



## Analysis of Electrolytes in Saliva of Periodontitis and Healthy Individuals

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### ABSTRACT

The aim of the study is to analyse the salivary electrolytes in saliva of periodontitis and healthy individuals. The objective is to learn about the association of salivary electrolytes in saliva of periodontitis and healthy individuals. The salivary electrolytes include sodium, potassium, chloride, calcium, phosphorus. The electrolytes play an important role in the buffering action of the saliva in oral cavity. Thus this research is to study about the variation in the salivary electrolytes among the healthy individuals and periodontitis patients. The reason is to assess the variation or the differences in the salivary electrolytes among the healthy individuals and periodontitis patients. The salivary electrolytes were analysed both in healthy individuals and periodontitis patients.

**Keywords:** Oral ecosystem, impulses, electrolytes, inflammation, antimicrobial.

### INTRODUCTION

Saliva plays an important role in maintaining the equilibrium of the oral ecosystem. Saliva is often referred to as the mirror of the body as it is the indicator of the health not just in oral cavity but also throughout the body. The whole saliva contains locally produced as well as serum derived markers that have been found to be useful in the diagnosis of a variety of systemic disorders<sup>1</sup>.

Various trace elements like sodium, magnesium, potassium, chloride are present in our body fluids. These trace elements are also referred to as electrolytes since they carry electric charges. It is important to maintain the balance of electrolytes in our body. They are what our cells use to maintain voltage across their cell membrane and carry electrical impulses across themselves to other cells<sup>2</sup>. Salivary electrolytes play an important role in the anti-microbial functions of saliva.

Periodontitis is also known as pyorrhoea is a set of inflammatory disease affecting the periodontist, that is the tissues that surround and support the teeth. Periodontitis involves progressive loss of alveolar bone around the teeth, when untreated it leads to loss of teeth<sup>3</sup>. Periodontal disease has certain genetic background, but also local factors such as smoking, tobacco consumption and improper oral hygiene as well as systemic ones such as diabetes, cardiovascular disorders, etc. can lead to this disease<sup>4</sup>.

Periodontitis leads to inflammation of gums and these inflammatory cells release metalloproteinases which degrade gingival collagenous fibrous tissue and eventually the surrounding bone<sup>5</sup>.

It is believed that some of the antimicrobial activities probably depend on the electrolytes present in the saliva. So the aim of this study is to analyse the levels of

electrolytes especially sodium and chloride in the saliva of individuals and that of patients with periodontitis.

### SUBJECTS AND METHODS

This is a prospective study involving 30 adult human subjects, who include 15 healthy individuals and the rest 15 are affected by periodontal disease.

#### Collection of saliva for salivary analysis

Unstimulated whole saliva (resting saliva) from each subject was expectorated into sterile tubes, 2 hours after breakfast, after a single mouth rinse with 15ml of distilled water to washout exfoliated cells. 5ml of saliva was collected from the patient, centrifuged and the supernatant obtained was stored at 4°C for subsequent analysis.

#### Estimation of electrolytes in saliva

Sodium and chlorine were determined using Colorimetric method.

#### Estimation of sodium levels in saliva

Sodium was estimated as described by Hedge Mithra N et al<sup>6</sup>. Sodium is precipitated as a triple salt with magnesium and uranyl acetate. The excess of uranyl ions are reacted with ferrocyanide in an acidic medium to develop a brownish color. The intensity of the colour produced is inversely proportional to the concentration of sodium in the sample.

#### Estimation of chloride levels in saliva

Chlorine was estimated as described by Hedge Mithra N et al<sup>6</sup>. Chloride ions combine with free mercuric ions and release thiocyanate from mercuric thiocyanate. The thiocyanate released combines with the ferric ions to form a red brown ferric thiocyanate complex. Intensity of the colour formed is directly proportional to the amount of chloride present in the sample.



