

Views and preferences of patients attending a tertiary hospital in Nigeria on use of saliva for clinical or laboratory tests

TJ Lasisi^{1,2} and FB Lawal³

Departments of Physiology¹, Oral Pathology² and Periodontology and Community Dentistry³, College of Medicine, University of Ibadan, Ibadan, Nigeria

Abstract

Aim: The purpose of this study was to assess the knowledge and views of patients on the use of saliva for clinical or laboratory analysis.

Methods: This was a cross sectional survey of 189 patients attending one primary and one tertiary oral health facility in Nigeria. Information was obtained from participants using pretested structured questionnaires and SPSS version 23 to analyze the data. Tests of associations between variables were determined using Chi-square and level of significance set at < 5%.

Results: One hundred and fifty-two (80.4%) respondents were aware of the use of saliva for clinical or laboratory test. The majority 152 (80.4%) agreed that saliva is easier to collect than other body fluids while 63 (33.3%) preferred to give saliva sample to blood 54 (28.6%) and urine 51 (27%) for clinical or laboratory tests. Only 20 (10.6%) had given saliva for tests before. Ninety-nine (52.4%) indicated strong interest in donating saliva for research while only 4 (2.1%) had given saliva as samples for research work before. Age, educational status and occupational class were significantly associated with awareness of use of saliva as investigative specimen ($p < 0.05$).

Conclusions: This survey revealed that majority of the patients were aware of the use of saliva as well as its advantages over other body fluids for clinical or laboratory tests. Very few indicated previous saliva sampling for clinical and laboratory tests. Thus there is need for development of precise, cheap and accessible saliva tests for patient-centered diagnostic testing and disease monitoring.

Keywords: Awareness; clinical testing; diagnosis; laboratory testing; patients; saliva

Résumé

But: Le but de cette étude était d'évaluer les connaissances et les points de vue des patients sur l'utilisation de la salive pour l'analyse clinique ou laboratoire.

Correspondence: Dr F.B. Lawal, Department of Periodontology and Community Dentistry, College of Medicine, University of Ibadan, Ibadan, Nigeria, E-mail: folakemilawal@yahoo.com.

Méthodes : Ceci fut une enquête transversale de 189 patients fréquentant un établissement primaire et un établissement tertiaire de santé bucco-dentaire au Nigeria. L'information a été obtenue des participants en utilisant des questionnaires structurés pré testés et SPSS version 23 a été utilisé pour analyser les données. Les tests d'associations entre variables ont été déterminés en utilisant le Chi-carré et le niveau de signification fixé à <5%.

Résultats : Cent cinquante-deux (80,4%) répondants étaient au courant de l'utilisation de la salive pour des tests cliniques ou laboratoire. La majorité des répondants (80,4%) ont indiqué que la salive était plus facile à recueillir que les autres fluides corporels, 63 (33,3%) préféraient donner des échantillons de salive que de sang 54 (28,6%) et d'urine 51 (27%) pour des tests cliniques ou laboratoire. Seulement 20 (10,6%) avaient donné de la salive pour les tests avant. Quarante-vingt-dix-neuf (52,4%) ont manifesté un vif intérêt pour le don de salive à des fins de recherche alors que seulement 4 (2,1%) avaient donné de la salive comme échantillons pour des travaux de recherche auparavant. L'âge, le niveau d'éducation et la classe professionnelle étaient significativement associés à la connaissance de l'utilisation de la salive comme spécimen d'investigation ($p < 0,05$).

Conclusions: Cette enquête a révélé que la majorité des patients étaient conscients de l'utilisation de la salive ainsi que de ses avantages par rapport aux autres fluides corporels pour des tests cliniques ou laboratoire. Très peu ont indiqué que des échantillons de salive ont été prélevés auparavant pour des tests cliniques et laboratoire. Il est donc nécessaire de développer des tests de salive précis, à bas prix et accessibles pour les tests de diagnostic centrés sur le patient et la surveillance des maladies.

