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Comparative evaluation of three different dentrifices on salivary glucose levels in patients with gingivitis

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Abstract

AIM: Due to lack of literature on the effect of varying toothpastes on saliva and salivary constituents, the present study was undertaken to evaluate and compare the effect of three different toothpastes on salivary glucose. MATERIALS AND METHODS: Fourty five subjects in the age group of 18 - 20 years with mild to moderate gingivitis were randomly divided into 3 groups (15 in each group) and intervened with three different toothpastes (fluoridated , non fluoridated, herbal). Unstimulated saliva samples were collected before and after brushing and salivary glucose was assessed at an interval of one week, starting from day 1. The salivary samples were collected in sterile container and the salivary glucose level were estimated using the glucose oxidase - peroxidase (GOD-POD) method.RESULT: A distinct difference was observed in the salivary glucose between the herbal toothpaste treated groups compared to fluoridated and conventional toopaste.CONCLUSION: Herbal toothpastes have better effect on long term control of salivary glucose levels

Keywords: Salivary glucose, gingivitis, hyperglycemia

Introduction

Hyperglycaemia is the immediate metabolic consequence of diabetes mellitus resulting in widespread multiorgan damage ranging from micro to macro vascular complications [1] According to WHO, developing countries comprise of 70% of diabetic population, among

which 50.8 million people suffering from diabetes are residing in India. In India, approximately 57.2 million and 101.2 million people are expected to be noticed by the year 2025 and 2030 respectively [2,3]. Increased glucose level, poorly controlled metabolic glucose level tooth loss, altered taste, periapical abcess, proneness to bacterial, viral and fungal infections, salivary gland disorder etc., [4,5]. Saliva is an extracellular fluid, Diagnosis of disease through the analysis of saliva is potentially valuable for children and older adults as collection of the fluid is associated with fewer compliance problems as compared with the collection of blood Long standing hyperglycaemia besides damaging various systems of body may also impair salivary gland functions, which leads to a reduction in the salivary flow and changes in saliva's composition.The present study was conducted with an aim to assess and compare the effect of salivary glucose using commercially available three different dentrifices .

Materials and Methods

The present study was conducted on 45 dental students of age group 18-20 years old with plaque induced gingivitis grouped to three different toothpaste groups .Ethical clearance was obtained from Institutional Ethical Review Board and informed consent was obtained from all the participants prior to the study. Three different tooth pastes tested were Group A – herbal tooth paste (VICCO VAJRATHANTI) (Figure 1), Group B - fluoridated tooth paste (Sensodyne) (Figure 2), Group C - conventional tooth paste (CLOSE UP) (Figure 3) Inclusion Criteria consists of females of age group 18-20 Yrs with OHI index ranging from 1.3-3.0 and are of good Systemic healthy , also Gingivitis patients were included based on the gingival status of mild to moderate inflammation ie Gingival Index Score up to 2.[6] Exclusion criteria includes Smokers and chronic alcoholics. Subjects on any medication within 48 hours, Pregnant and lactating women, subjects undergoing orthodontic treatment, periodontal treatment .The participants were instructed to brush for 3-4 minutes twice daily using the tooth paste provided to them and also asked not to use other auxillary oral hygiene aids. Unstimulated salivary samples were collected in a container by the participants before and immediately after brushing on 1st day and the 7th day.

Patients were advised to report before breakfast for saliva collection. The later was collected by making the patients to rinse his/her mouth with water and were insisted to open mouth for 5 min without swallowing, and about 10 mL of saliva was collected in a sterile container by the spitting.

Glucose Estimation

The unstimulated salivary samples were collected by the participants in sterile plastic container containing 0.1ml of sodium fluoride((Figure 4).They were transported to research lab for analyzing the salivary glucose using photoelectric calorimeter (Figure 5).The study was conducted over a period of 1 week

Figure 1 : Group A – Herbal Tooth Paste (Vicco Vajrathanti)

Figure 2: Group B: Fluoridated Tooth Paste (Sensodyne),

Figure 3: Group C - Conventional Tooth Paste (Close Up)

