



RESEARCH ARTICLE

AWARENESS AND PREVALENCE OF WHITE SPOT LESION AMONG DENTAL STUDENTS:  
A CROSS SECTIONAL STUDY

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ABSTRACT

**Aim:** This cross sectional study is aimed at assessing the perceptions and level of awareness of dental students about their own dental health through evaluating the prevalence of white spot lesion.

**Materials and Methods:** A detailed oral examination of ninety two dental students of K.V.G. Dental College and Hospital, Sullia, D.K, Karnataka, aged between 20 and 24 years was done to detect white spot lesions and caries experience through International Caries Detection and Assessment System II criteria. The subjects were handed a questionnaire to investigate the possible explanatory variables for their caries status and to assess dental knowledge and attitudes. Attempt was made by examiner to identify the etiology of white spot lesion as carious or enamel hypoplasia by air drying using a three-way syringe.

**Results:** A majority of 93.5% of the student had acceptable level of knowledge to identify the non cavitated white spot lesion. The results revealed 60.8% of patients undergoing orthodontic treatment had at least one white spot lesion. Among the ninety two students participated in the study, the examiner found a prevalence of enamel hypoplasia to be 29.3% and carious hypomineralisation to be 9.8%.

**Conclusion:** Findings of this study indicate that the level of knowledge among dental students regarding white spot lesion of teeth as well as its association with orthodontic treatment and oral hygiene habits was acceptable.

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INTRODUCTION

Despite great achievements in oral health of populations globally, dental caries still remain as one of the most prevalent chronic diseases in the world (Ismail *et al.*, 2013). In this sense, there is a necessity of delivering an improved education in cariology for dental students who will become future practitioners (Schulte *et al.*, 2011). The early diagnosis and management of caries is a part of the undergraduate curriculum in dental schools for guiding professionals in making treatment decisions. The detection of white spot lesions is advantageous as it ensures prevention and management through remineralization of non-cavitated lesions and delay unnecessary restoration (Afsaneh *et al.*, 2014). The cycle of demineralization remineralization is an ongoing phenomenon and takes place in oral cavity with intake of various foods or drinks. But if the oral protective factors eg; salivary buffers, fluorides etc are unable to keep the balance in favor of remineralization of tooth there occurs a net loss of mineral

leading to incipient caries lesion (Gugnani *et al.*, 2012). The first visual indication of caries in enamel is generally a small white spot lesion (WSL) on smooth surfaces or light to dark brown lesion in pits or fissures where demineralization has occurred under the dental plaque (Fejerskov and Kidd, 2008). A number of factors can lead to the development of white spots on teeth. Sometimes these spots are caused by incipient caries, nutrition, genetics, or an excessive intake of fluoride, while other times they become evident after orthodontic brackets have been removed (Wilkins, 2004). Reports of prevalence of white spot lesion in population based in western countries have been published, but none pertaining specifically to Indian population. The aim of this study was to assess the knowledge of dental students regarding significance of prevention of white spot lesion; and to assess the perceptions and level of awareness about their own dental health through evaluating their oral health status.

MATERIALS AND METHODS

A cross sectional study was conducted among dental students which comprised of ninety two students of K.V.G. Dental

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College and Hospital, Sullia, D.K, Karnataka, aged between 20 and 24 years. Data from only one dental school was used to reduce the possible confounding effect of differences in dental curricula and teaching styles. Subjects on long term medication for systemic illness, subjects with fixed functional appliances, extensive use of appliance attachments other than the base arch-wire and with restored facial surfaces were excluded. A questionnaire aiming to explore the oral health practices and to inspect their dental knowledge and attitudes was handed over to the students. A thorough oral examination of these dental students were conducted by the examiner under direct illumination on a dental chair to detect white spot lesions. Deficiencies in enamel formation such as pits and linear grooves, which were visible without drying the teeth were recorded as enamel hypoplasia. Localized opacities that were white, creamy, yellow, or light brownish in color, visible after air drying were scored as hypomineralised enamel due to carious process. The subjects were scored as per International Caries Detection and Assessment System II criteria and Decayed Missing Filled Tooth index.

### Visual assessment

Visual assessment of WSL was done using international caries detection and assessment system (ICDAS-II) for scoring dental caries. The scoring criteria in accordance to the ICDAS-II system for Coronal: Smooth Surface Caries are

Code 0: Sound tooth surface

Code 1: First visual change in enamel

Code 2 : Distinct visual change in enamel when viewed wet

Code 3 :Initial breakdown in enamel due to caries with no visible dentin

Code 4: Underlying dark shadow from dentin with or without localized enamel breakdown.