**Statistical Analysis**

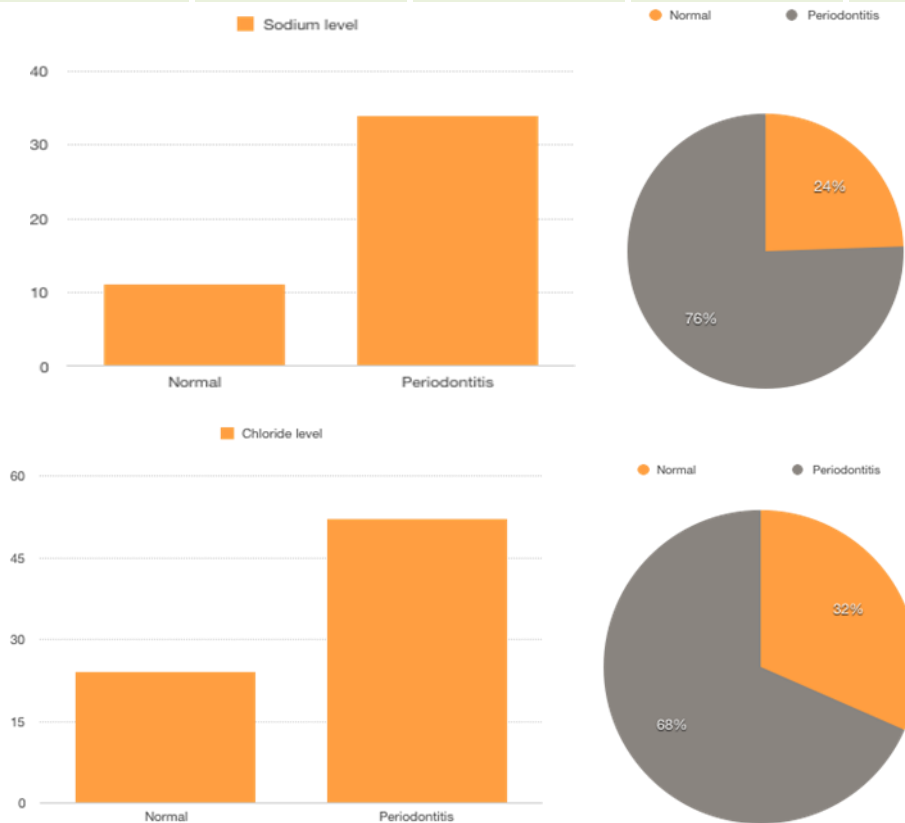
The obtained values were statistically analysed.

**RESULTS**

It is observed that there is a slight variation in the level of sodium and chloride than the normal level of it in healthy individuals. The level of electrolytes is increased in the

saliva of periodontitis patients. The mean value of sodium obtained in healthy individuals is 10.4 mmoles/L while that in periodontitis patients is 34.9 mmoles/L. The level of chloride obtained in healthy individuals is 24.8 mmoles/L while that in periodontitis patients is 52.6 mmoles/L.

		Statistics			
		normal level of Na mmoles/L	normal level of Cl mmoles/L	Na level in periodontitis mmoles/L	Cl level in Periodontitis Mmoles/L
N	Valid	15	15	15	15
	Missing	0	0	0	0
Mean		10.4667	24.8667	34.9333	52.6000
Std. Error of Mean		1.28681	2.15554	1.95538	3.56678
Std. Deviation		4.98378	8.34837	7.57314	13.81407L



**DISCUSSION**

Sodium is one of the important electrolytes among all the electrolytes present in the oral cavity that includes chlorine, calcium, potassium and bicarbonate. It played certain role that is important to maintain a normal body function. Sodium helps to control blood pressure, and regulates the function of muscles and nerves, which is why sodium concentration are carefully controlled by the body<sup>7</sup>. The Adequate Intake of sodium is 1.2 to 1.5 grams per day<sup>8</sup>.

Chlorine is another important electrolyte present in the saliva. It is a major mineral nutrient that occurs primarily

in body fluids. Chloride is a prominent negatively charged ion of the blood, where it represents 70% of the body's total negative ion content. On average, an adult human body contains approximately 115 grams of chloride, making up about 0.15% of total body weight<sup>9</sup>.

It is believed that all the salivary electrolytes including sodium and chlorine has antimicrobial action to a certain extent. Antimicrobial action is nothing but it either kills the microorganisms or inhibits their growth<sup>10</sup>. In our experiment we can notice a slight increase in the level of sodium and chlorine in the saliva of patients with periodontitis when compared with the normal healthy individuals. This slight variation may be due to its



antimicrobial function. Thus the level of the electrolytes increase in order to evoke certain immunological responses against the infection caused in the oral cavity. The electrolytes may either directly involve in these responses or in turn stimulate certain enzymes in the oral cavity to respond to these infections.

The condition at which there is an increase in the level of sodium in the body is called hypernatremia. Similarly the condition at which there is an increase in the level of chlorine in the body is called hyperchloremia. These two conditions may be due to its antimicrobial response towards certain infections. In that case periodontitis is one of the infection that leads to a considerable increase in the level of sodium and chloride ions in the oral cavity.

### CONCLUSION

The antimicrobial action of electrolytes present in the saliva increases in response to an infection in the oral cavity. Thus in case of periodontitis there is a slight increase in the level of sodium and chlorine when compared with the level of sodium and chlorine in healthy individuals. But in conclusion further studies should be done with larger sample size to confirm the findings.

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