

ORIGINAL ARTICLE

EVALUATION OF SALIVARY CORTISOL LEVEL AND SALIVARY FLOW IN XEROSTOMIA: A CLINICAL STUDY

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ABSTRACT:

Background: Xerostomia is known as dry mouth is due to inadequate saliva in either quantity of flow or quality of saliva. The present study was conducted to evaluate salivary cortisol level and salivary flow in patients with xerostomia and to find any relation with anxiety and depression. **Materials & Methods:** This study was conducted in department of Oral Medicine and Radiology in year 2012. It comprised of 30 patients (study group) (group I) with subjective symptoms of dry mouth and 30 control subjects (control group) (group II). All the subjects were divided into 3 age groups. Group I - <30 years, group II - 31-40 years and group III - >40 years of age. Stimulated and unstimulated saliva was collected and measured for the concentration of cortisol in the saliva ($\mu\text{g}/\text{dl}$) by using a salivary cortisol enzyme immunoassay kit with a lower sensitivity of $0.36 \mu\text{g}/\text{dl}$. The values were recorded and subjected to statistical analysis. P value <0.05 was considered significant. **Results:** The present study consisted of 60 subjects which were divided into group I (30) (study) and group II (control) (30). The present study consisted of 15 males and 45 females. The difference was significant (P- 0.04). The mean cortisol level in unstimulated saliva in group I was $2.31 \mu\text{g}/\text{dl}$ and in group II was $1.86 \mu\text{g}/\text{dl}$. The difference was non significant (P>0.05). The mean cortisol level in stimulated saliva in group I was $1.78 \mu\text{g}/\text{dl}$ and in group II was $1.52 \mu\text{g}/\text{dl}$. The difference was non significant (P>0.05). The volume of unstimulated saliva in group I was $0.62 \text{ ml}/\text{min}$ and in group II it was $1.86 \text{ ml}/\text{min}$. The difference was non significant (P>0.05). The volume of stimulated saliva in group I was $1.84 \text{ ml}/\text{min}$ and in group II it was $3.62 \text{ ml}/\text{min}$. The difference was non significant (P>0.05). **Conclusion:** There was no statistical difference in unstimulated and stimulated salivary cortisol level and volume of unstimulated and stimulated saliva in both groups. Salivary cortisol measurement may be useful in detecting stress related disorders.

Key words: cortisol, stimulated saliva, unstimulated saliva

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INTRODUCTION

Xerostomia is known as dry mouth is due to inadequate saliva in either quantity of flow or quality of saliva. It is also called as salivary gland hypofunction. Inadequate production of saliva results in xerostomia, hence it can be seen in various conditions. It is a symptom of various disorders and it is not a disease.¹ Xerostomia may be a symptom of a serious systemic disease, such as systemic lupus erythematosus, rheumatoid arthritis, scleroderma, sarcoidosis, amyloidosis, Sjogren's syndrome, Parkinson's, Diabetes, or hypothyroidism. A systemic disease is one that affects the entire body.

Various studies have used different tests to evaluate the psychological condition as one of the reason resulting in xerostomia. Thus its relation with stress may not be overlooked.² The cortisol level in the serum or saliva is a reliable indicator of stress. It is produced by the adrenal cortex and is an important hormone for normal health. It follows the 'a circadian rhythm' i.e its level is peak in the morning (between 7 and 8 a.m.) and decrease to substantially lower levels late at night.³ Salivary cortisol indicates free, biologically active portion of cortisol in the blood. Salivary measures of cortisol have been shown to be

a valid and reliable reflection of serum cortisol. Measurement of stress level by salivary cortisol provides better results as compared to than serum cortisol. Thus there is alteration in salivary cortisol level in depressed patients and healthy individuals. Hence, salivary cortisol levels may be used as a non-invasive biological marker for changes like xerostomia related to anxiety and depression.⁴ The present study was conducted to evaluate salivary cortisol level and salivary flow in patients with xerostomia and to find any relation with anxiety and depression.

MATERIALS & METHODS

This study was conducted in department of Oral Medicine and Radiology in year 2012. It comprised of 30 patients (study group) (group I) with subjective symptoms of dry mouth and 30 control subjects (control group) (group II). Patients diagnosed with Sjogren's syndrome, connective tissue disorder, on chemotherapy and radiotherapy, patients on therapy for mental illness, subjects on corticosteroid therapy, patients on xerogenic drugs, and patients with diabetes mellitus were excluded from the study. All the subjects were divided into 3 age groups. Group I - <30 years, group II - 31-40 years and group III - >40 years of age.