Mots clés: Sensibilisation; essais cliniques; diagnostic; essais laboratoire; patients; salive

Introduction

Several clinical conditions can be assessed by using saliva as a diagnostic biofluid. For example, data are available that correlate levels of specific salivary proteins or RNAs with parameters of oral cancer [1-3] and breast cancer [4,5]. Oral fluid based tests also exist or are being developed to detect a variety of

infectious diseases including HIV, parvovirus, acute hepatitis, dengue fever and malaria, as well as to detect alcohol, drug use and steroid hormone levels [1,6,7].

Although, changes in salivary composition can provide insight into disease pathogenesis, in a review of saliva's premise as a diagnostic tool, it was emphasized that if no one uses the test then the test is not useful [6]. It has been reported in the literature that saliva collection/testing will become accepted for diagnostic procedures only if a greater focus is placed on diagnosis and disease susceptibility rather than immediate treatment [8].

One of the key presumed advantages of using saliva as a diagnostic tool is that it is easier to collect and avoids the invasiveness and discomfort associated with collecting blood and the inconvenience associated with collection and the occasional inability to collect urine. However, a literature search of medical and dental databases (PubMed, HINARI and Cochrane collaboration), revealed sparse patient data on the knowledge and practices of the use of saliva and other body fluids (blood and urine) for clinical testing and to support the assumption that saliva offers some advantages over other traditional diagnostic fluids for clinical or laboratory testing. Without acceptability or demand from patients for salivary testing, saliva is unlikely to be used as often as blood and urine are for diagnostic testing. This could be due to lack of evidence or dearth of research into this field; hence the need for this study.

In addition, there is a need for data to evaluate the advantages or disadvantages of saliva compared to other traditional diagnostic fluids for clinical testing from the patients' perspectives. The findings from this study may help elucidate the level of awareness of and receptivity toward saliva-based tests among patients. This will offer insights on this issue and move our understanding from mere conjecture to the realm of empirical evidence. Thus, this study aimed at assessing the knowledge and opinions of patients on the use of saliva for clinical and laboratory tests.

Materials and methods

This was a pilot descriptive cross sectional survey carried out at a Primary Oral Health Care Centre and a Tertiary Dental Centre; both of the University College Hospital, Ibadan, Nigeria. Consecutive adult patients aged 16 years and above attending the clinics, for the first time, during the period of the study were recruited. Information on biodata of the participants and their views as it relates to the use of saliva in clinical and laboratory testing was obtained

through a structured questionnaire. The questions assessing the biodata of the participants evaluated their age, gender, marital status, tribe, occupation and level of education. The occupational class of respondents was classified based on a modification of the classification from the Office of Population Census and Survey (OPCS) into skilled workers, unskilled workers and dependants [9]. The questionnaire also assessed the knowledge of use of saliva in clinical and laboratory testing, sources of this knowledge, the diseases that it could be used to investigate and diagnose, their preferred choice of sample donation as it relates to saliva and other body fluids, perceived advantages of saliva over other body fluids and if they would prefer to give saliva for research purposes. The questionnaire was pretested among 30 patients in the two clinics, before the onset of the study, to validate the questionnaire and determine the ease of answering the questions as well as its comprehensiveness. Prior to administration of the questionnaire, the purpose of the study was explained to the patients and only those who consented were recruited for the study. Patients who participated in the pre-testing of the questionnaire were excluded from the main study. Patients in pain and those below the age of 16 years were excluded from the study. Ethical approval was obtained from the Joint University of Ibadan/University College Hospital Ethics Review Committee (UI/EC/13/0420). All statistical analyses were carried out using SPSS Version 23. Categorical data were displayed as frequencies and percentages and compared with Chi Square while quantitative data were displayed as mean \pm standard deviation (SD). For the purpose of analysis and to reduce the number of empty cells; age was dichotomized around the mean age as less than or equal to 34 years and above 34 years. Educational qualification was also constructed as a binary variable; less than tertiary and tertiary qualification. Statistical significance was accepted when $p < 0.05$.

