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Saliva in diagnostics- a useful screening tool

Jayita Poduval

Associate Professor, Department of ENT, Pondicherry Institute of Medical Sciences, Kalapet, Puducherry- 605014, India

The use of saliva for the purpose of diagnosing disease is scarcely known but is rapidly gaining popularity. In fact, the use of human saliva for diagnostics is changing from classical forms of testing such as that for salivary flow, to that of looking at salivary biomarkers. This article briefly reviews the same while differentiating between the two methods of diagnosis.

Salivary flow testing is also known as sialometry, which measures the flow rate of saliva. Saliva is mainly produced by the major salivary glands, viz. parotid, submandibular and sublingual glands. Salivary flow testing is usually included in the topodiagnostic methods of testing for facial nerve paresis or paralysis, and is a very sensitive early indicator of nerve damage because the flow is drastically reduced in the first 24 to 48 hours of nerve injury. This finding was earlier used to select patients for early facial nerve decompression but it is now well known that neuropraxia may cause such a temporary dysfunction of the nerve and does not reliably indicate the extent of the lesion. It has therefore been given up [1], as have been the other topognostic tests, viz. Schirmer's test and electrogustometry.

The present indications of salivary flow testing are limited to the grading of severity of salivary gland disease, esp. Sjogren's Syndrome, and other similar autoimmune conditions, and in evaluation of their response to therapy. In these cases, it is usually combined with related tests like Schirmer's test and labial biopsy [2]. The co-operation of the patient is of utmost importance as the testing equipment needs to be installed accurately. Emotional factors may affect the test results, therefore, counselling and reassurance must be given to the patient along with an informed, written consent.

Partial surgical removal of the parotid gland decreases flow in the gland but is not associated with complaints of xerostomia. It may also cause a compensatory increase in secretion from other glands. Cunning et al reported a decrease in unstimulated salivary flow in patients undergoing unilateral submandibular gland excision with increased subjective complaints of xerostomia [3]. Unstimulated saliva is collected 2 hours after eating or after an overnight fast. Whole saliva (a total product of all salivary glands) can be measured by a variety of volumetric and gravimetric techniques, including drooling, spitting, suction and swab [4]. Isolated parotid secretions can be obtained by placement of a suction cup over the Stensen's duct, usually a Carlson-Crittenden cup [5] or Lashley cup.

Human saliva can also be tested for levels of steroid hormones such as cortisol. This is useful in diseases of the adrenal glands, such as Cushing's syndrome and Addison's disease, especially screening for the latter [6, 7]. It may be used by dermatologists when confronted with hyperpigmented skin lesions, which among other things, could be due to Addison's disease. Saliva cortisol levels may also be used for the evaluation of chronic stress whereas salivary alpha amylase could be increased in acute stress [8]. Other hormones- both male and female- in the saliva, may be evaluated in conditions such as polycystic ovary syndrome, anovulation, menopause and hypogonadism [9]. Similarly, insulin resistance, metabolic syndrome and diabetes mellitus could also be evaluated using salivary biomarkers such as chromogranin A and salivary lysozyme [10, 11]. The expression of nitric oxide in saliva correlates well with levels of it in the blood and is thus useful for the detection and measurement of this biomarker that could be used for monitoring blood pressure and heart health [12, 13].

The HIV antibody is also expressed in saliva and detection of the same is now approved for medical and commercial use [14]. Similarly, antibodies against Hepatitis A, B and C are also well evaluated using saliva [15, 16]. Periodontal disease is also another area where salivary biomarkers have proved useful.

Allergic states, parasitic and fungal infections can also be adequately assessed using saliva as a screening and diagnostic tool [17]. The same applies to the detection of illegal drugs as well as prescription medications, and the monitoring of circadian rhythms in certain industries and occupations. Breast, pancreatic and oral cancers could also be screened using saliva [18].

***Corresponding author:**
Dr. Jayita Poduval
Associate Professor, Department of ENT, Pondicherry Institute of Medical Sciences, Kalapet, Puducherry- 605014, India

PCR (polymerase chain reaction), ELISA (enzyme- linked immunosorbent assay), HRMS (high resolution mass spectrometry) are the more popular methods in current use when working with a saliva sample. Nanotechnology is believed to further enhance the sensitivity of these methods. Even though variability may exist among laboratories using saliva for diagnostics, the safety and non invasive nature, affordability and ease of collection allow fairly good levels of accuracy. Standardization is possible pending further research and widespread adoption of this modality of diagnostics.

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