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Estimation of flow rate and study of epithelial cells in stimulated and unstimulated saliva

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Introduction

The stimulated and unstimulated whole saliva differ each other in quantity and quality and can play a role in the efficacy of salivary functions.

Material and Methods

Salivary flow rate is assessed on two consecutive days, 2 hours after breakfast. To stimulate the salivary secretion, the subjects were asked to chew vitamin C (Lime Cee®) tablets and the secreted saliva was collected. Saliva secreted without any stimulation also was collected from the same subjects to assess the unstimulated salivary flow rate.
The collected saliva samples were centrifuged and sediment was smeared and stained with PAP (papanicolau) stain. The morphology, inflammatory component and bacterial colonies present in unstimulated and stimulated saliva are studied.

Fig. 1: Stimulated saliva samples

Fig. 2: Unstimulated saliva samples

Results

1) Study of flow rate of saliva
• A mean increase of 8.55 was observed in the salivary flow rate while stimulated than unstimulated.

2) Study of epithelial cells
• Observed reduction in the number of inflammatory cells in smear prepared from stimulated saliva.
• Number of bacterial colonies also is reduced in smears prepared from stimulated saliva.

Fig. 3: Centrifugation

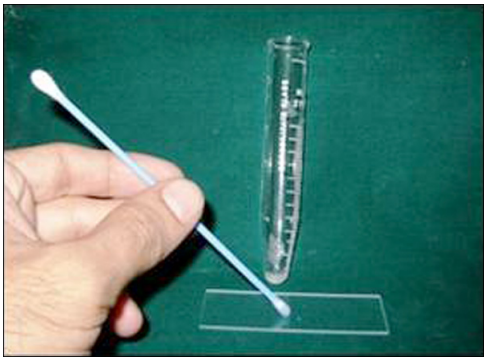

Fig. 4: Sediment after centrifugation

Fig. 5: Preparation of smear

Fig. 6: Smear stained with Rapid PAP®

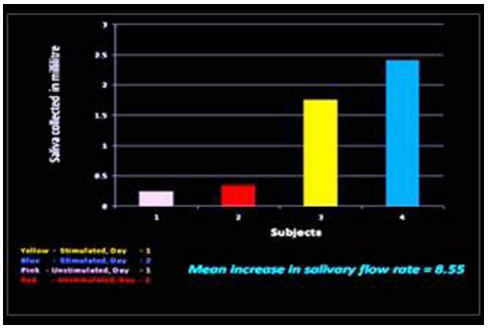

Fig. 7: Salivary flow rate

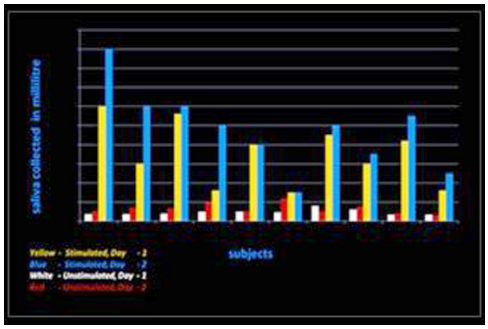

Fig. 8: Mean increase in salivary flow rate

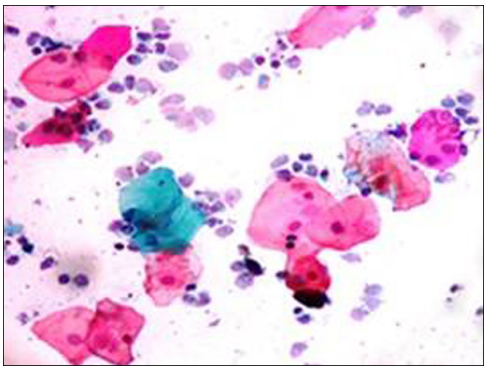

Fig. 9: Epithelial cells in background of inflammatory cells

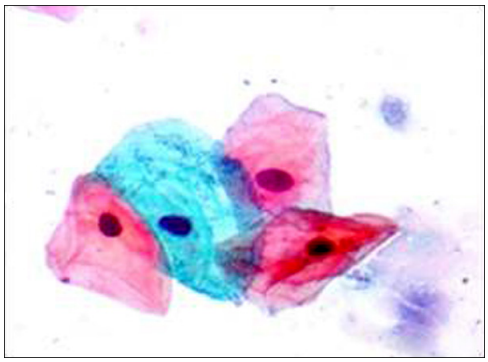

Fig. 10: Cyanophilic and eosinophilic cells from different layers