Results

A total of 189 patients participated in the study. The age of the participants ranged from 16 to 78 years and the mean age was 33.9 (\pm 13.1) years. There were 92 (48.7%) male, many 139 (73.5%) of the respondents were of the Yoruba tribe and 82 (43.4%) were dependants (Table 1).

Knowledge of use of saliva in clinical and laboratory tests

One hundred and fifty-two respondents knew saliva could be used for clinical and laboratory testing and mass/social media was the major source of

knowledge 45 (29.6%). Other sources of knowledge included; training 43 (28.3%), journals/scientific publications and conferences 28 (18.4%), other sources such as internet, friends, families, hospital 14 (9.2%) while others 22 (14.5%) could not remember the source of information. The majority 108 (57.1%) mentioned that saliva could be used for diagnosis of disease condition. The diseases mentioned included oral diseases 121 (64.0%), systemic diseases 59 (31.2%) and HIV 33 (17.5%), Fig. 1.

Table 1: Socio-demographic characteristics of study participants

Variable	Frequency	%
<i>Age (years)</i>		
≤ 20	25	13.2
21-40	119	63.0
41-60	35	18.5
> 60	10	5.3
<i>Sex</i>		
Male	92	48.7
Female	97	51.3
<i>Marital status</i>		
Single	86	45.5
Married	100	52.9
Widowed	3	1.6
<i>Educational qualification</i>		
None	7	3.7
Primary	5	2.6
Secondary	26	13.8
Post-secondary	56	29.6
Tertiary	95	50.3
<i>Occupational class</i>		
Skilled	62	32.8
Unskilled	45	23.8
Dependants	82	43.4

Advantages, preference and convenience of saliva and other body fluids

The majority strongly agreed or agreed that saliva has some advantages over other body fluids (Table 2), which included; ease of collection 152 (80.4%), elimination of fear of prick 130 (68.8%), lower cost of sample collection 135 (71.4%) and reduced risk of infection 122 (64.6%). Of the three body fluids (saliva, urine and blood); saliva was the most preferred specimen to give as sample for tests by the respondents 63 (33.3%), followed by blood 54 (28.6%), urine 51 (27.0%) and none was preferred by 21 (11.1%). With regards to most convenient and comfortable specimen to give; saliva was the most frequently mentioned 100 (52.9%) followed by urine 52 (27.5%) and blood 25 (13.2%) while 12 (6.3%) were indifferent.

Interest in giving samples for research purposes

Responses to questions on giving of samples for research purposes showed that 136 (72.0%) respondents were interested in donating saliva, 27 (14.3%) were not interested and 26 (13.8%) were undecided. A significant number 128 (67.7%) were interested in giving urine, 33 (17.5%) were not interested and 28 (14.8%) were undecided. One hundred and four (55.0%) were interested in giving blood for research, 59 (31.2%) were not interested and 26 (13.8%) were undecided.

Only 20 (10.6%) patients had given saliva sample for clinical or laboratory tests. The respondents that had previously given saliva as sample for clinical or laboratory tests collected their sample in form of spitting 9 (45.0%), use of cotton wool 8 (40.0%) and with the use of mechanical

