20 - 30 %
d. 30 - 40%
e. 40 + %

5. When have you commonly noticed the first incidence of white spot lesion after commencement of treatment? *
a. Within a month
b. 1 -3 months
c. 3 - 6 months
d. 6 months and above

6. In which gender White spot lesions are more common? *
a. Male
b. Female
c. Can't specify

7. In which surface was the highest incidence of lesion found? *
a. Labial Surface
b. Labial surface around Braces
c. Lingual Surface
d. Proximal Surface

8. Have you noticed White spot lesions around fixed lingual retainers? *
a. Yes
b. No
c. Sometimes

9. Do you advice any preventive treatment for your patients? *
a. Yes
b. No
c. Maybe

10. What precautions do you take to prevent white spots caused by braces?
a. No precautions

b. Encourage use of fluoride rinses
c. Provide fluoride rinses during treatment for free
d. Provide fluoride rinses for a fee
e. Place fluoride varnishes on teeth during appointment
f. Use GC Mousse with Recaldent
g. Use glass ionomer to bond brackets
h. Other:

11. Have you found these preventive measures effective in reduction of white spot lesions?
a. Yes
b. No
c. Sometimes

12. If preventive measures are found to reduce occurrence of white lesions, what percentage was the subsequent reduction ?
a. 0%- 10%
b. 10-20 %
c. 20-30%
d. 30 + %

13. If you prescribe fluoride to a patient with severe white spots, when will you recommend its usage ? *
a. During Orthodontic treatment
b. Right after the debonding appointment
c. Wait a few months after the debonding appointment
d. Don't recommend fluoride for white-spot lesions

14. Recently, because of poor oral hygiene of patients, were you forced to remove braces? *
a. Never
b. Rarely
c. Sometimes
d. Often
e. Other:

15. Assuming a patient has severe white spots during the debonding appointment, what will you recommend him/her to do immediately? *
a. Wait a few months and allow the saliva to remineralize the white spots
b. In-office fluoride
c. Home fluoride rinses
d. GC Tooth Mousse with Recaldent
e. Refer to General dentist / Conservative dentist for treatment

Other:

16. Are you aware of the latest development in treatment of white spot lesions such as Resin infiltration with DMG Icon? *
a. Yes. I have adopted such practices.
b. Yes. I'm aware of these practices.
c. No