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Exploring the Knowledge of Oral Medicine Specialists towards Salivary Diagnostic Markers for Oral and Systemic Diseases

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ABSTRACT

Aim: To assess the knowledge, attitude and perception of salivary diagnostic markers among Oral Medicine Specialists.

Background: Early detection plays a crucial role in treatment planning and prognosis. Saliva serves as a potential diagnostic fluid as it is economic, non-invasive and gives information about oral & general health. Saliva can be used for clinical diagnosis, disease monitoring and decision making. Salivary constituent's effective indicators of local and systemic disorders. Main problem is standardization of saliva collection methods as it is heterogeneous across studies.

Materials And Methods: A 15 multiple choice questionnaire was prepared by the principal investigator and the guide circulated among peers for validation. An online survey was created using google forms and distributed among Oral Medicine Specialists. Data was tabulated in Excel spreadsheets. Imported to IBM SPSS software version 2.0 and statistical analysis were performed. Frequency, percentage and chi square test was performed.

Results: Oral medicine specialists were mostly aware about recent salivary diagnostic markers. Majority of the participants believe that salivary biomarkers can serve as a diagnostic & prognostic tool. 70% of the participants feel that saliva can replace tissue or serum as a biomarker and can be translated into routine clinical practice.

Conclusion: Oral medicine specialists have adequate awareness and knowledge about salivary diagnostic markers, but certain knowledge has to be brushed up among them. Majority of participants showed a positive attitude towards its use as a diagnostic & prognostic tool. Furthermore, they need to be trained on these grounds to help them treat their patients in the best possible way.

Keywords: *Attitude, Diagnostic markers, Knowledge, Oral Potentially Malignant Disorders, Precancerous conditions, Salivary markers*

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INTRODUCTION

Human saliva is considered as a clear, slightly acidic (pH 6.0 -- 7.0) heterogeneous fluid that is composed of 98% water and 2% other compounds such as electrolytes, mucus, antibacterial compounds, and various enzymes1. Saliva is also a complex mixture of oral fluids which is composed of salivary gland secretions, gingival crevicular fluid, expectorated bronchial and nasal secretions, serum and blood derivatives from oral wounds, bacteria and bacterial products, viruses, fungi, desquamated epithelial cells, other cellular components, as well as food debris2. Saliva can be used for clinical diagnosis, disease monitoring and decision making. Salivary constituents are effective indicators of local and systemic disorders.

The history of using saliva as an indicator of what is taking place within the human body dates back centuries. Cytochemical procedures using saliva samples to identify biomarkers and to better understand disease have been employed in gout and rheumatism3. Early attempts to use saliva for diagnostic purposes presumed the presence of specific biomarkers already known to be present in serum to also be present in saliva. Granted that this presumption appeared, and is now known, to be largely accurate, accounting for how biomarkers made their way into saliva remained confounding. Furthermore, limitations posed by the available technical methods of saliva collections, coupled with a lack of standardized parameters for collection and storage, sometimes translated into considerable difficulty with detection of low-level markers at that time.

Comparatively, saliva carries many advantages over blood. Collection is undemanding. While blood sampling requires highly trained personnel, saliva procurement can be done by anyone, including self-collection4. The procedure is noninvasive. Sample procurement is painless, reducing the discomfort most individuals endure from biopsies and repeated blood draws, while encouraging others to participate in timely medical evaluations and screenings. Samples are safer to handle. Salivary secretions contain factors that inhibit the infectivity of HIV, resulting in extremely low or negligible rates of oral transmission. Samples are easier to ship and store. Saliva does not clot and requires less manipulation than blood. The procedure is economical. Saliva is easily collected, shipped, and stored, resulting in decreased overall costs for patients and healthcare providers5.

Unstimulated whole saliva, also called resting saliva, is composed mainly of SMG saliva together with saliva from SLG and minor salivary glands6. The characteristics of unstimulated saliva are that it is more viscous and is mucin-rich. Stimulated whole saliva is mainly composed of PG saliva and to some extent saliva from the SMG that is produced upon stimulation. Characteristics of stimulated saliva reveal that it is thin, watery and amylase-rich.

Several types of inflammatory biomarkers associated with oral diseases and systemic diseases have been detected in saliva. Interleukins-1b, -6 and -8 (IL-1b, -6 and -8), tumour necrosis factor-a (TNF-a) and matrix metalloproteinases (MMP)-8 and -9. An increasing number of specific molecular markers for different diseases, such as oral and breast cancer, cardiovascular diseases and human immunodeficiency virus (HIV) are being identified7.