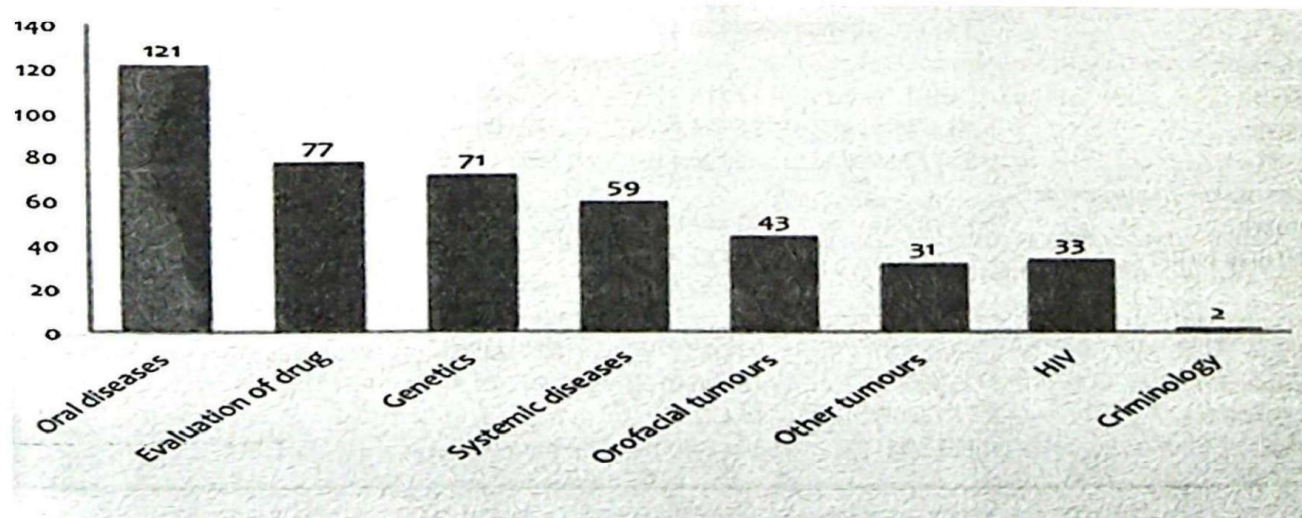


Fig. 1: Responses from the patients on the use of saliva for clinical and laboratory testing

collector 2 (10.0%) while 1 (5.0%) could not remember how it was collected for the investigation. The site of sample collection included the hospital 16 (80.0%), home 2 (10.0%) and laboratory 2 (10.0%). The saliva sample was used for disease diagnosis 9 (45.0%), research purposes 4 (20.0%), treatment monitoring 2 (10.0%) and other things 5 (25.0%) such as genetic tests and DNA analysis.

The specific investigations the saliva sample was used for included; HIV tests 2 (10.0%), oral diseases 6 (30.0%), systemic diseases 2 (10.0%), drug evaluation 2 (10.0%), genetic tests 6 (30.0%), and others such as investigating tuberculosis 2 (10.0%).

Sociodemographic characteristics and knowledge of saliva as clinical and laboratory specimen

The younger age group (≤ 34 years) knew more than those > 34 years that saliva could be used as an investigative specimen for clinical or laboratory tests ($p = 0.02$). A higher proportion of those with tertiary education also mentioned that saliva could be used as an investigation specimen ($p = 0.01$). Those in the skilled occupational class also had a greater awareness than others that saliva could be used as an investigation specimen ($p = 0.001$). There was no association between other sociodemographic variables and knowledge of saliva as a specimen for clinical and laboratory tests (Table 3).

Table 2: Advantages of saliva over other body fluids as specimen

Advantages of saliva	Views of respondents			
	Strongly agree n (%)	Agree n (%)	Strongly disagree/ Disagree n (%)	Don't know n (%)
Ease of collection	104 (55.0)	48 (25.4)	4 (2.1)	33 (17.5)
Elimination of prick	75 (39.7)	55 (29.1)	14 (7.4)	45 (23.8)
Lower cost of sample collection	70 (37.0)	65 (34.4)	13 (6.9)	41 (21.7)
Reduced risk of infection	66 (34.9)	56 (29.6)	21 (11.1)	46 (24.3)
Does not require special skills	64 (33.9)	46 (24.3)	32 (16.9)	47 (24.9)

NB: There were very few strongly disagree "responses" hence "strongly disagree" and "disagree" were merged to reduce empty cells.

