Saliva as a Diagnostic Tool in Orofacial Disorders

Abhishek Ranjan Pati

Reader, Department of Oral Medicine & Radiology, Institute of Dental Sciences, Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar 751003, Odisha, India

Abstract

Saliva is formed by major exocrine organs, namely the parotid gland, "sub-mandibular" gland and "sublingual glands" and many minor "salivary glands." Nature has bestowed saliva "The natural source" with many functional capabilities that have a crucial value in maintaining the well being of mouth. Saliva plays a major role in the protection of oral tissues, food preparation, digestion, lubrication and speech.[1] But one purpose not given by life is the utilization of saliva for investigative value, it is the human who has to explore this precious wonder fluid marvelously studded with clues about the human body in health and disease. Saliva as a diagnostic aid in orofacial disorders is the traditional monitoring tool for various diagnosis.[2]

Keywords: *Saliva, HIV, orofacial disorders.*

Introduction

Nature has bestowed saliva "The natural source" with many functional capabilities that have a crucial value in maintaining the well being of mouth. Saliva plays a major role in the protection of oral tissues, food preparation, digestion, lubrication and speech.[1] But one purpose not given by life is the utilization of saliva for investigative value, it is the human who has to explore this precious wonder fluid marvelously studded with clues about the human body in health and disease. Saliva as a diagnostic aid in orofacial disorders is the traditional monitoring tool for various diagnosis.[2] Saliva is formed by major exocrine organs, namely the parotid gland, "sub-mandibular" gland and "sublingual glands" and many minor "salivary glands." The total saliva produced during a 24 hr period is about 1000 to 1500 ml. The approx 0.4 ml per minute.[3]

Historically[4] the diagnostic value was recognized by the prehistoric legal center of the population who engaged salivary surge as the foundation of anancient"lie detector"examination, but now with endless, untired efforts of dental investigators in finding change in saliva stream speed and constituents by means of investigating and checking in several mouth disorders, it is established that saliva is valuable in the analysis of general disorder of salivary glands like inflammatory as well as autoimmune disease, by nurturing a known volume of saliva, a quantitative determination of specific organism can be made which is employed in identifying risk for caries and as an indicator for infection. The buccal mucosa cells are used for getting DNA for gene analysis, the list keeps growing.[5,6] Saliva is more and more used in the analysis and evaluation of ailment but the possibility of physiological difference within several constituent whose inference is projected as an analytic assist ought to be investigated sooner than it is utilized.

Saliva as a diagnostic tool in various disorders:

Autoimmune disorders - Sjogren syndrome:[7,8,9,10,11,12]

Saliva in infections:

- Viral: HIV, Herpes, Mumps
- Bacterial
- Fungal

HIV: Groopman JE, Salahuddin (1984)[13] demonstrated that HIV-1 was detected initially in whole saliva, at frequencies ranging from 1 to 45%. David HO, Roy E et al (1985)[14] conducted a study for the isolation of HTLV- iii(human T-cell lymphotropic virus) from saliva of infected patients. 83 saliva samples were collected from 71 homosexual men seropositive for HTLV-iii. Saliva samples were cultured within 60 minutes after collection and blood was collected from 50 of 71 for virus isolation. It was concluded that the HTLV-

iii titer of patients saliva was substantially less than that of blood. Thus this study indicates that transmission of HTLV-iii does not occur if exposed to the saliva of infected persons so useful in allaying public concern regarding the causal spread of AIDS. Yapijakis C, Panis V, Koufaliotis N, Yfanti G, Karachalios S, Roumeliotou A, et al (2006)[15] conducted a study investigate the finding possibility of "human immunodeficiency virus (HIV)" in the salivary sample,sixty-eight subjects were investigated, consisting of thirty-four"HIV" carriers and thirty-four non-carriers (controls) of coordinated sex and age. The mouth assessment revealed the saliva and blood sample of study subjects. Every subject was investigated andscreened for "HIV"by means of 2 method "Oraquick-compatible enzyme-linked immunosorbent assay (ELISA) and a fluorescent immunoenzymatic method (ELFA)", long-established by "western blotting", and a simple molecular method "(polymerase chain reaction amplification of a relatively constant viral DNA region)", long-established by "DNA hybridization". They investigated that the detection of anti-HIV in saliva mightattainthe accurateness of 97.1-100%, analogousby way of blood.

