ORIGINAL RESEARCH

Assessment of salivary alpha amylase activity in patients undergoing Orthodontic Treatment

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ABSTRACT:
Background: Salivary biomarkers have received special attention because they are readily accessible and easily obtained. The present study was conducted to assess salivary alpha amylase activity in patients undergoing orthodontic treatment. **Materials & Methods:** The present study was conducted on 34 patients undergoing orthodontic treatment of both genders. The patients were assessed during pretreatment, during bonding and initial arch wire insertion. Saliva was sampled daily during the 21 days for assessment of alpha-amylase levels. Alpha-amylase concentrations in the saliva samples were determined through the Salivette Cortisol device. **Results:** out of 34 patients, both males and females were 17 in number. Pre- treatment level of salivary amylase level was 7432.6 U/ml, during bonding was 8005.7 U/ml and during initial arch wire insertion was 8521.4 U/l. The difference was significant (P< 0.05). **Conclusion:** There was significant increase in salivary alpha amylase level in saliva of patients undergoing orthodontic treatment at different phases.
Key words: Cortisol, orthodontic, salivary alpha amylase

INTRODUCTION

The psychological stress that most perioperative patients feel has been reduced by many interventions, including providing information, relaxation, hypnosis, and massage therapy. Salivary biomarkers have received special attention because they are readily accessible and easily obtained. There are many advantages to using salivary biomarkers, including the rapid appearance of proteins in the saliva in response to stimuli, and the ability to easily measure salivary α-amylase (sAA) at a patient's bedside using a portable measuring instrument.[1]

Salivary alpha-amylase (sAA) is a metalloenzyme produced by the parotid, submandibular, and sublingual glands for the purpose of hydrolyzing a-1,4 linkages of starch into glucose and maltose. Its diurnal rhythm exhibits a pronounced decrease within 60 minutes after awakening and a steady increase in activity throughout the day.[2]

Salivary alpha-amylase is released from preformed granules located within acinar cells that are innervated by both parasympathetic and sympathetic branches of the autonomic nervous system.[3] Although it does not demonstrate a 1:1 relationship with plasma catecholamine levels, sAA secretion is regulated by alpha- and beta-adrenergic receptors and is still directly correlated with catecholamine release. Subjectively assessed pain is routinely reported by patients undergoing orthodontic treatment, being caused by force application to the teeth and trauma due to attrition of brackets and wires in the oral mucosa.[4] The present study was conducted to assess alpha amylase activity in patients undergoing orthodontic treatment.

MATERIALS & METHODS

The present study was conducted in the department of Orthodontics. It comprised of 34 patients undergoing orthodontic treatment of both genders. All were informed regarding the study and written consent was obtained. Ethical approval was obtained prior to the study.

Data related to patients such as name, age, gender etc. was recorded. The patients were assessed during pretreatment, during bonding and initial arch wire insertion. Saliva was sampled daily during the 21 days for assessment of alpha-amylase levels.

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Alpha-amylase concentrations in the saliva samples were determined through the Salivette Cortisol device. Results were tabulated and subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS
Table I Distribution of patients

Total- 34		
Gender	Males	Females
Number	17	17

Table II Assessment of salivary amylase level

Phase	Level (U/ml)	P value
Pretreatment	7432.6	0.021
During bonding	8005.7	
Initial arch wire insertion	8521.4	

Table I shows that out of 34 patients, both males and females were 17 in number. Table II, graph I shows that pre- treatment level of salivary amylase level was 7432.6 U/ml, during bonding was 8005.7 U/ml and during initial arch wire insertion was 8521.4 U/l. The difference was significant (P< 0.05).

Graph I Salivary amylase level
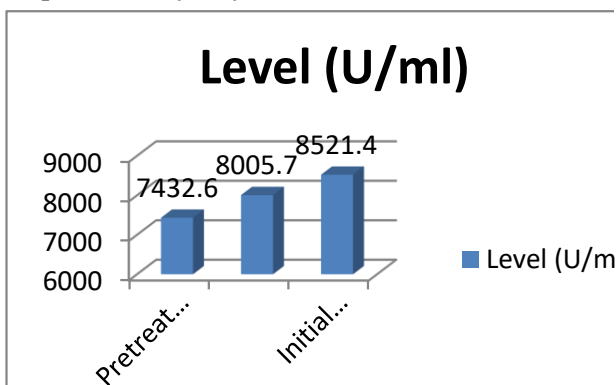
DISCUSSION
Positive relationship between salivary alpha amylase and the dental anxiety remains unclear. Salivary alpha amylase (SAA) was considered as a suitable biomarker of sympathetic nervous system activity in recent years. Alpha amylase enzyme is one of the most important enzyme compositions in the saliva that accounts for 40% to 50% of the total salivary proteins, and most of it is secreted from the parotid gland. SAA plays an important role in carbohydrate hydrolysis. Furthermore, alpha amylase can also play a role in the oral immune system.[5] Recently, sAA has emerged as a reliable biomarker for objectively assessing patient pain. Separate studies have also found a relationship between Corah's Dental Anxiety Scale (DAS) and patient pain. Pain perception is not simply a physiological experience. Emotional states can modulate pain, and there exists a reciprocal interplay among dental fears, dental pain, and the body's physiological response.[6] The present study was conducted to assess alpha amylase activity in patients undergoing orthodontic treatment.

In present study, out of 34 patients, both males and females were 17 in number. Pre- treatment level of salivary amylase level was 7432.6 U/ml, during bonding was 8005.7 U/ml and during initial arch wire insertion was 8521.4 U/l. The difference was significant (P< 0.05).

Nater et al[7] conducted a study to assess the correlation between the salivary levels of alpha-amylase and pain intensity reported by patients during orthodontic treatment. Twenty male patients (11–37 years of age) were assessed daily, before treatment, after bracket bonding, and after initial arch wire insertion. Saliva was sampled for alpha-amylase analysis, and pain intensity was measured with the visual analog scale. There was no correlation between alpha amylase concentrations in the saliva and pain intensity, although the patients had a significant and progressive increase of alpha-amylase levels during the assessment period.

Rohleder et al[8] conducted a study and utilized the sAA, the State anxiety, Visual Analogue Scale (VAS) of pain, and heart rate variability to assess prior to and after the relaxation on the day before surgery, and on postoperative days (POD) 1, 2, 3, and 7. A total of 75 patients participated and 301 relaxing response readings were obtained. We found that the sAA significantly decreased depending upon the pain and anxiety by relaxation, but they were unrelated to sympathetic nervous system activity. There was weak correlation between the change in sAA, and anxiety and VAS pain. Thus, sAA appears to be an easy-to-use, non-invasive and good marker for relaxing response within a short period in surgery-related stress patients.

Brown et al[9] did not find that preoperative sAA factors (concentration and output rate) were related to either VAS extraction pain or DAS score. A strong positive relationship was observed between the concentration of sAA and the rate of sAA output. Based on the results, authors concluded that dental anxiety has a moderate but significant correlation with intraoperative dental pain.

CONCLUSION
There was significant increase in salivary alpha amylase level in saliva of patients undergoing orthodontic treatment at different phases.

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