Table 3: Socio-demographic characteristics and knowledge of saliva as clinical and laboratory specimen

Variable	Knowledge of saliva as diagnostic specimen		Total n (%)	X ²	p value
	Yes (%)	No (%)			
<i>Age (years)</i>					
≤ 34	107 (84.9)	19 (15.1)	126 (100.0)	5.9445	0.015*
>34	44 (69.8)	19 (30.2)	63 (100.0)		
Total	151 (79.9)	38 (20.1)	189 (100.0)		
<i>Sex</i>					
Male	75 (81.5)	17 (18.5)	92 (100.0)	0.296	0.359
Female	76 (78.4)	21 (21.6)	97 (100.0)		
Total	151 (79.9)	38 (20.1)	189 (100.0)		
<i>Educational qualification</i>					
Tertiary	83 (87.4)	12 (12.6)	95 (100.0)	6.643	0.010*
Less than tertiary	68 (72.3)	26 (27.7)	94 (100.0)		
Total	151 (79.9)	38 (20.1)	189 (100.0)		
<i>Occupational class</i>					
Skilled	53 (85.5)	9 (14.5)	62 (100.0)	14.579	0.001*
Unskilled	27 (60.0)	18 (40.0)	45 (100.0)		
Dependants	71 (86.6)	11 (13.4)	82 (100.0)		
Total	151 (100.0)	38 (100.0)	189 (100.0)		

Discussion

The use of saliva in diagnostics has been introduced since the second half of the 20th century [10]. Its main advantage is easy and non-invasive sample collection compared to peripheral blood. Generally salivary analysis has shown promising suitability in two important areas: early detection of some diseases and monitoring the course of the disease as well as the treatment outcome [11-14]. In addition, saliva has shown significant application in the detection of addictive drugs [15,16]. However, despite all the attributes and achievements in salivary diagnostics, its use for clinical testing is still subject to its acceptability by the patients. Within the context of our environment, in a developing country, where research as well as health promotion is of paramount need, the knowledge and preference of the populace on the use of saliva as an alternative to other body fluids (especially blood and urine) for clinical or laboratory tests are essential.

In this study, majority of the participants (80.4%) knew that saliva could be used for clinical or laboratory testing, which is an indicator that the awareness is good. The high level of awareness may be explained by the socioeconomic status of the participants. Majority of the participants had tertiary education and the findings indicated that the major source of awareness was print/electronic media.

The majority (80.4%) agreed that saliva is easier to collect than other body fluids while 33.3% preferred to give saliva sample to blood (28.6%) and urine (27%) for clinical or laboratory tests. Although the percentage of participants that indicated preference for saliva sampling in our study is lower than those reported in previous studies [8,17], this finding indicates that among the three body fluids, saliva was most preferred to give for clinical or laboratory test by the participants. Similarly, McCall *et al.*, in their assessment of patients' preferences for drug testing methods and comparison of the acceptability of urine testing versus oral fluid testing within a hospital setting, reported that majority (85%) of the respondents indicated preference for oral fluid testing [18]. Also, they showed that the majority of patients and staff rated oral fluid as more comfortable and easier to give.

Questions on giving of samples for research purposes showed that majority (72.0%) were interested in donating saliva for clinical or laboratory tests. However, only 20 (10.6%) had given saliva sample for clinical or laboratory tests before the study. This finding is similar to previous report by Dhima *et al.*, which showed that only 11 (10.6%) of their respondents had ever given saliva samples for

medical appointments or research studies [17]. This suggests that the use of saliva for clinical or laboratory test is still poor in our environment, although whether this has improved in the developed countries is not known. Among those that indicated previous saliva sampling, the specific use indicated were disease diagnosis (47.4%), research purposes (21.1%), and treatment monitoring (10.5%). This shows that despite the awareness and the advantages of saliva over other fluids (blood and urine) as well as the respondents' preference of its use for clinical or laboratory testing, very few have previously given saliva for different purposes. One of the factors that may account for the low prevalence of previous use of saliva for clinical or laboratory tests may be non-availability of point of care saliva based tests in our environment.

One limitation of this study is the inclusion of patients attending the hospital setting, which may limit the applicability of the finding to the general population. For the purpose of early disease detection or screening exercise, a survey in a non-hospital setting would have been more appropriate. Another limitation is that the sample is relatively small to make generalized submissions.

Conclusion

This study evaluated knowledge and opinions of patients attending dental care settings in Nigeria on the use of saliva, urine and blood samples for clinical or laboratory testing. The majority was aware of the use of saliva and also indicated preference for saliva sampling over other body fluids (blood and urine). Very few indicated previous saliva sampling for clinical and laboratory tests. Thus there is need for the development of precise, cheap and accessible saliva-based tests for patient-centered diagnostic testing and disease monitoring.