Sialochemistry offers great value in the diagnosis of Sjogren's Syndrome. An increase in the levels of immunoglobulins, inflammatory mediators, albumin, sodium, and chloride and a decrease in the level of phosphate are indicative of SS. Salivary protein analysis demonstrated an increased level of lactoferrin, beta 2 microglobulin, lysozyme C, and cystatin C. However, the levels of salivary amylase and carbonic anhydrase were decreased8.

Early detection plays a crucial role in treatment planning and prognosis. The upregulated salivary miRNA 184, and miRNA 21 and downregulated salivary miRNA 145 can be used as potential biomarkers to predict malignancy. Of these three, salivary miRNA 184 had the highest sensitivity and specificity9. The aim of this survey was to assess the knowledge, attitude and perception of salivary diagnostic markers among Oral medicine specialists.

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MATERIALS AND METHODS

This is a cross-sectional study based on self-reported questionnaires. An online questionnaire was developed by using google forms, with a consent form appended to it. Link of the questionnaire was sent through emails, whatsapp and other social media. Participants with access to the internet could participate in the study. Participants with age more than 18 yrs, able to understand English language, who are pursuing or completed their master degree in Oral Medicine and willing to give informed consent were included. Ethical approval for conducting the survey was obtained from the Institutional Human Ethics Committee. All the data were collected and compiled by the author. Simple random sampling was used to select the participants for the study. This provides equal odds for every member of the population to be chosen as a participant in the study. The primary items were reviewed by peers who provided feedback and suggested necessary changes in order to establish both face and content validity of the survey questionnaire.

Online self-reported questionnaires developed, which contained 15 multiple choice questions. Afterwards, the reliability of the questionnaire was established using a pilot test by collecting data from 20 dentists not included in the study sample. They were asked to fill in the questionnaire individually and were encouraged to think loudly and to speak what they meant by each answer and how they understood each question. Responses were voice recorded and questions were adjusted accordingly. Excel spreadsheets were used for data collection and manipulation. Age, gender, profession, knowledge, attitude and perception were assessed. Output was collected as nominal values, so percentage was calculated and the results were tabulated. Results were represented by pie charts and bar graphs.

Data were analyzed using IBM SPSS software version 20. Data were described using frequencies and percentages. Chi-square was used to analyze differences between categorical variables. A p-value of less than 0.05 was considered statistically significant.

RESULTS

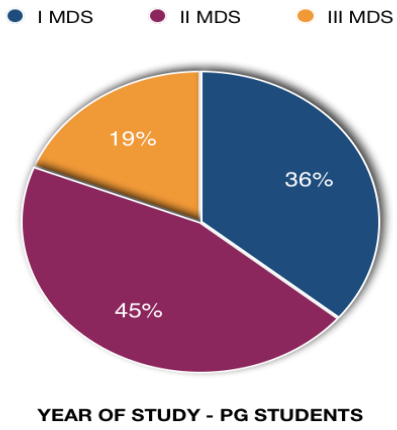
Study was conducted among 150 Oral Medicine specialists, out of which 55 were males (37%) and 95 (63%) were female, which is given in Table 1.

TABLE 1: Gender distribution

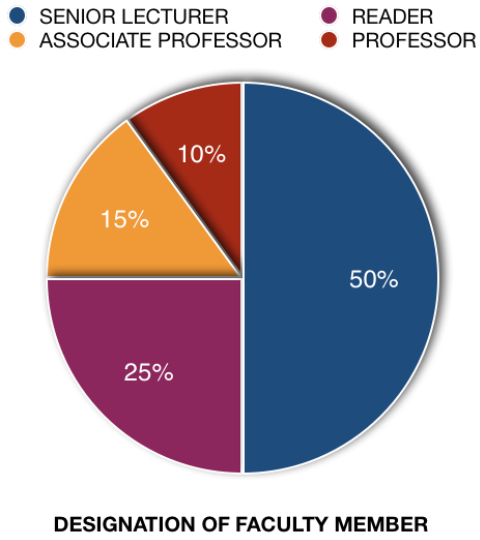
Gender	Frequency	Percentage
MALES	55	37%
FEMALES	95	63%

