The Diagnosis of White Spot Lesions in Orthodontic Patients

A thesis submitted in partial fulfilment of the requirements for the degree of Doctor of Clinical Dentistry (Orthodontics)

by

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1. Thesis Abstract

**Objectives:** (i) To investigate the associations between the presence, number and severity of white spot lesions (WSLs) and patient characteristics. (ii) To investigate the associations between the presence, number and severity of WSLs and the saliva properties tested using the Saliva-Check BufferKit (GC Corp., Belgium). (iii) To evaluate the use of the DIAGNOdent pen (KaVo, Biberach, Germany) as an aid in the identification of WSLs in orthodontic patients.

**Method:** With ethics approval, 91 orthodontic patients had de-identified parameters recorded which included date of birth, sex, postcode, age at banding, time in bands, failure to attend (FTA) rate, type of bracket used, reported oral hygiene regimen and number of restored molars. All participants were examined for WSLs on their upper and lower anterior teeth using a visual index outlined by the International Caries Detection and Assessment System II (ICDAS II) and a laser-based caries detection device (DIAGNOdent pen). Of the 91 participants, 50 had saliva properties tested which included hydration, consistency, resting pH, stimulated flow, stimulated pH and buffering capacity.

**Results Paper 1:** Brushing fewer than 14 times a week and the presence of restored molars were significant variables for the development and severity of WSLs when the severity was ≥ ICDAS II grading of 2 (p<0.05). When WSLs were ICDAS II ≥ 3 grading, the FTA rate and
brushing fewer than 14 times per week were significant variables (p<0.05). The number of WSLs increased when participants brushed fewer than 14 times per week or had an increased FTA rate (p<0.05). Comparisons between ICDAS II scores and DIAGNOdent pen scores were statistically significant (p<0.0001).

**Results Paper 2:** When using the Saliva-Check Buffer Kit, the pH of stimulated saliva was a significant diagnostic variable in identifying WSLs (p<0.05). The pH of stimulated saliva and the quantity of saliva produced in 5 minutes were significant variables of WSL severity when the grading was greater than or equal to an ICDAS II score of 2 (p<0.05). When the grading was greater than or equal to an ICDAS II score of 3, the pH of unstimulated saliva was a significant variable (p<0.05). No relationship was found between the number of WSLs in a patient and the saliva properties tested with the Saliva-Check Buffer Kit.

**Conclusions:** A patient’s report of brushings per week indicates the presence, severity and number of white spots they may experience. The number of restored molars may indicate the presence and severity of their white spot lesion experience. Patients who fail to attend appointments are likely to have a larger number of WSLs with greater severity. The DIAGNOdent Pen corresponds significantly to the ICDAS II system to grade WSLs in orthodontic patients. The pH of stimulated saliva, the pH of unstimulated saliva and saliva flow rate may indicate orthodontic patients who are susceptible to WSLs and may also indicate the severity...
of the lesions. The Saliva-Check Buffer Kit is unable to distinguish between patients who have many or those who have few WSLs.
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2. Thesis Declaration

I certify that this work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution in my name and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. In addition, I certify that no part of this work will, in the future, be used in a submission in my name, for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for the joint-award of this degree.

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