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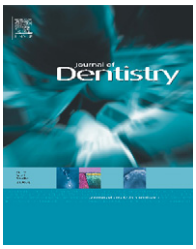

An in vivo investigation of associations between saliva properties, caries prevalence and potential lesion activity in an adult UK population

Sachin Varma, Avijit Banerjee, David Bartlett*

Department of Conservative Dentistry and Prosthodontics, King's College London Dental Institute at Guy's, King's College & St. Thomas' Hospitals, Guy's Dental Hospital, London Bridge, London SE1 9RT, UK

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ABSTRACT

Objective: To investigate associations between prevalence and activity of intra-oral incipient, carious lesions and salivary properties tested using the Saliva Check kit (GC Corp., Belgium).

Methods: With ethical approval, 58 subjects with >16 teeth underwent clinical/radiographic examination. Conventional decayed, missing, filled teeth/decayed, missing, filled surfaces (DMFT/DMFS) indices and a more recently developed visual index described by International Caries Detection and Assessment System (ICDAS) were used to ascertain caries prevalence. Potential lesion activity was scored using an Ekstrand visual index. Saliva properties tested included hydration, resting pH, stimulated flow and buffering capacity. Spearman's rank correlation was used to analyse data.

Results: No saliva parameters correlated significantly with DMFT/DMFS caries prevalence scores (D3 threshold). The resting pH correlated negatively and significantly with the total number of lesions ($r = -0.267$, $p = 0.043$), with ICDAS scores >1 ($r = -0.333$, $p = 0.011$) and with mild lesions ($r = -0.263$, $p = 0.046$). A negative correlation was found between saliva buffering capacity and the potential activity of moderate lesions (ICDAS 3 and 4; $r = -0.227$, $p = 0.035$).

Conclusions: There appeared to be a correlation between the resting pH of saliva and the prevalence of early lesions as well as the saliva buffering capacity and the potential lesion activity of moderate lesions. A difference was shown between lesion prevalence calculated using traditional DMFT(S) D3 versus the ICDAS D1 thresholding.

1. Introduction

There have been few reports on the prevalence of incipient, pre-cavitated lesions. Pitts[1,2] described an epidemiological ''iceberg'' to explain caries progression with a D4 lesion extending into the pulp and D1 representing pre-cavitated, incipient enamel lesions. Lesions recorded at the D3 threshold are defined as those lesions involving dentine, cavitated or not. Pitts[2] stated that the D3 threshold was most commonly reported by classical epidemiological studies surveying caries incidence, prevalence and aetiological relationships.

The most common method of recording caries for epidemiological studies is the DMFT index (decayed, missing, filled teeth) and DMFS (decayed, missing, filled surfaces).[3] The problems with this index include the missing and filled

* *Corresponding author at*: Floor 26, Guy's Dental Hospital, London Bridge, London SE1 9RT, UK. Tel.: +44 207 188 1577; fax: +44 207 188 7486.
E-mail address: avijit.banerjee@kcl.ac.uk (A. Banerjee).

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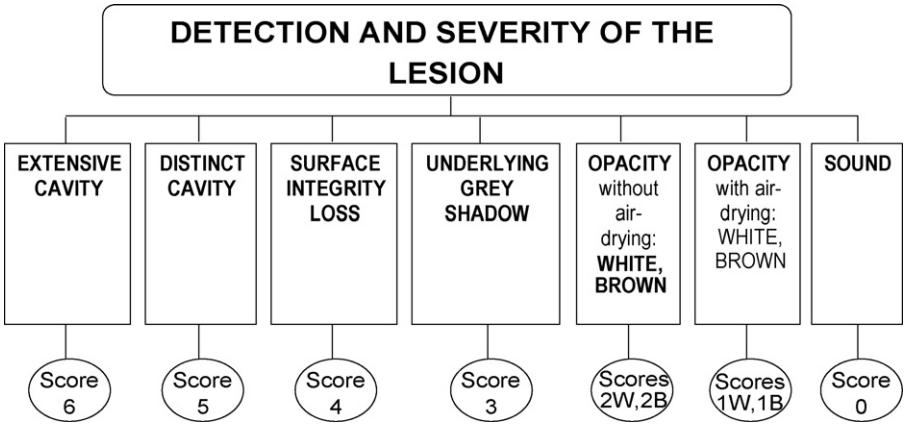