Table 1 showing frequency and percentage distribution of gender

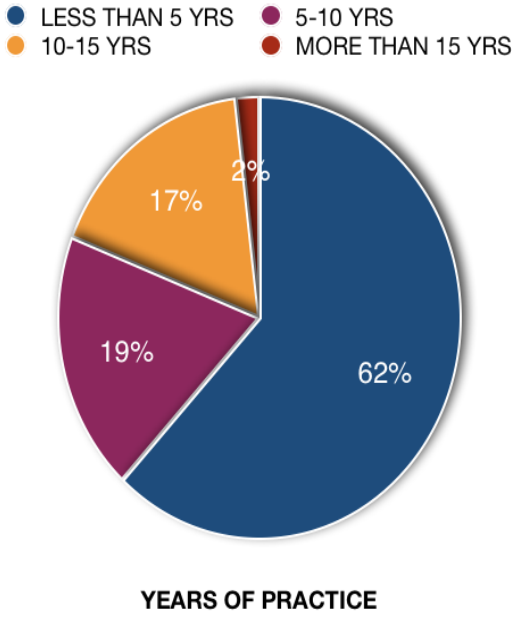
36% were first year MDS students, 45% were second year MDS students and 19% were third year MDS students, given in Graph 1. 50% were senior lecturer, 25% were readers, 15% were associate professors and 10% were professors, given in Graph 2. Among the oral medicine specialists, 62% had less than 5 years of practice, 19% had 5-10 years of practice, 17% had 10-15 years of practice and 2% had more than 15 years of clinical practice; given in Graph 3.



GRAPH 1: Year of study of PG students

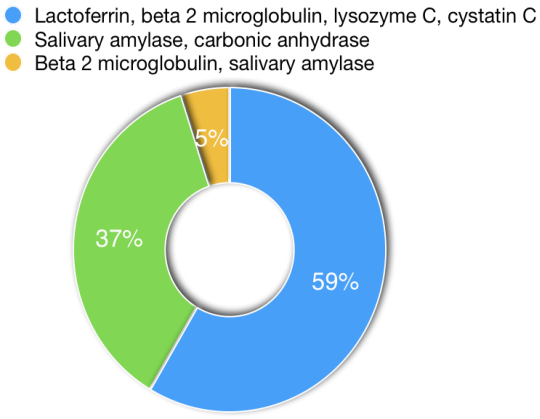


GRAPH 2: Designation of faculty member



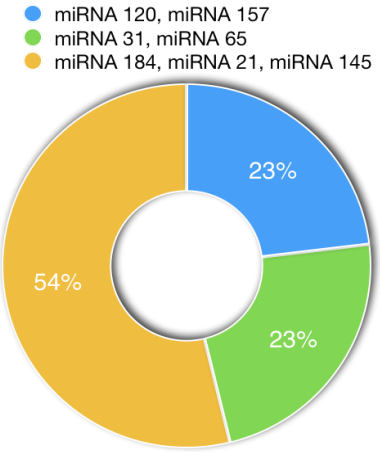
GRAPH 3: Years of practice of Practitioners

Graph 4 shows participants' knowledge on salivary protein increases in Sjogren's Syndrome. 89 (59%) participants answered lactoferrin, beta 2 microglobulin, lysozyme C and cystatin C increased in Sjogrens syndrome. 56 (37%) participants answered that salivary amylase and carbonic anhydrase increased in Sjogrens syndrome. 8 (5%) participants answered that beta 2 microglobulin and salivary amylase were increased in Sjogren's syndrome.



GRAPH 4: Salivary protein increased in Sjogrens syndrome

Graph 5 shows participants' knowledge on genomic salivary markers in detecting early malignancy. 81 (54%) participants answered miRNA 184, miRNA 21 and miRNA 145. 35 (23%) participants answered miRNA 120 and miRNA 157. 35 (23%) participants answered miRNA 31 and miRNA 65.



GRAPH 5: Genomic salivary markers in detecting early malignancy

Graph 6 shows participants' knowledge on proteomic salivary markers in detecting early malignancy. 68 (45%) participants answered IL-8, IL-1 and TNF-α. 48 (32%) participants answered TGF-β and lysozyme. 35 (23%) participants answered C-reactive protein and salivary alpha amylase.