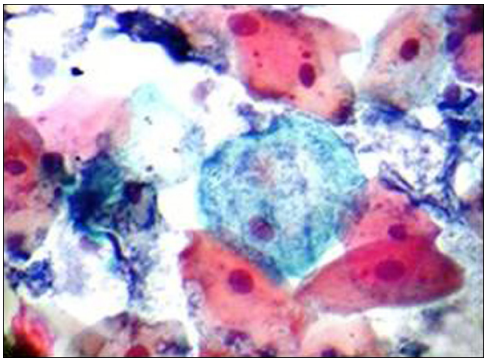

Fig. 11: Intra cytoplasmic bacterial colonies

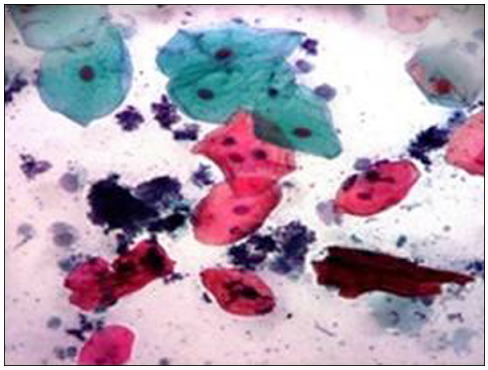

Fig. 12: Bacterial colonies in unstimulated saliva

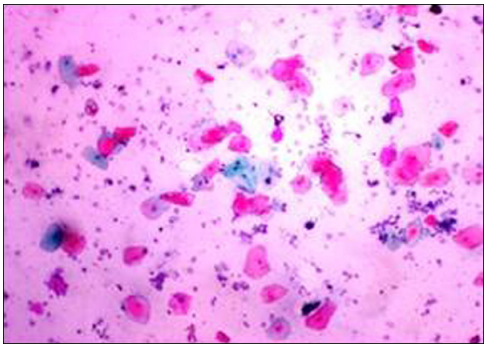

Fig. 13: 10x magnification

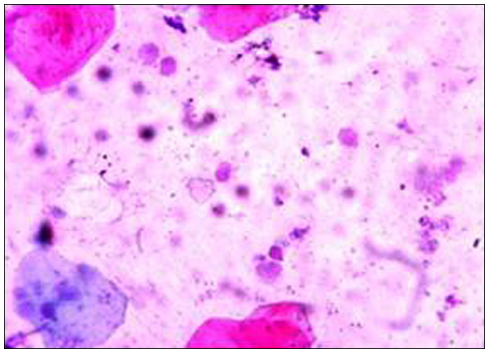

Fig. 14: 40x magnification Unstimulated saliva-inflammatory cells are more in number

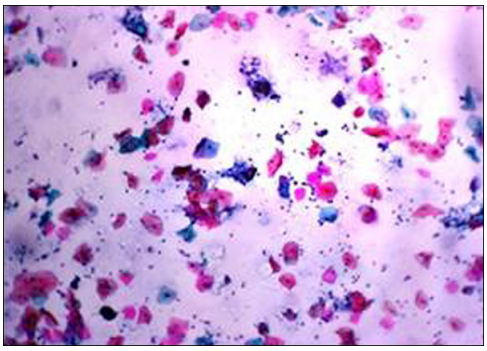

Fig. 15: 10x magnification

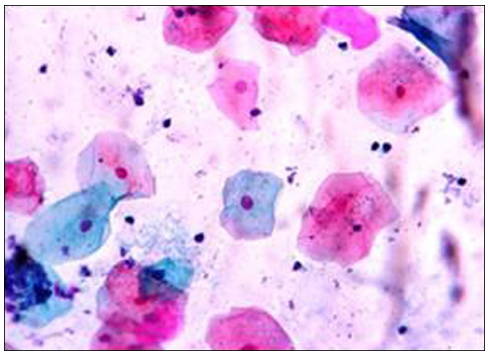

Fig. 16: 40x magnification Stimulated saliva-inflammatory component is less

Conclusions

The whole salivary flow rate is increased while stimulated and the tonicity of saliva is higher compared to unstimulated saliva as the time for ductal modification of saliva is less while stimulated. Ducts secrete K+ and HCO3 and reabsorbs Na+ and Cl- ions without any alteration in the water component of saliva and hypotonic saliva is excreted into the oral cavity. While stimulated the flow rate is increased giving less time for ductal reabsorption of ions and the tonicity of saliva may not be reduced as much in case of unstimulated saliva.
The reduction in the number of inflammatory cells in stimulated saliva could also be due to fact that there is less time for the ductal modification of saliva as indicated by the increase in the salivary flow rate while stimulated. The reduction in inflammatory cells in saliva with stimulation could play a role in the host defence against dental caries, gingivitis, Periodontitis and oral mucosal microbial infection like candidasis. Salivary antibacterial systems may contribute to the regulation of the oral flora and play an important part in the natural defence mechanisms of the oral cavity. Reduced inflammatory cells in stimulated saliva could lead to a reduced cytokine production which could play a role in the progression of oral disease.