Code 5: Distinct cavity with visible dentin

Code 6: Extensive distinct cavity with visible dentin

ICDAS assessment criteria 0-2 were considered in the present study as it deals with non-cavitated lesions on enamel surface.

### Statistical analysis

The statistical analysis was carried out using the SPSS software. Analysis of the data was done by Chi-square test. Mann Whitney U test and Fisher exact tests were the post hoc test.

## RESULTS

Nintety two students agreed to participate in the study of which forty six students had undergone treatment with fixed orthodontic appliances. A cumulative percentage of 42.4% of subjects had white spot lesions. The examiner found a prevalence of enamel hypoplasia to be 29.3% and carious hypomineralisation to be 9.8% (Table:1 ,Figure:1). A majority of 93.5% of the students had acceptable level of knowledge to identify the non cavitated white spot lesions. A high proportion of 60.8% of patients undergoing orthodontic treatment had atleast one white spot lesion. Multiple white spot lesions were observed in 28.3% of the subjects of which 50% subjects had undergone orthodontic treatment. The white spot lesions were significantly more in all teeth in orthodontic ally treated subjects than the others. The prevalence of white spot lesion on molars of subjects undergone orthodontic treatment was found

to be 52.2% and 19.6% in incisors. The presence of the lesion on premolars and canine were 17.4% and 4.3 % respectively (Table: 2, Figure:2).

## DISCUSSION

A successful learning process involves translation of theoretical concepts as well as practical learning of the taught methods into clinical practice (Davis and Taylor-Vaisey, 1997). Students' attitudes toward caries prevention can impact receptivity to training and subsequent involvement in preventive services they would provide in their future practices (Robinson and Lee, 2001). Education in preventive dentistry has become an integral component of the dental curriculum (Autio-Gold and Tomar, 2008). One of the main challenges that dental educators face is to teach their students a practical method to detect and assess early carious lesions and thus contribute to a true prevention-based practice of dentistry (Braga *et al.*, 2010). In this study, dental students' awareness regarding white spot lesion was acceptable as 93.5% of the students identified themselves as confident in their ability to assess the non cavitated white spot lesion. The translucency of enamel is an optical phenomenon that depends on the size of intercrystalline spaces (Gorelick *et al.*, 1982). The earliest evidence of enamel demineralization on smooth enamel surface of a crown is the "white spot lesion" (Mizrahi, 1982). Hypomineralisation of enamel is important clinically because it can result in increase caries susceptibility, increased wear, tooth sensitivity and poor esthetics. The prevalence of the phenomenon is reported to vary from 4.9% (O'Reilly and Featherstone, 1985) to 84% (Al-Khateeb *et al.*, 1998) of tooth surfaces, which was similarly recognized in the present study with an aggregate of 42.4%. There was no significant association between awareness and demographic factors like age and gender. The Chi-square test results indicate a highly significant role of the fixed orthodontic appliance in the formation of white spot lesions, as 50% of the subjects with multiple white spot lesions had undergone fixed orthodontic therapy. This suggests a directly proportionate relationship of the process of enamel demineralization and fixed appliance orthodontic therapy. This study is in concurrence with other reports based on western population, which show a high prevalence of white spot lesions after orthodontic treatment (Mizrahi, 1982; O'Reilly and Featherstone, 1985; Al-Khateeb *et al.*, 1998; Ekstrand *et al.*, 1995 & 1997).

The ICDAS-II criteria incorporate concepts from the research conducted by Ekstrand *et al.*, 1995 and other caries detection systems which have been systematically reviewed (Shivakumar *et al.*, 2009; Carounanidy and Sathyanarayanan, 2010; Ismail, 2005). The scoring system has both content and correlational validity with histological depth of carious lesions. The ICDAS system provides an international system for caries detection that would allow for comparison of data collected in different locations as well at different points of time (Ismail, 2005). Precise localization of white lesions and their extent on different quadrants in different tooth groups has not been addressed in the literature. A complex disease like dental caries is hard to categorize into a scale as the process is continuous. Gorelick *et al* indicated the maxillary lateral incisor (Gorelick *et al.*, 1982) while Geiger *et al* showed that the maxillary lateral incisor and canines are the most common teeth affected (Geiger *et al.*, 1988). However, in this study there were more white spot lesions seen on molars; followed by incisors and premolars; and followed by canine.