Hepatitis: Hutse Vet al (2005)[16] conducted a study on 43"HBsAg" positive and 73"HBsAg""negative paired serum samples" were investigated. These were gathered from subjectscoming to college outpatient department. The samples were stored using the "Oracol collection device" and they were passed through the "IgG quantification assay" to guarantee their fineness and amount. The finding of HBsAg in oral solution was done with"ETI-MAK-4 ELISA". The corroboration of this test gave a sensitivity and specificity around 90.7% and 100%.

Varicella-zoster infection: Talukder Y et al[17] investigated by means of matching serum as well as oral solution form fit grown-up subjects (n = 205) in addition top lay school kids (n = 98), saliva collection for regular"measles, mumps and rubella" tests (n = 537) and samples from subjects of atopic dermatitis (n = 252). When it was compared to paired sera tested by the same ELISA the sensitivity of the oral fluid assay was 93% and specificity 95.7% overall, varying slightly with the age group. The analysis was revealed to have good quality possibility for utilization in major epidemiological settings.

Herpesvirus infection: Blackbourn DJ, Lannette ET (1998)[18] conducted a study on "14 HHV-8-seropositive subjects, as well as 8 Kaposi's sarcoma subjects, to determine the growth of Human herpesvirus 8 by "polymerase chain reaction" in nose secretion and salivary fluid of patients. They concluded that HHV was present in solitary or equally body fluids in eight (57%) of fourteen subjects. They further determined that "parallel PCR testing revealed the concomitant presence of cytomegalovirus, Epstein-Barr virus and HHV-6" in a variety of amalgamation in these body fluids. Thus data indicates recurrent detaching of numerous herpes – viruses within saliva predominantly Kaposi sarcoma patients. Yildirim S et al (2006)[19] reported a case and found that "EBV was detected in baseline samples of saliva from the "Kostmann syndrome patients".

Mumps: Thomas Thieme, Stephen Piacentini et al (1994)[20] conducted study on 157 asymptomatic subjects to decide if oral liquid samples are capable to be used to constantly measure defensive blood quantity of antibodies to "measles, mumps and rubella", and to compare coordinated serum and saliva samples from eleven subjects after "measles-mumps-rubella immunization. They concluded that the incidence of antibodies in "oral fluid specimens" correlated with that of serum with 94% sensitivity and 94% specificity for mumps, thus protective levels of antibodies assessed by means of an oral fluid with good consistency. Muhels R.L et al (2000)[21] evaluated that in viral mumps the saliva shows an increase in the sodium values and a very less potassium level, which approaches its plasma equivalent. Sodium valuesincrease to 90-120 mmol/l and potassium values dropunder 10 mmol/l.

Bacterial infections:

Dental Caries: J Van Houte, HV Jordan (1990)[22] carried out a study on 273 subjects for the detection of the alliance of microbacterial concentration of teeth tartar and saliva with human root surface dental cavity and saliva samples were collected from one-third of the patients for determining of the concentration of streptococcus mutans and lactobacillus and they concluded that saliva populations of mutans streptococci had positive correlation by way of the occurrence of tooth root surface dental caries.

Fungal infection: Hicks MJ, (1998)[24] carried out a study to determine the prevalence of fungal organisms in whole unstimulated saliva from children with vertically acquired HIV infection. 27 HIV infected and 11 HIV exposed, but uninfected subjects were studied and the

whole unstimulated saliva was collected. The results were, yeast and hyphae were present cytologically in 19% of HIV infected and 9% of HIV-exposed but uninfected children and thus they concluded that fungal organisms in the saliva reflected oral carriage or mucosal colonization, influenced the development of clinically significant candidiasis in the immunocompromised children.

Saliva in malignancies:

Head and neck cancer: Jiang WW, Fmasayesva B (2005)[25] conducted a quantity PCR of "cytochrome oxidase I and cytochrome C oxidase II (Con II)" genes in mouthwash samples of 94 subjects having "head and neck squamous cell carcinoma" and 656 controls were considered. They evaluated the "mitochondrial DNA/nuclear DNA" in salivary samples from HNSCC subjects and controls in association to "smoking, ethanol intake and tumor stage". The mean values of "COX I and COX-II" in saliva samples have considerably elevated in comparison with controls. On univariate investigation, smoking, age, HNSCC analysis, and higher stage of HNSC were associated with higher levels of mt DNA contact in saliva.