Literature

1. Martinez JR Ion transport and water movement J Dent Res. 1987; 66:638-647.
2. Zeldow BJ Studies on the antibacterial action of human saliva.II. Observations on the mode of action of a Lactobacillus Bactericidin J Dent Res. 1961;40:446.
3. Graves D Cytokines that promote periodontal tissue destruction. J Periodontol. 2008; 79(8):1585-91.
4. Shetty K The role of salivary cytokines in the etiology and progression of periodontal disease Gen Dent. 2006;54(2):140-143.

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Poster Faksimile:

ESTIMATION OF FLOW RATE AND STUDY OF EPITHELIAL CELLS IN STIMULATED AND UNSTIMULATED SALIVA

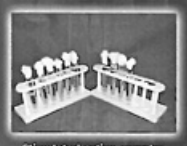
Estimation of salivary flow rate and exfoliated buccal epithelial cells present in unstimulated and stimulated saliva samples of ten individuals with no known disease has been analysed.

Salivary flow rate is assessed on 2 consecutive days, 2 hours after breakfast. To stimulate salivary secretion, the subjects were asked to chew Vitamin.C tablets (LIME CEE) and the secreted saliva was collected. Saliva secreted without any stimulation also was collected from the same subjects to assess the unstimulated salivary flow rate.

The collected saliva samples were centrifuged and sediment has been smeared and stained with PAP stain. The morphology, inflammatory component and bacterial colonies present in unstimulated and stimulated saliva are studied.

MATERIALS AND METHODS

ESTIMATION OF SALIVARY FLOW RATE


Stimulated saliva samples

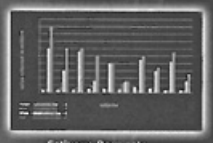

Unstimulated saliva samples

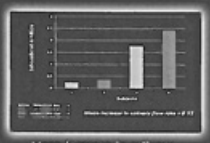
STUDY OF EPITHELIAL CELLS


Centrifugation


Sediment

OBSERVATIONS


Salivary flow rate

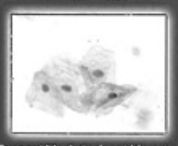

Mean increase in salivary flow rate = 8.55

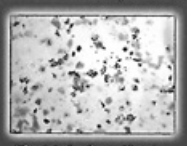

Preparation of smear

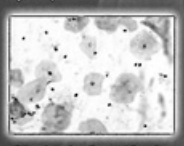
Smear stained with PAP

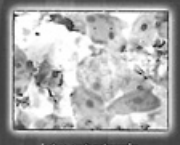
Comparison of inflammatory components

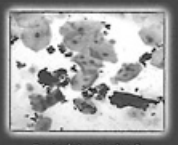

Epithelial cells in background of inflammatory cells

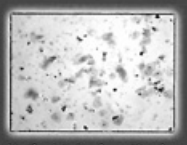

Cyanophilic & Eosinophilic cells from different layers

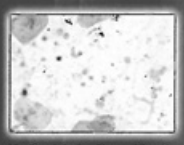

Stimulated saliva - 10x view


Stimulated saliva - 40x view


Intra cytoplasmic bacterial colonies


Bacterial colonies in unstimulated saliva


Unstimulated saliva - 10x view


Unstimulated saliva - 40x view

DISCUSSION

- The reduction in number of inflammatory cells in stimulated saliva could be due to fact that there is less time for the ductal modification of saliva.
- The reduction in inflammatory cells in saliva with stimulation could play a role in host defense against dental caries,gingivitis,periodontitis and oral mucosal microbial infection like candidiasis.
- Reduced inflammatory cells in stimulated saliva could lead to a reduced cytokine production which could play a role in progression of oral disease.

CONCLUSION

- Upon stimulation the salivary flow rate is increased by a mean of 8.55 times, in the selected group, under standard conditions.
- Morphology of epithelial cells in stimulated and unstimulated saliva does not show significant variation.
- Reduction in the inflammatory component is observed in stimulated saliva samples.
- Reduction in number of bacterial colonies are observed in smears prepared with stimulated saliva sediment.

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