For collection of saliva, the patients were asked to refrain from eating, smoking, brushing, and oral hygiene procedures two hours before procedure. Sterile disposable plastic collectors were used to obtain the samples of unstimulated saliva. The subjects were instructed to pool saliva in the floor of the mouth for one minute and then expectorate it into disposable plastic collectors. The saliva collected was then transferred to coded collection tubes, graduated in milliliters. The collected sample was placed in ice and the salivary flow rate (ml/minute) was estimated by measuring the quantity of the saliva collected in the collector. The samples were frozen at -30°C until further analysis. The stimulated saliva was collected by asking subjects to chew sugarless chewing gum for five minutes after which the entire saliva was expectorated into sterile plastic collectors, which were placed in ice immediately and the salivary flow rate (ml/minute) was estimated by measuring the quantity of saliva collected in the collector. The concentration of cortisol in the saliva ($\mu\text{g}/\text{dl}$) was determined by using a salivary cortisol enzyme immunoassay kit with a lower sensitivity of $0.36 \mu\text{g}/\text{dl}$. The values were recorded and subjected to statistical analysis. P value <0.05 was considered significant.

RESULTS

Table I shows that, the present study consisted of 60 subjects which were divided into group I (30) (study) and group II (control) (30). The difference was non significant (P=1). Table II shows that 20 subjects were seen in all age groups such as <30 years, 31-40 years and >40 years. The difference was non significant (P >0.05).

Table III shows that present study consisted of 15 males and 45 females. The difference was significant (P= 0.04). Graph I shows that the mean cortisol level in unstimulated saliva is group I was $2.31 \mu\text{g}/\text{dl}$ and in group II was $1.86 \mu\text{g}/\text{dl}$. The difference was non significant (P >0.05). Graph II shows that the mean cortisol level in stimulated saliva is group I was $1.78 \mu\text{g}/\text{dl}$ and in group II was $1.52 \mu\text{g}/\text{dl}$. The difference was non significant (P >0.05). Graph III shows that volume of unstimulated saliva in group I was $0.62 \text{ ml}/\text{min}$ and in group II it was $1.86 \text{ ml}/\text{min}$. The difference was non significant (P >0.05). Graph IV shows that volume of stimulated saliva in group I was $1.84 \text{ ml}/\text{min}$ and in group II it was $3.62 \text{ ml}/\text{min}$. The difference was non significant (P >0.05).

Table I Distribution of Subjects

Group I (study)	Group II (control)	P value
30	30	1

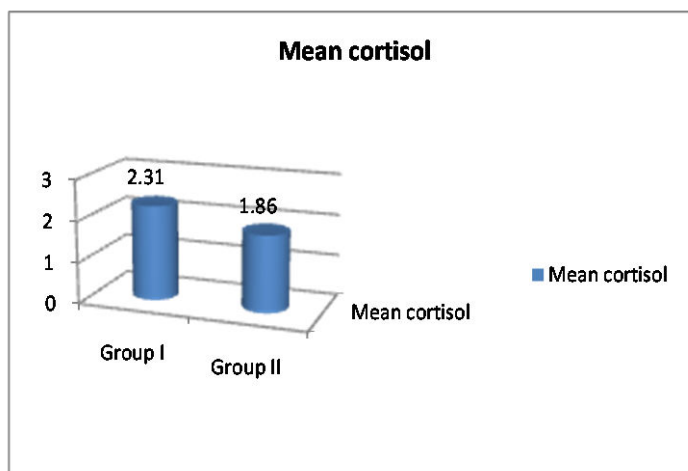
Table II Distribution of subjects in different age groups

Age groups	<30 years	30-40 years	>40 years
Number	20	20	20

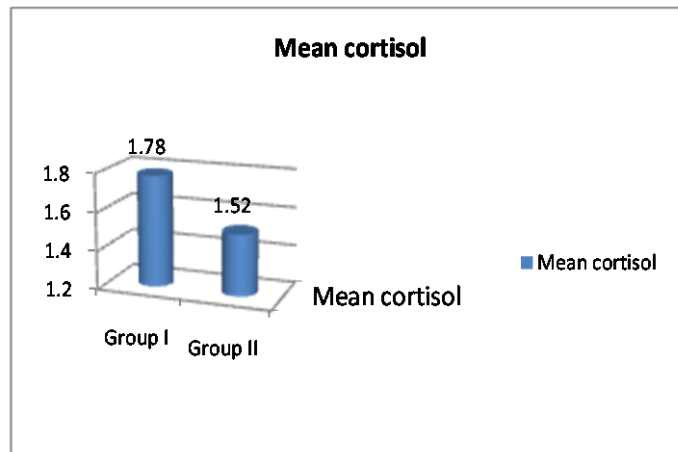
Table III Distribution of subjects on the basis of gender