Saliva in immune-related disorders:

Multiple sclerosis: Frena Adamashuilli, Aliraza Minagar (1993)[26] carried out a study for the quantity of soluble "HLA" in body secretions and to found that a possible function in assessing illness. "Enzyme-linked immunoassay" was used to gauge soluble "HLA class I and class II molecules" in saliva and cerebrospinal fluid in 13 non treated subjects with multiple sclerosis and saliva of 53 healthy controls is also studied. They concluded that soluble HLV in saliva specifically HLA 11 correlated with the levels formed in CSF, thus saliva provided a noninvasive correlation of CSF measurement.

Graft versus host disease: Patients with "graft versus host disease"experience from xerostomia and augmented levels of oral injections and mucosal pathologies. Izutsu KT, Menard TW (1985)[27] carried out a study on 42 subjects at 90 days to 2 years following bone marrow transplantation. They studied labial gland IgA, rather than whole saliva. It was concluded that there was a decreased concentration of IgA, 90 days after transplantation, and was suggestive of immunocompromised status. Morhang G, Engstron PE (1994)[28] demonstrated that the subjects of"GVHD" had a smaller amount of saliva IgM one year after "bone marrow transplantation". Maglu RS (1996)[29] demonstrated there is a mean decrease of 55-90% in the "salivary flow rate of patients" with graft versus host disease.

Drug monitoring: Similar to other body fluids, saliva is proposed for the monitoring of systemic levels of drugs. A requirement for this investigative purpose of saliva is a definable associationamidthe absorption of a curative medicine in blood and the absorption in saliva. Amedicine to appear in saliva, medicine molecules in serum have to cross through the salivary glands and into the oral cavity.

Antipsychotic drugs: Ben Aryeh (1980)[31] conducted a study on 118 manic-depressive patients, "salivary and serum lithium" concentration were calculated. The results were lithium concentration was higher in saliva as compared to serum. A method to measure serum lithium levels from salivary measurement was extracted from serum = 0.364 saliva. The results demonstrated the likelihood of through salivary lithium capacity for checking patients on long-lasting lithium treatment.

Antiasthmatic drugs: Krik JK, Dupnis (1994)[34] concluded saliva theophylline conc. established an improved association with serum levels of free "theophylline than with serum concentration of total theophylline."

Immunosuppressive drugs: Coates JE, Lam SF (1988)[35] demonstrated that a lesser association (r = 0.68) was established between salivary and whole serum levels of immunosuppressive drugs.

Antiepileptic drugs: Rosenthal E, Moffr E (1995)[36] evaluated the saliva evaluation of anti-epileptic medicines. Salivary carbamazepine levels were found to be 38% of serum carbamazepine level and a constructive correlation between salivary and serum carbamazepine levels was observed.

Alcohol and tobacco: Luepkar RV, Pachauk TF (1981)[37] evaluated that salivary thiocyanate level was established to be a pointer of smoking. Istvan (1982)[38] carried out a study on cigarette smokers between the age of 35 and 59 and investigated the relation of salivary continue and no of cigarette smoked per day to body mass index.

Discussion

Saliva is easilyavailable, which can be stored by

various method and it contains many hormones, drugs, and antibodies of interest in screening and diagnosis.[40] It is collected in distant areas by inexperienced persons and, by way of assured compilation instruments, is steady at optimum temperatures for few weeks Absorbing specimens on cotton may contribute interfering substances to the extract. A major advantage is that blood-borne diseases associated with blood collection are not relevant to saliva (noninvasive). Due to less quantity of harmful antigens in saliva, "HIV and hepatitis" diseases are much less of a danger from saliva than from blood.[40] Hocini et al. (2000) investigated that secretary"leukocyte protease inhibitor (SLPI- antiviral activity against free HIV-1)" can be an additional reason causative to the safety of saliva as an analytical sample.

Understanding of saliva assays is hard. Because blood levels of steroid hormones are several-fold higher than saliva levels, much has been written about the problems of contamination from bleeding gums. The use of saliva as a diagnostic fluid has become a successful research story during the past 10 years. Recent and most advanced technologies have enabled the salvia to be used to diagnose some of the diseases and prediction of disease progression, to be enhanced by future research activities.

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