References

1. Dawes C. Considerations in the development of diagnostic tests on saliva. *Ann N Y Acad Sci* 1993;694:265-269.
2. Lasisi T, Abdus-Salam A, Lasisi O and Akang E. Evaluation of Serum and Salivary IgG in Head and Neck Squamous Cell Carcinoma. *British Journal of Medicine and Medical Research* 2013;3(4):2269-2275.
3. Santos-Pereira SA, Giraldo PC, Saba-Chujfi E, *et al.* Chronic periodontitis and pre-term labour in Brazilian pregnant women: an association to be analysed. *J Clin Periodontol* 2007;34(3):208-213.
4. Boyle JQ, Mao L, Brennan JA, *et al.* Gene mutations in saliva as molecular markers for

- head and neck squamous cell carcinomas. *Am J Surg* 1994;168(5):429-432.
5. Li Y, St John MA, Zhou X, *et al.* Salivary transcriptome diagnostics for oral cancer detection. *Clin Cancer Res* 2004;10(24):8442-8450.
 6. Nieuw Amerongen AV, Ligtenberg AJ and Veerman EC. Implications for diagnostics in the biochemistry and physiology of saliva. *Ann N Y Acad Sci* 2007;1098:1-6.
 7. Pfaffe T, Cooper-White J, Beyerlein P, Kostner K and Punyadeera C. Diagnostic potential of saliva: current state and future applications. *Clin Chem* 2011;57(5):675-687.
 8. Koka S, Beebe TJ, Merry SP, *et al.* The preferences of adult outpatients in medical or dental care settings for giving saliva, urine or blood for clinical testing. *J Am Dent Assoc* 2008; 139(6): 735-740.
 9. Esan TA, Olusile AO, Akeredolu PA and Esan AO. Socio-demographic factors and edentulism: the Nigerian experience. *BMC Oral Health* 2004;4(1):3.
 10. Pink R, Simck J, Vondrakova J, *et al.* Saliva as a diagnostic medium. *Biomed Pap Med Fac Univ Palacky Olomouc Czech Repub* 2009; 153(2): 103-110.
 11. Arif S, Qudisia S, Urooj S, *et al.* Blueprint of quartz crystal microbalance biosensor for early detection of breast cancer through salivary autoantibodies against ATP6AP1. *Biosens Bioelectron* 2015;65:62-70.
 12. Guncu GN, Yilmaz D, Kononen E and GURSOY UK. Salivary Antimicrobial Peptides in Early Detection of Periodontitis. *Front Cell Infect Microbiol* 2015;5:99.
 13. Wang Q, Gao P, Wang X and Duan Y. The early diagnosis and monitoring of squamous cell carcinoma via saliva metabolomics. *Sci Rep* 2014;4:6802.
 14. Yap G, Sil BK and Ng LC. Use of saliva for early dengue diagnosis. *PLoS Negl Trop Dis* 2011;5(5):e1046.
 15. Toennes SW, Steinmeyer S, Maurer HJ, Moeller MR and Kauert GF. Screening for drugs of abuse in oral fluid--correlation of analysis results with serum in forensic cases. *J Anal Toxicol* 2005;29(1):22-27.
 16. Vindenes V, Lund HM, Andresen W, *et al.* Detection of drugs of abuse in simultaneously collected oral fluid, urine and blood from Norwegian drug drivers. *Forensic Sci Int* 2012;219(1-3):165-171.
 17. Dhima M, Salinas TJ, Wermers RA, Weaver AL and Koka S. Preference changes of adult outpatients for giving saliva, urine and blood for clinical testing after actual sample collection. *J Prosthodont Res* 2013;57(1):51-56.
 18. MacCall CA, Ritchie G and Sood M. Oral fluid testing as an alternative to urine testing for drugs of abuse in inpatient forensic settings: giving patients choice. *Scott Med J* 2013;58(2):99-103.

24/07/19