Male	Female	P value
15	45	0.04

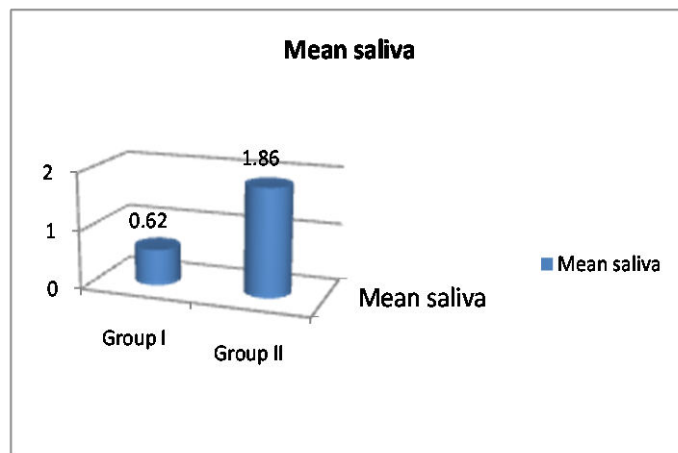
Graph I Mean cortisol level in unstimulated saliva in both groups



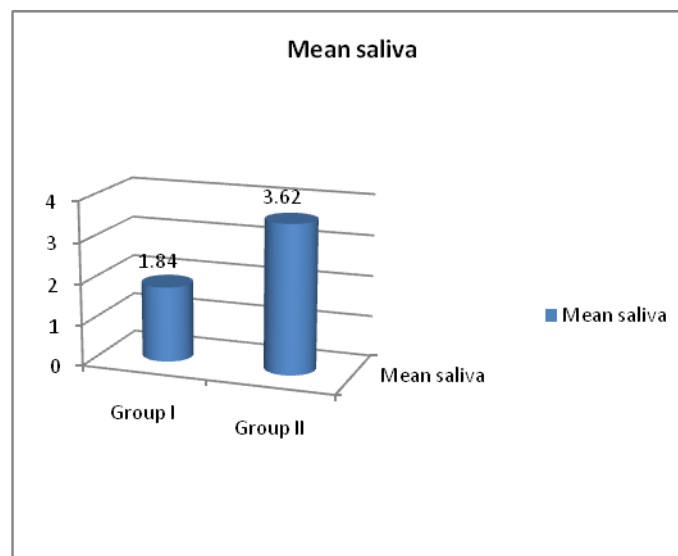
Graph II Mean cortisol level in stimulated saliva in both groups



Graph III Mean unstimulated saliva in both groups



Graph IV Mean of stimulated saliva in both groups



DISCUSSION

Few authors have conducted study to evaluate the relation between stress and salivary cortisol level. The present study aimed to evaluate salivary cortisol level and salivary flow in patients with xerostomia and to find any relation with anxiety and depression.. The present study consisted of 60 subjects which were divided into group I (30) (study) and group II (control) (30). Subjects were divided in age groups such as <30 years, 31-40 years and >40 years. The present study consisted of 15 males and 45 females. The higher significant number of females as compared to males may be due to differences in exposure to xerogenic medications or life changes such as menopause. Our result is in agreement with the study by Hill et al.⁵ We measured the mean cortisol level in unstimulated saliva is group I and in group II. The difference was non significant. Few studies assessing salivary levels of cortisol in patients with dry mouth showed that the levels of salivary cortisol were increased in the study group when compared to the controls.^{6,7}

We also measured the mean cortisol level in stimulated saliva is group I and in group II. The values were slightly higher in group I but it was statistically non significant. Our results are in agreement with Sreebny et al.⁸ We measured the volume of unstimulated and stimulated saliva in both groups. The difference was non significant. Similar results were obtained in the study by Murray Thompson.⁹

CONCLUSION

There was no statistical difference in unstimulated and stimulated salivary cortisol level and volume of unstimulated and stimulated saliva in both groups. Salivary cortisol measurement may be useful in detecting stress related disorders.

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