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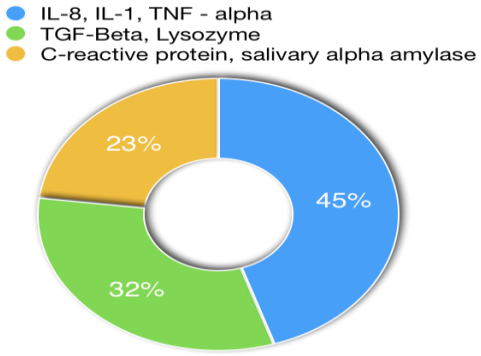
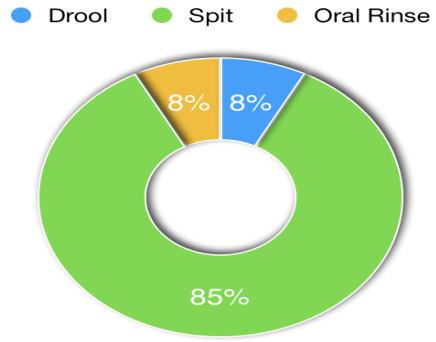
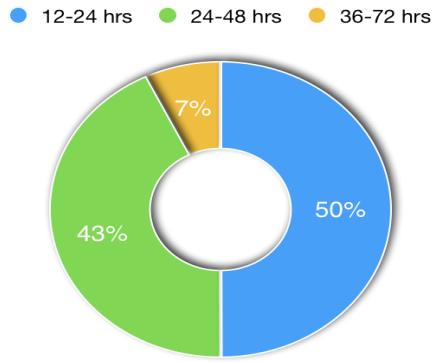


GRAPH 6: Proteomic salivary markers in detecting early malignancy

85% participants preferred the spit method, 8% preferred drool and 8% preferred oral rinse method for saliva collection, given in graph 7. 50% responded that saliva needs to be transported within 12-24 hours, 43% responded to transportation within 24-48 hours and 7% responded to transportation within 36-72 hours, given in graph 8.

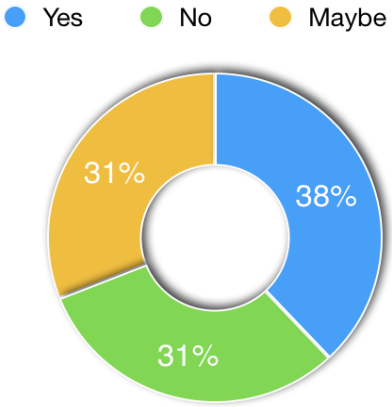


GRAPH 7: Saliva Collection Method

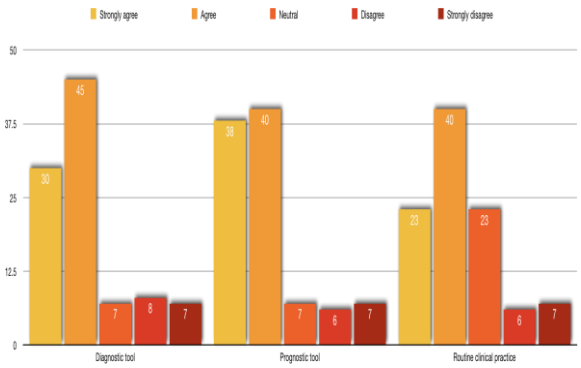


GRAPH 8: Salivary Sample Transportation

38% participants believed that saliva can replace tissue and serum for detection of Oral Potentially Malignant Disorders. 31% were doubtful and 31% replied negatively (Graph 9). Graph 10 represents the participants attitude towards salivary biomarkers as a diagnostic tool, prognostic tool and whether it can be employed in routine clinical practice.



GRAPH 9: Can saliva replace tissue & serum for detection of OPMD



GRAPH 10: Salivary biomarkers for OPMD & OSCC

DISCUSSION

This study was conducted among 150 Oral Medicine specialists, out of which 55 were males (37%) and 95 (63%) were females. Most of the participants were senior lecturers and had less than 5 years of experience.

Most of the participants had sufficient knowledge about salivary protein increase in sjogren's syndrome, genomic salivary marker and proteomic salivary markers in detecting early

malignancy. Literature search revealed no other studies conducted on knowledge, awareness and perception of salivary markers in sjogrens syndrome or early detection of malignancy. A Survey conducted among the general dentist revealed that awareness among dental students about salivary markers in caries detection is fair and there is the need for continuous education and for formal inclusion of the methods used in detection of caries, in the students' curriculum10,11.

The results of Zahran et al. study revealed upregulated miRNA 184 with an area under the curve (AUC) of 0.86 and miRNA 21 with an AUC of 0.73 and downregulated miRNA 145 with an AUC of 0.68, which proved that these miRNAs are significant in detecting early malignancy in OPMD and should be further analyzed in various populations12,13.

Majority of the participants believed that salivary biomarkers can serve as a diagnostic and prognostic tool14. Most of them had a positive attitude that it can be translated into routine clinical practice. Early detection of disease plays a crucial role for treatment planning and prognosis. Saliva has great potential as a diagnostic fluid and offers advantage over serum and other biological fluids by an economic and noninvasive collection method for monitoring of systemic health and disease progression. The plethora of components in this fluid can act as biomarkers for diagnosis of various systemic and local diseases3.