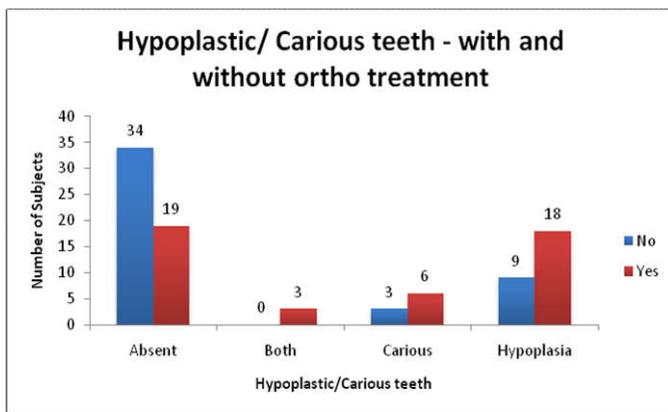
**Table 1. Prevalence of white spot lesion detected by examiner and student awareness**

		Orthodontic Rx					
		No		Yes		Total	
		n	%	n	%	n	%
Examiner	Absent	34	73.9%	19	41.3%	53	57.6%
	Both	0	0	3	6.5%	3	3.3%
	Cariou	3	6.5%	6	13.0%	9	9.8%
	Hypoplasia	9	19.6%	18	39.1%	27	29.3%
Student Awareness	No	1	2.2%	5	10.9%	6	6.5%
	Yes	45	97.8%	41	89.1%	86	93.5%

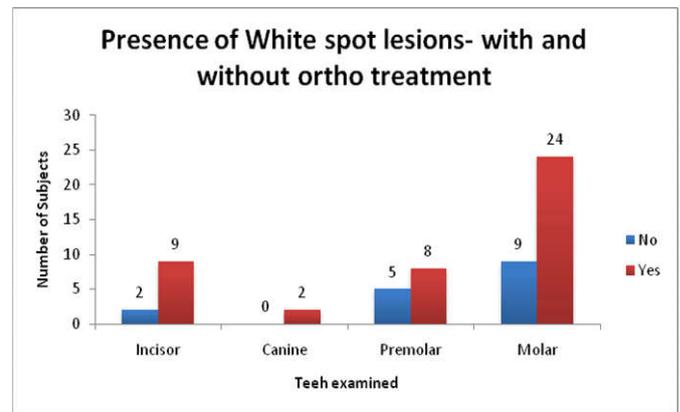
**Table 2: Prevalence of white spot lesion on each tooth type**

Tooth type	Orthodontic Rx		P value
	No	Yes	
Incisor	4.3%	19.6%	0.02
Canine	0	4.3%	0.49
Premolar	10.9%	17.4%	0.36
Molar	19.6%	52.2%	0.001

\*p<0.05 Statistically significant p>0.05 non significant, NS



**Figure 1. Prevalence of white spot lesion detected by examiner**



**Figure 2. Prevalence of white spot lesion on each tooth type**

Simply identifying patients may not be sufficient to decrease the incidence of white spot lesions. Bishara *et al* recommend that the clinicians should document the extent and severity of any white spot lesion present through the use of intraoral photographs before orthodontic treatment begins (Bishara and Ostby, 2008). Proper oral hygiene measures and additional fluoride supplementation may be more imperative in susceptible individuals (Donly and Sasa, 2008).

Clearly the best approach during orthodontic treatment is to prevent lesions from occurring. Enamel decalcification is the most frequent unwanted complication with fixed appliance therapy (Proffit *et al.*, 2003). To decrease the current frequency of white spot lesions in the orthodontic population, better communication between the patient and the dental professional may be needed. Microabrasion has been shown to be an effective treatment approach for the cosmetic improvement of long-standing postorthodontic demineralized enamel lesions (Murphy *et al.*, 2007). Another treatment option is MI Paste™ with Recaldent™ (CPP-ACP), which has been shown to remineralize subsurface lesions in human third molar enamel (Reynolds, 1997). Resin infiltration technique is a novel concept in which pores in enamel lesion is occluded by resin and thus preventing acid infiltration into the lesion (Paris *et al.*, 2007). However, in many cases, none of these treatments are adequate to mask the lesions completely.

**Conclusion**

Findings of this study indicate that the level of knowledge regarding non cavitated enamel lesions among dental students is good. This study recommends clinicians to give more importance to improve patient compliance in oral hygiene maintenance in the initial months of orthodontic treatment and subsequent extra preventive measures to prevent demineralization. Further studies comparing various intervention and preventive strategies have to be assessed in order to reduce the burden of white spot lesion during orthodontic treatment.

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