

**Research Article****Evaluation of Salivary Sialic Acid in Oral Premalignancy****<sup>1</sup>Dr Pankaj Bansal****<sup>2</sup>Dr P.D. Rath****<sup>1</sup>Dept of General Medicine, <sup>2</sup>Consultant Rheumatologist  
School of Medical Sciences & Research, Sharda University, Greater Noida****ABSTRACT**

**Background:** Levels of sialic acid & have been shown to increase in serum/ saliva of patients with various malignant tumors. The purpose of this study was to determine the levels of sialic acid in patients with oral premalignancy and evaluate their value in adjuvant diagnosis in these patients.

**Patients & Method:** 30 patients with oral premalignancy and 30 healthy individuals were included in this study. Saliva sample was collected from all the subjects. Supernatant liquid was obtained and salivary sialic acid (SSA) levels examined.

**Results:** The salivary sialic acid concentration was significantly higher in oral precancer patients than in healthy controls ( $p < 0.05$ ).

**Conclusions:** The results of this study suggest that the determination of salivary sialic acid level is an easy, reproducible method which can be used for early detection of oral precancer.

saliva as a diagnostic fluid. It meets the demands for inexpensive, noninvasive and easy-to-use diagnostic methods. As a clinical tool, saliva has many advantages over serum, including ease of collection, storing and shipping, and it can be obtained at low cost in sufficient quantities for analysis. For patients, the noninvasive collection techniques dramatically reduce anxiety and discomfort and simplify procurement of repeated samples for monitoring over time. Saliva also is easier to handle for diagnostic procedures because it does not clot, thus lessening the manipulations required.<sup>1</sup> Analysis of saliva may be useful for the diagnosis of hereditary disorders, autoimmune diseases, malignant and infectious diseases, and endocrine disorders, as well as in the assessment of therapeutic levels of drugs and the monitoring of illicit drug use.<sup>2</sup>

In the recent quick development of cancer diagnostic methods, attention of researchers is focused onto tumor-derived compounds as possible markers of neoplasia.<sup>3</sup> Sialic acid (SA) is the generic term given to a family of acetylated derivatives of neuraminic acid which occur mainly at terminal positions of glycoprotein and glycolipid oligosaccharide side-chains. Several biological functions have been suggested

**Introduction**

Saliva is a biofluid that is readily accessible via a totally noninvasive method. Compelling reasons exist to use

for SA, such as stabilizing the conformation of glycoproteins and cellular membranes, assisting in cell-cell recognition and interaction, contributing to membrane transport, providing binding sites for ligands for the membrane receptor functions, and affecting the function, stability and survival of glycoproteins in blood circulation.<sup>4</sup>

Sialic acids also exist in many human body fluids including saliva, gastric juice, serum, urine, tears, and human milk. Sialic acid is a significant component in all salivary mucins. Indeed, the name sialic acid is derived from the Greek 'sialos' meaning saliva.<sup>5</sup> Sialic acid measurements of body fluids are used to predict disease risk. There have been many papers suggesting that measurements of total sialic acid in the serum can predict the risk of various diseases.<sup>6</sup> Serum sialic acid levels have been used as laboratory markers in a variety of pathological conditions. Marked elevation of serum sialic acid concentrations (TSA and/or LSA) that correlate with the clinical activity of a disease have been documented in many malignancies.<sup>7</sup>

Not much research has been done on the salivary level of sialic acid (SSA) in patients with oral precancer. The purpose of this study was to determine the usefulness of SSA measurements in the diagnosis of patients with oral precancer.

## **MATERIALS & METHOD**

Whole saliva was obtained from 30 patients with oral precancer. All patients were staged according to UICC recommendations. The diagnosis of

premalignancy was confirmed in each case by histopathology. The age of all patients ranged between 25 and 45 years. Control salivary sample was obtained from 30 age-matched healthy individuals without known signs of oral precancer.

The method was reviewed and permission was taken from the ethical committee of SHARDA University. All the subjects were informed about the study and their written consent obtained before conducting the research.

Unstimulated whole saliva was collected between 10:00 am to 12:00 pm to avoid discrepancies in diurnal variation. The subjects were asked to rinse their mouth with clean water to remove lodged debris, if any, and then to spit gently into small plastic cups. These plastic cups were then immediately transferred to ice-boxes and taken to laboratory for SSA estimation.

First, the saliva sample from each subject was centrifuged at 3000 rpm for 15 mins to achieve a clear supernatant fluid at the top and precipitate at the bottom. The supernatant fluid was transferred to a separate container and levels of SSA (free sialic acid) determined by using method described by Yao et al. SSA levels were expressed in mmol/Lt. Statistical analysis was performed using Student's t test. A p value <0.05 was considered statistically significant.

## **RESULTS**

Mean SSA concentrations were significantly higher in patients with oral precancer ( $37.42 \pm 2.90$  mmol/Lt) than in normal controls ( $32.05 \pm 3.40$ ) ( $p < 0.05$ ) (Table 1).

Table 1. Mean SSA levels in patients with oral precancer and controls

Groups	No. of patients	Mean SSA $\pm$ SD (mmol/l)
Oral precancer	30	37.42 $\pm$ 2.90
Control group	30	32.05 $\pm$ 3.40

### Discussion

Sialic acids are a family of nine-carbon acidic monosaccharides that occur naturally at the end of sugar chains attached to the surfaces of cells and soluble proteins.<sup>5</sup> They occur in body tissues and fluids as structural units of oligosaccharides, glycolipids and glycoproteins when they are bound in glycosidic linkage, usually to D-galactose or to N-acetyl-D-galactosamine. Their functions in the salivary secretions have always created much interest because of their possible relevance to oral health.<sup>8</sup>

In the human body, the highest concentration of sialic acid (as N-acetylneuraminic acid) occurs in the brain.<sup>5</sup> Altered glycosylation of glycoconjugates is among the important molecular changes that accompany malignant transformation.<sup>9</sup> An increasing number of systemic diseases and conditions have been shown to be reflected diagnostically in saliva.<sup>1</sup> The high sensitivity of sialic acid as a tumor marker has been reported in a variety of cancerous conditions.<sup>9,10,11</sup> Sialic acid levels have been reported to correlate with stage of disease, tumor burden, degree of metastasis and recurrence of disease.<sup>7</sup>

In our study, we found significantly increased level of salivary sialic acid in precancerous patients compared to healthy controls. Rajpura KB<sup>12</sup> & Rao VR<sup>13</sup> found similar association of serum sialic acid in oral cancer & precancer patients. Significant elevation in the serum levels of TSA and LASA were observed in patients with the precancerous and cancer lesions when compared with the controls.

Estimation of sialic acid using saliva had definite advantages as whole saliva can be collected non-invasively, and by individuals with limited training. No special equipment is needed for collection of the fluid. Diagnosis of disease *via* the analysis of saliva is potentially valuable for children and older adults, since collection of the fluid is associated with fewer compliance problems as compared with the collection of blood.<sup>2</sup>

### Conclusion

The use of saliva as an alternative method of diagnosis or as a means to monitor the evolution of certain illnesses or the dosage of certain medicines is a promising path.<sup>14</sup> In our study we investigated the clinical usefulness of salivary levels of sialic acid for early diagnosis and management of oral precancer patients. The data revealed significant elevations in sialic acid levels in oral precancer patients and suggested its potential utility in adjuvant diagnosis and prognostication of the disease.

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