Original Research Article

Is saliva, a possible alternative to correlate serum lipids? - An exploratory study

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Abstract

Background and Objective: Serum lipid panel screening has become a routine check up to rule out cardiovascular risks in many clinical conditions & it mainly serves as diagnostic, prognostic & monitoring purposes. But the salivary lipid profile has been poorly recognized. Hence the present study was undertaken to evaluate & to correlate between salivary & serum lipid profile. **Method:** A prospective study included 50 healthy individuals. Serum & salivary TC (CHOD-PAP method), TAG (GPO-PAP method), HDL-C (CHOD-PAP method) were estimated. Salivary & serum LDL- & VLDL-C was calculated by Friedewala's formula **Results:** There was a moderate correlation between salivary & serum TC, TAG which was statistically significant ($p<0.05$). No correlation found between salivary & serum HDL-C, LDL-C. **Interpretation and Conclusions:** For the present study, salivary TC & TAG can be used as a non-invasive to assess lipid parameters.
Keywords: Lipids; Saliva; Serum;

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INTRODUCTION

Current guidelines by the American Heart Association recommends that all adults above 20 years should undergo for routine lipid screening in order to rule out the lipid disorders like familial hypercholesterolemia or individuals having cardiovascular risks. Most commonly used to assess the lipid panel is in the serum which makes the patient more uneasiness.Saliva is a complex biofluid which reflects the both systemic and oral homeostasis, any changes in salivary composition reflects the disease susceptibility[1] in an individual. Whole saliva contains about 10-100µg/mL lipids mainly consists of glycolipids and neutral lipids. Salivary lipids are mostly of glandular origin and also believed to diffuse directly from serum[2, 3] As a clinical tool, saliva sampling has more benefits compared to serum collection.1) Sampling of saliva is non – invasive method 2) Method is quite easy and fast 3) Allows multiple collections whenever required for patients 4) Collection of saliva is painless, reliable and suitable for population based screening 5) Collection of saliva doesn't require a skilled person, thereby reduces the costs 6) The person who collects sample is away from infectious agents, such as hepatitis/HIV, while handling saliva. 7) Lessens manipulations 8) No special equipment is required 9) Reduces anxiety and discomfort[4-9]. Hence, the present study was undertaken to evaluate and to correlate between serum and salivary lipid profile.

METHODOLOGY

Source of data: A prospective study included 50 healthy individuals who had no complaint or any major illness in recent/past. Patients with medically compromised or with other illness were excluded.

Method of collection of sample: After obtaining detailed history and written informed consent, oral examination was done. Saliva (2ml) and blood (2ml) samples were collected from each individual after overnight fasting. Blood samples were drawn from an antecubital vein under aseptic conditions. Saliva samples were collected under resting conditions following flushing of mouth with 100ml of distilled water. For a healthy individual, detailed information about the saliva collection protocol was given: the importance of the samples, to brush the teeth properly without toothpaste by using bass technique

and to use dental floss before the collection, to avoid fluid (apart from water) ingestion and chewing gum at least 30 min before collection and to rinse the mouth with distilled water. In this study, unstimulated saliva was used, as stimulation can affect the quantity, pH and concentration of saliva. The best way to collect saliva is either by dripping or spitting method. In this study, spitting method was used, in which an individual expectorates into the test tube[5, 9]. Lipid analysis was done on the fully automated analyzer based on spectrophotometric principle by using standardized kits from ERBA diagnostics (Transasia Bio-Medicals Ltd, Germany). Both serum and salivary lipid profile was analyzed on the same day. Measurement of serum and saliva total cholesterol (TC) was done based on cholesterol oxidase-pheonl amino anti pyrine (CHOD-PAP) method; Serum and salivary triglycerides (TAG) was done by glycerol phosphate oxidase- phenol amino antipyrine (GPO-PAP) method; Serum and salivary HDL-C was done by phosphotungstic and cholesterol oxidase-phenol amino antipyrine (CHOD-PAP) method; Whereas, LDL-C and VLDL-C were calculated according to Friedewala's formula. LDL-C = TC- (VLDLC) - (HDLC) VLDL-C = TG/5

Statistical analysis: Evaluation of results was carried out by using descriptive and correlation analysis. Results were expressed as mean±SD. For all the tests, $p < 0.05$ was taken as statistically significant.

RESULTS

Table 1: showing minimum and maximum values in both saliva and serum lipids.

Lipid parameters (mg/dl)	Minimum values	Maximum values
SERUM TC	109.21	209.1
SALIVA TC	0.52	6.9
SERUM TG	37.5	210
SALIVA TG	0.00	12.98
SERUM HDL	30	97
SALIVA HDL	0.02	1.45
SERUM LDL	45.64	113
SALIVA LDL	0.06	9.6

Table 2: Showing both saliva and serum lipid values as Mean±SD

LIPID PARAMETERS (mg/dl)	Mean ± SD
SERUM TC	150.81 ± 25.31
SALIVA TC	3.9 ± 2.2
SERUM TG	97.87 ± 44.06
SALIVA TG	4.54 ± 3.2
SERUM HDL	48.14 ± 12.48
SALIVA HDL	0.37 ± 0.26
SERUM LDL	74.7 ± 16.27
SALIVA LDL	1.65 ± 1.94

Table 3: showing the correlation between the serum and lipid profile using Pearson's correlation.