Fig. 1 – ICDAS scores of the detection and histological severity of the carious lesion observed (reproduced with kind permission from K.R. Ekstrand).

components not always being indicative of past caries experience, leading to a real risk of overestimation of the caries experience in a population.[4] Traditionally, this index has been used in epidemiological data for recording at the D3 threshold but opinion exists advocating recording at the D1 threshold in order to obtain a more realistic picture of the extent of dental disease and its distribution.[5–8] A more recently developed International Caries Detection and Assessment System (ICDAS) (Fig. 1) has been recognised for use in epidemiological studies.[1,9–11]

Investigators have developed classification systems linking visual and/or radiographic appearance to lesion histology as well as attempting to predict potential caries activity by recording the state of the carious lesion at a snapshot in time.[5,6,8,12–14] It has been reported that operator opinion regarding lesion activity is variable and unreliable using visual and tactile investigation alone.[15] Bleeding on probing near a carious site can be predictive for lesion activity; plaque alone however has a less predictive power.[7] Potential lesion activity might be calculated using weighted numerical values for lesion appearance, lesion location in relation to a cariogenic plaque stagnation area, surface integrity and association to gingival bleeding (Fig. 2).

Investigations of salivary properties (including flow rate and buffering) and their association with caries prevalence in adult populations have been documented in the past with conflicting results.[16–20] Only one report has shown a positive correlation between a low buffering capacity and caries activity but this analysis was subjective and operator-dependent.[17] The advent of a simple chairside saliva check kit (GC Saliva check, GC Corp., Belgium) analysing levels of labial hydration of unstimulated saliva, the resting pH, volume of stimulated saliva and its buffering capacity together with the development of the new visual indices, creates the potential for using these markers to predict lesion activity. The aim of this study was to investigate the null hypothesis that there is no association between the prevalence or activity of intra-oral incipient, carious lesions and the saliva properties, tested using the Saliva Check kit (GC Corp.) in an adult UK population.

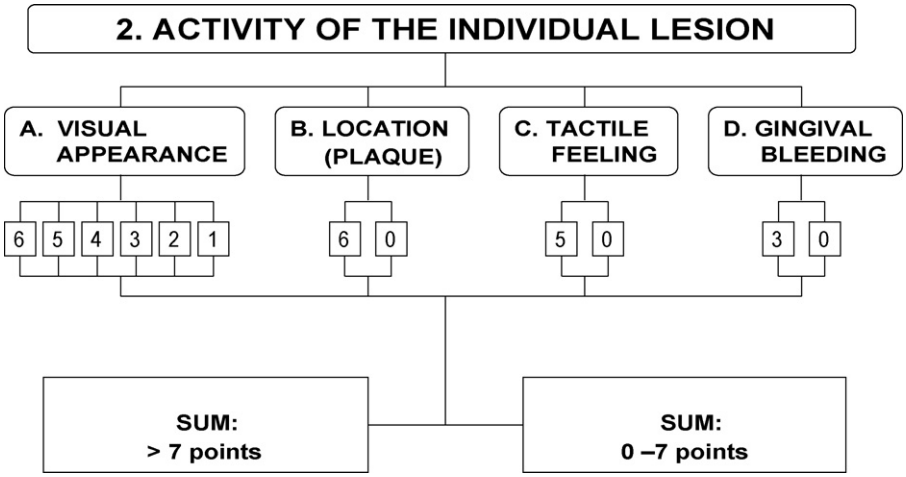

Fig. 2 – Final determination of lesion activity using weighted scoring >7 = potentially active and 0–7 = potentially in-active (with kind permission from K.R. Ekstrand).