Discussion

Saliva plays a key role in maintaining oral functions and protecting oral tissues (Mandel 1989, Fox *et al*, 1985). Any change in salivary gland fluid secretion or constituent levels may, therefore, reflect alterations in salivary host response mechanisms subsequent to HIV infection and may represent, conceivably, an increased risk to the patient. Systemic disorders and xerogenic medications are

common causes of salivary gland hypofunction (Navazesh 1994, Atkinson and Wu 1994). To our knowledge this is the first study to determine the effect of xerogenic medication intake on salivary gland function among HIV-infected subjects. All previous investigators have evaluated the impact of medical status on either whole or individual gland function on the basis of a single measure rather than repeated flow rate measurements. In addition, the clinical significance of reduction in flow rate induced by medical status has not been established before.

In our study no significant difference could be demonstrated between the group with xerostomia inducing drugs and without any medication neither regarding unstimulated nor stimulated flow rates. Whereas, the study by Navazesh *et al* (Navazesh *et al*, 1996) demonstrated significantly lower salivary flow rates in persons with systemic disorders and on medications as compared with the controls. The results also revealed a significantly higher prevalence of salivary gland hypofunction of clinical significance in this group. The results were in agreement with other reports on older populations (Persson *et al*, 1991, Naerhi *et al*, 1992, Wu and Ship 1993, Oesterberg *et al*, 1984, Handelman *et al*, 1989). The persons with systemic disorders and taking xerogenic medications had significantly lower flow rates than healthy controls. The types of medications most often used by this studied population were also similar to what has been published previously in other groups of middle aged and elderly adults (Persson *et al*, 1991, Naerhi *et al*, 1992, Thomson *et al*, 1993).

The effects of medications and systemic diseases on major salivary gland flow rates were recently investigated by Wu and Ship (Wu and Ship 1993) in a group of white,

ambulatory, community-dwelling persons. They reported an overall decrease in both parotid and submandibular flow rates with increasing numbers of medications and systemic disorders. However, only the unstimulated submandibular flow rate was significantly affected by the number of systemic disorders, whereas the stimulated submandibular flow rate was significantly affected by both the number of medications and systemic disorders. They suggested that the submandibular gland may be more sensitive to physiologic permutations than the parotid gland.

Our study revealed that the unstimulated flow rate was significantly higher in the asymptomatic group; 0.32, when compared to the symptomatic and AIDS group 0.13 and 0.16 respectively ($p<0.05$). However, no significant difference between the groups could be found with respect to stimulated flow rate. These results were in agreement with those of Fox et al (Fox et al 1991). Whereas, in other previous studies, stimulated parotid and submandibular/sublingual saliva output was diminished significantly in HIV-infected individuals (Atkinson *et al*, 1990).

In our study hyposalivation has been found to be statistically significant associated with sex (more males had hyposalivation than females), stage of HIV infection, risk group (heterosexual > IVDU), systemic disease, smoking habit, and alcohol consumption. The difference in flow rates between genders has been reported previously (Naerhi *et al*, 1992, Parvinen and Larmas 1982). The result of a study by Navazesh *et al* (Navazesh *et al*, 1996) revealed higher flow rates for men compared with women when both systemic disorders and medications were accounted for. This

finding might have been caused by differences in degree of hydration (Holmes 1964) or size of the salivary glands (Dawes *et al*, 1978).

A study by Navazesh *et al* (Navazesh *et al*, 1996) demonstrated that age did not affect flow rate once medical status and gender had been accounted for; this confirms the findings reported by other investigators (Baum 1981, Heft and Baum 1984, Tylenda *et al*, 1988).

Oral candidiasis in HIV-infected patients appears to be related to local and systemic factors (McCarthy *et al*, 1991) Disease progression and xerostomia appear to be particularly important. However, in our study no significant difference was found between hyposalivation and the presence or absence of oral candidiasis. This finding may be due to the low number of the study samples. Of interest, the colony forming unit of below median was found to be statistically significant associated with hyposalivation of the subjects.

The caries rates were inversly correlated with salivary flow. Edgar and O'Mullane (Edgar and O'Mullane 1989) stated that unstimulated flow rate is more important than stimulated flow rate for general oral health. The study revealed that root caries were inversely correlated to the unstimulated saliva, while the submandibular/sublingual flow, which represents the majority of unstimulated flow, was even more correlated than unstimulated flow. This substantiated the Kitamura study (Kitamura *et al*, 1986) and indicated that the dental professional has to be vigilant in identifying xerostomia early and in instituting nutritional counseling and preventive treatment with fluorides

and other agents, such as remineralizing solutions, artificial saliva, chlorhexidine and/or sialogoues (Rounds and Papas 1991). However, in our study hyposalivation was not found to be significantly associated with the presence or absence of cervical and root caries. This may be due to the low number of the study samples. Further studies are needed to confirm this finding.