LIPID PARAMETERS (mg/dl)	'r' value	'p' value
TOTAL CHOLESTEROL	**0.48**	**0.021**
TRIGLYCERIDES	**0.414**	**0.023**
HDL-C	0.015	0.936
LDL-C	0.325	0.084

It is observed that there is moderate correlation between salivary TC and serum TC which is significant at p=0.021 and between salivary TG and serum TG which is significant at p=0.023 level. But no correlation found between HDL-CandLDL-C levels.

DISSCUSSION

Nowadays, lipid screening has become one of the crucial factors due to modern lifestyle activities which are associated with numerous diseases like myocardial infarction, stroke, hypertension, peripheral vascular diseases etc. which can occur young age. Since the serum lipid profile has become uneasiness to patients, the present study wanted to assess the lipids in saliva and also to correlate between salivary lipids and serum lipids, thereby to reduce the disadvantages caused by blood drawing method. In the present study, there was a moderate degree of correlation was found between serum and salivary TC, TG (r=0.48, r=414) which was statistically significant (p=0.021, p=0.023). But there was no correlation found between serum and saliva HDL-C, LDL-C. Role and diffusion of salivary lipids are not evaluated much compared to serum lipids. It is believed that cholesterol has been derived from plasma and involves several processes like ultrafiltration via gap junctions between the cells to enter into saliva[10]. A study by Karjalainen *et al*, assessed the salivary cholesterol in healthy individuals and they concluded that serum concentration is reflected by salivary concentration levels to some extent. Another study by AL Rawi[11] *et al*., done on ischemic stroke and patients with risks of having a stroke, assessed lipid profile in saliva, showed higher levels of TC, TG, LDL-C which was statistically significant, thus saliva can be used to assess the lipid profile. There is elevated salivary cholesterol levels in diabetic children, which has been shown by a study done by Gheena *et al*[12] thus showing that lipid analysis in saliva would reduce anxiety, discomfort and would be helpful more in children. There was a moderate level of correlation between serum and salivary TC, TG, HDL-C and VLDL-C and low and mild correlation between serum and salivary LDL-C in a comparative healthy 100 individuals shown by the study Simranjith *et al*, There was an increase in the saliva values corresponding to the increase in the serum values for TC andTG in the present study, which shows that cholesterol and triglycerides are filtered from plasma into the saliva in some extent. Since

large portion of salivary lipids is usually associated with high molecular weight glycoproteins like mucins, proline rich proteins patients were given detailed information about collection protocol[5,10,13]. Thus, in the present study showed the correlation between serum and saliva TC, TG indicating that saliva can be used to assess the TC and TG levels. No correlation found between HDL-C and LDL-C probably due to lesser sample size which is one of the limitations of this study. Hypercholesterolemia and hypertriglyceridemia are both independent risk factors that alone or both can accelerate the atherosclerosis. Inorder to prevent the routine serum lipid screening in these individuals who are at risk of developing cardiovascular complications, saliva screening would be beneficial among them.

CONCLUSION

The results obtained in our study highlights that saliva can be used as non-invasive diagnostic method or for screening purposes or monitoring purposes to assess the total cholesterol and triglycerides levels in an individuals. Further more studies should be done on salivary lipids about reference range for each analyte. Since analytes present in saliva are in very low concentration, proper technologies are required to know the proper sensitivity and specificity of an analytes.

REFERENCES

1. Tatiana Kelly da Silva Fidalgo, Valeria Abreu, Liana Bastos Freitas-Fernandes, Ivete Pomarico Riberio de Souza, Lucianne Cople Maia. Do salivary lipids influence dental caries susceptibility? A systematic review. Scientific Reports 2012; 1(12):1-4.
2. Malgorzata KP, Teresa. Salivary description and significance. J Stoma 2015; 68(6):768-777.
3. Tibor K Fabian, Pal Fejerdy, Peter Csermely. Saliva in health and disease, chemical biology. Wiley encyclopedia of chemical biology 2007:1-9.
4. Roslinda M, Jennifer LC. The impact of saliva collection and processing methods on CRP, IgE and Myoglobin immunoassays. Clinical and Tanslational Medicine 2012;1(19):1-8
5. Kaufman E, Lamster IB. The diagnostic applications of saliva: A review. Crit Rev Oral Biol Med. 2002; 13:197-212.
6. Malamud D. Saliva as a diagnostic fluid. Dent Clin North Am. 2011; 55: 159-178.
7. 7) Wong DT. Salivary diagnostics powered by nanotechnologies, proteomics and genomics. J Am Dent Assoc. 2006;137:313-321.
8. Streckus CF, Bigler LR. Saliva as a diagnostic fluid. Oral Dis. 2002; 8: 69-76.
9. Simranjit Singh, Venkatapathy Ramesh, Nirima Oza, Pennagaram DB, Karthikshree VP et.al,. Evaluation of serum and salivary lipid profile: A correlative study. J Oral Maxillofac Pathol 2014; 18(1):4-8.
10. Chiappin S, Antonelli G, Gatti R. Saliva specimen: a new laboratory tool for diagnostic and basic investigation. Clin Chim Acta 2007; 383(1-2):30-40.
11. AL Rawi, K Atiyah. Assessment of salivary lipid profiles in patients with ischemic stroke and patients at risk of having stroke among Iraqi sample. The Internet Journal of Third World Medicine 2007; 7(1):1-8.
12. Gheena S, Chandrasekhar, Prathiba Ramani. Salivary characteristics of diabetic children. Brazilian Journal of Oral Sciences 2011; 10(2):93-97.
13. Drobitch RK, Svensson CK. Therapeutic drug monitoring in saliva. An update. Clin Pharmacokinet 1992; 23: 365-379.

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