Figure 4: Salivary samples collected from all three groups before brushing

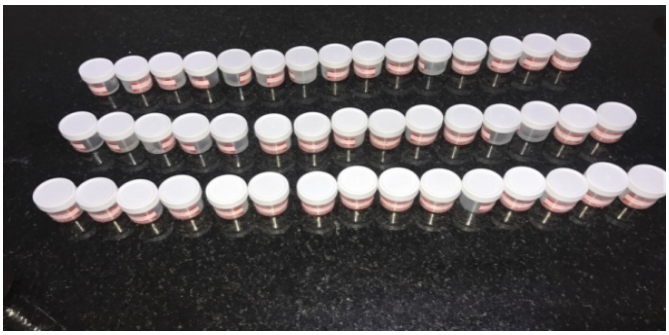

Figure 5 : Photoelectric calorimeter to evaluate salivary glucose

Statistical analysis

. Data obtained from 45 patients before and after brushing on first day as well as on 7th day of was subjected to statistical analysis using *ANOVA test and* Post-hoc Analysis Tukey's Test and it is shown in Table 2,3,4. There is high statistical significance between the before and after brushing of the three groups ($P > 0.001$). A distinct difference was observed in the glucose estimation of Group I .ie.,Vicco toothpaste group performed on 7th day after brushing.

Results

45 Young females dental students were selected.Obtained salivary glucose level in the range between 3.7 to 42. Salivary glucose level greater than 11.6 mg%, the patient is considered as diabetic and the normal range of salivary glucose levels is 7.60–11.6 mg%. However, the salivary glucose levels were similar all the three groups on the first day of before brushing series, difference in value was noted with after brushing values obtained on 7 th day of all the three groups compared to that with salivary glucose level obtained with before brushing series on the first day.

Discussion

The present study was conducted to estimate and compare the glucose level of saliva in a total of 45 female dental students of 18 years, divided into three groups before and after brushing with commercially available toothpaste, herbal toothpaste and fluoridated toothpaste. Glucose, a small molecule can easily diffuse through semipermeable membranes thus increasing the salivary glucose levels, which ultimately results in altered salivary glucose level and greater susceptibility to disease in the oral cavity[7]. Renowned studies on diabetes specify that higher the prevalence of complications, if the onset of the disease is at very young age and if the diagnosis and presentation of the condition are delayed and/or missed. This has become a burning issue in underdeveloped, developing, and even in developed countries. The reasons that could be attributed were individual variations in the permeability of glandular epithelium, multiple sources of glucose from which it will be secreted into saliva, varying degrees of microbial load in the oral cavity which may compete for utilization of secreted glucose for their metabolism and alter its availability for testing, occurrence, or absenteeism of gingival inflammation that may influence readings, as selected sample of children are under the treatment for diabetes these drugs used may interfere with the secretion of glucose into the saliva and also there could be existence of threshold mechanism similar to renal threshold. Although there was no consistent increase in salivary glucose level along with blood glucose, the mean salivary glucose levels were higher in diabetics when compared with healthy nondiabetics. Thus, current epidemic of the

disease and presence of large diabetic population highly deserves a noninvasive method for its diagnosis and monitoring.

Considering salivary glycated protein instead of salivary glucose, searching for biomarkers that are not usually native of saliva but specifically appear during the absolute disease conditions, targeting at glandular saliva rather than the saliva collected from oral cavity in order to avoid confounding variables from oronasal mucosal secretions, gingival crevicular fluid, and from oral wounds and standardizing the local and systemic influencing factors may positively influence the dependability of saliva as diagnostic medium for diabetic conditions.

Salivary glucose estimated is less in case of herbal toothpaste Vicco Vajradanti is due to the presence of its ingredients Babhul, Bakul, Jambhul, Laung, Manjishtha, Bor, Akhrot, Akkal - kadha, Jeshthamadh Ajwain, **Dalchini**, Khair, Patang, Harada, Vajradanti, Anantmul, Amla, Behada, Kavab, Maifal that tends to possess antidiabetic effect.

Limitations

Present study has a female population and is susceptible to hormonal influence as Estrogen is mainly responsible for alterations in blood vessels and progesterone stimulates the production of inflammatory mediators and can cause changes in quantity of saliva secretion composition of saliva changes in different condition and as a result, there will be alteration in the salivary glucose level.

Conclusion

Our study findings suggest that Herbal toothpastes have better efficiency in long term control of salivary glucose levels proportionately by maintaining their proper salivary glucose. Thus, helps to improve oral health.Further studies on outsized sample size should be done to ascertain the diagnostic valuability of salivary glucose level in the early diagnosis.

Ethics approval and consent to participate

Ethical clearance was obtained from Institutional Ethical Review Board of Rajas dental college and hospital and individual informed consent was obtained from all the participants prior to the study.

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