Evaluation of salivary total proteins, albumin, globulin, and A/G ratio among healthy individuals and patients with chronic pulpitis

P. S. Karthikeson1, R. Gayathri2*, V. Vishnu Priya2

ABSTRACT

Aim: This study aims to estimate the salivary total proteins, albumin, globulin, and A/G ratio in patients with chronic pulpitis.

Introduction: Pulpitis is inflammation of dental pulp tissue. The pulp contains the blood vessels, the nerves, and connective tissue inside a tooth and provides the tooth’s blood and nutrients. Pulpitis is mainly caused by bacterial infection leading to toothache. Thus, the estimation of salivary proteins helps in indication of health status of the patient.

Methods: The saliva samples were collected from total of 12 individuals where six samples from normal individuals as control group and six samples from pulpitis patients, and the total protein and albumin levels were estimated through direct biuret method and bromocresol green method, respectively, and the absorbance was estimated using a colorimeter and the specific levels were calculated.

Results: From the results obtained, it is clearly inferred that there is a significant decrease in the total protein and globulin levels and increase in albumin levels in the saliva of patients with pulpitis when compared to that of normal individuals and there is an increase in the A/G ratio.

Conclusion: Salivary protein and albumin concentrations were determined as markers for plasma protein leakage, occurring as a consequence of the inflammatory process. Hence, this study will help in assessing the pulpal health of the patient by evaluating salivary protein, globulin, and A/G ratio.

KEY WORDS: Chronic pulpitis, Markers, Patient, Pulpal health, Salivary protein

INTRODUCTION

Saliva is a fluid secreted by the submandibular gland, the sublingual gland, and the parotid gland. Much mucus in the mouth and the secretion of mucus in the mouth mixed into a colorless liquid, including inorganic substances, mucus, glycoproteins, and enzymes, and antibacterials including secretory immunoglobulins and lysozyme compounds and so on. The enzyme in saliva is a must for starch and fat digestion few parts.[1] These enzymes break down in the tooth gap; food pellets play an important role in protecting the teeth from germs damage.[2] In addition, saliva also has a lubricating function, wet food to make it easy to swallow, and protect the oral mucosa, keep the surface moist.[3,4] There are many ingredients that play an important role in disease development. Saliva made for the body’s own secretion of a physiological substance, the composition of complex and more there are more than 90 kinds of proteins that can be stably present in saliva.[4,5] More than 40 kinds of saliva proteins have been isolated before, including albumin and globulin A variety of oral diseases are known to survive in saliva; total protein in the serum is made up of albumin and globulin.[6] The globulin, in turn, is made up of α1, α2, β, and γ globulins.[7] These fractions can be quantitated using protein electrophoresis, but the total protein test is a faster and cheaper test that estimates the total of all fractions together.[8,9] The traditional method for measuring total protein uses the biuret reagent, but other chemical methods such as Kjeldahl method, dye binding, and refractometry are now available.[10] The measurement is usually performed on automated analyzers along with other laboratory tests.[11] Serum albumin is the most abundant blood plasma protein and is produced in the liver and forms a large proportion of all plasma proteins. The human version is human serum albumin,
and it normally constitutes about 50% of human plasma protein. Serum albumins are important in regulating blood volume by maintaining the oncotic pressure (also known as colloid osmotic pressure) of the blood compartment. They also serve as carriers for molecules of low water solubility this way isolating their hydrophobic nature, including lipid-soluble hormones, bile salts, unconjugated bilirubin free fatty acids, calcium, and ions (transferrin). The globulins are a family of globular proteins that have higher molecular weights than albumins and are insoluble in pure water but dissolve in dilute salt solutions. Some globulins are produced in the liver. The present study is done to estimate the level of salivary total proteins, albumin, globulin, and A/G ratio among healthy individuals and patients with chronic pulpitis.

**MATERIALS AND METHODS**

The saliva samples were collected from total of 12 individuals where six samples from normal individuals as control group and six samples from pulpitis patients, and the total protein and albumin levels were estimated through direct biuret method and bromocresol green method, respectively, and the absorbance was estimated using a colorimeter and the specific levels were calculated.

**Estimation of Total Protein**

Colorimetric determination of total protein based on the principle of direct biuret reaction (copper salt in an alkaline medium). Protein in plasma or serum sample forms a blue colored complex when treated with cupric ions in alkaline solution. The intensity of the blue color is proportional to the protein concentration.

**Estimation of Albumin**

Colorimetric determination of albumin based on the principle of bromocresol green method, the reaction between albumin from serum or plasma and the dye bromocresol green produces a change in color that is proportional to the albumin concentration.

**RESULTS AND DISCUSSION**

Protein concentration in saliva changes by a variety of factors. Due to the salivary protein buffering, the rate of flow increases or decreases, resulting in an increase or decrease in salivary protein concentration. The mean total protein level in the control group was 2.552 g/dl, and the mean total protein level among the pulpitis patients was 1.86 g/dl [Graph 1]. The mean globulin level in the control group was 1.719 g/dl, and the mean globulin level among the pulpitis patients was 0.91 g/dl [Graph 2]. The mean albumin level in the control group was 0.833 g/dl, and the mean albumin level among the pulpitis patients was 1.10 g/dl [Graph 3]. The mean A/G ratio in the control group was 0.527 g/dl, and the mean A/G ratio among the pulpitis patients was 0.65 g/dl [Graph 4]. From the results obtained, it is clearly inferred that there is a significant decrease in the total protein and globulin levels and increase in albumin levels in the saliva.

Graph 1: Estimation of total protein (g/dl). **signifies P<0.05

Graph 2: Estimation of globulin (g/dl). **signifies P<0.05

Graph 3: Estimation of albumin (g/dl). **signifies P<0.05

Graph 4: Estimation of A/G ratio (g/dl). **signifies P<0.05
of patients with pulpitis when compared to that of normal individuals and there is an increase in the A/G ratio ($P<0.05$). Low A/G ratio is associated with liver injury and increase in A/G ratio increases is evidenced with excessive body water loss. Thus, these values can be used as a diagnostic aid in indicating the presence of pulpitis. Similar study was conducted by Swathi Kejriwal in Delhi where salivary mucin, amylase, and total protein were estimated in patients with gingivitis and periodontitis. Results showed that there was significant increase in mucin, amylase, and total protein levels. In pulpitis patients, there was increased albumin level and decreased total protein and globulin levels which was statistically significant.\[^{[19]}\]

**CONCLUSION**

Useful diagnostic information can be obtained by determining the total protein, albumin, globulin, and A/G ratio. Significant changes in these values can pinpoint specific changes, thus saliva being one of the major constituents of the oral cavity; therefore, estimation of total salivary proteins helps in diagnosis of pulpitis, thus facilitating early prognosis and treatment. The mechanism of the changes in the composition and the relationship remains to be further studied. In recent years, the research on saliva has gradually attracted the attention of scholars in developing non-invasive detection methods for disease diagnosis and prevention and further studies must be encouraged in this field.

**REFERENCES**


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**Table 1: Estimation of total protein, albumin, globulin, and A/G ratio**

<table>
<thead>
<tr>
<th>Salivary parameters (g/dl)</th>
<th>Control (mean concentration in g/dl)</th>
<th>Pulpitis (mean concentration in g/dl)</th>
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<tbody>
<tr>
<td>Total protein</td>
<td>2.552</td>
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