Since it was an online study, not many people from older age groups participated in the survey and the study was limited to the participants with access to the internet, who had smartphones and e-mail IDs. And the survey was in english so people who understand english could only participate.

CONCLUSION

To conclude, this study provides evidence regarding knowledge, awareness and perception on salivary diagnostic markers. Oral medicine specialists have adequate awareness and knowledge about salivary diagnostic markers, but certain knowledge has to be brushed up among them. Majority of participants showed a positive attitude towards its use as a diagnostic & prognostic tool. Furthermore, they need to be trained on these grounds to help them treat their patients in the best possible way.

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CONFLICT OF INTEREST

There are no conflicts of interest.

REFERENCES

1. Simonson LG, Reiher DA. Effect of human saliva and various compounds on the adsorption of the bacterium Streptococcus mutans to hydroxyapatite [Internet]. Vol. 26, Archives of Oral Biology. 1981. p. 143–6. Available from: http://dx.doi.org/10.1016/0003-9969(81)90085-6
2. Caillet J, Mignan S, Pham-Dang N, Devoize L. Analysis of leptin concentrations in oral fluids (saliva and crevicular gingival fluid) and blood in patients with chronic periodontal disease: systematic review of literature [Internet]. Vol. 26, Journal of Oral Medicine and Oral Surgery. 2020. p. 6. Available from: http://dx.doi.org/10.1051/mbcb/2019037
3. Meleti M, Cassi D, Vescovi P, Setti G, Pertinhez TA, Pezzi ME. Salivary biomarkers for diagnosis of systemic diseases and malignant tumors. A systematic review [Internet]. Medicina Oral Patología Oral y Cirugia Bucal. 2020. p. 0–0. Available from: http://dx.doi.org/10.4317/medoral.23355
4. Ogbureke KUE, Ogbureke EI. The History of Salivary Diagnostics. In: Streckfus CF, editor. Advances in Salivary Diagnostics. Berlin, Heidelberg: Springer Berlin Heidelberg; 2015. p. 17–31.
5. Naithani N, Bagaria A, Tihara P, Kumari S, Singh OK, Kaur G, et al. International Journal of

Research in Health and Allied Sciences. ijrhas.com [Internet]. Available from: http://ijrhas.com/uploadfiles/29covidvol6issue3pp122-125.20200629062015.pdf

6. Yoshizawa JM, Schafer CA, Schafer JJ, Farrell JJ, Paster BJ, Wong DTW. Salivary biomarkers: toward future clinical and diagnostic utilities. Clin Microbiol Rev. 2013 Oct;26(4):781–91.
7. Proctor GB. The physiology of salivary secretion. Periodontol 2000. 2016 Feb;70(1):11–25.
8. Rathnayake N, Akerman S, Klinge B, Lundegren N, Jansson H, Tryselius Y, et al. Salivary biomarkers for detection of systemic diseases. PLoS One. 2013 Apr 24;8(4):e61356.
9. Malathi N, Mythili S, Vasanthi HR. Salivary diagnostics: a brief review. ISRN Dent. 2014 Jan 29;2014:158786.
10. Martins JR, Díaz-Fabregat B, Ramírez-Carmona W, Monteiro DR, Pessan JP, Antoniali C. Salivary biomarkers of oxidative stress in children with dental caries: Systematic review and meta-analysis. Arch Oral Biol. 2022 Jul;139:105432.
11. Khandelwal A, Palanivelu A. Correlation Between Dental Caries And Salivary Albumin In Adult Population In Chennai: An In Vivo Study. BDS. 2019 Apr 30;22(2):228–33.
12. Maheswari TNU, Venugopal A, Sureshbabu NM, Ramani P. Salivary micro RNA as a potential biomarker in oral potentially malignant disorders: A systematic review. Ci Ji Yi Xue Za Zhi. 2018 Apr-Jun;30(2):55–60.
13. Uma Maheswari TN, Nivedhitha MS, Ramani P. Expression profile of salivary micro RNA-21 and 31 in oral potentially malignant disorders. Braz Oral Res. 2020 Feb 10;34:e002.
14. Sridharan G, Ramani P, Patankar S, Vijayaraghavan R. Evaluation of salivary metabolomics in oral leukoplakia and oral squamous cell carcinoma. J Oral Pathol Med. 2019 Apr;48(4):299–306.