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Oral mucosal lesions and oral hygiene habits in the home-living elderly

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SUMMARY **A large epidemiological health investigation, the Helsinki Ageing Study (HAS), was performed in 1989–1991 in Helsinki, Finland. We report here the prevalence of oral mucosal lesions in 338 76-, 81- and 86-year-old home-living elderly people, who completed the oral health investigation at the Institute of Dentistry, University of Helsinki. One or more lesions were found in 128 subjects (38%). Fifty-one per cent of the edentulous complete-denture wearers and 31% of the elderly with some natural teeth had mucosal lesions. The most common finding was inflammation under the denture, which occurred alone or combined with other lesions in 25% of the denture wearers. The three most common mucosal changes not related to denture wearing were coated changes of the tongue (7%), angular cheilitis (6%) and varicose veins under the tongue (4%). No differences were found in the number of mucosal lesions among the three age groups. Angular cheilitis and inflammation under removable dentures were more frequent in women than in men. However, no other differences were found in the presence of mucosal lesions between sexes. The total number of mucosal lesions correlated positively with the number of medications used daily. Ninety-six per cent of the subjects with complete dentures, and 98% of those with some natural teeth reported cleaning their dentures at least once a day. Of the denture wearers, 88% reported cleaning their oral mucosa also, as part of their oral hygiene routine. The presence of mucosal lesions was related to self-reported cleaning of the denture-bearing mucosa. However, no association was observed between cleaning frequency and presence of mucosal changes.**

Introduction

Age has an important influence on the prevalence and pattern of oral mucosal disease in man (Scott & Cheah, 1989). With advancing age, the oral mucosa becomes more permeable to noxious agents and more vulnerable to mechanical damage (Pindborg, 1986). Hyposalivation caused by an increasing number of diseases and their treatment with multiple medications (Närhi *et al.*, 1992) may further increase the risk for mucosal changes in the elderly (Närhi, Ainamo & Meurman, 1993). Among elderly populations, the prevalence of oral mucosal diseases has been reported to vary in the range of 40–59% (Manderson & Ettinger, 1975; Fleishman, Peles & Pisanti, 1985; MacEntee & Scully, 1988; Jorge-Junior *et al.*, 1991). In their study of oral mucosal lesions among the elderly in a surgical biopsy population, Scott & Cheah (1989) found the prevalence of oral mucosal disease to be 47% higher in elderly than in younger subjects. The presence of yeast is usually a minor embarrassment, but the possible role of yeasts in development of oral cancer requires attention (Krogh, 1990). Incidence of mouth cancer increases almost linearly with ageing (Silverglade & Stablein, 1988).

Oral hygiene habits have been found to be poor among the elderly (Helöe, 1973; Richie, 1973; Grabowski & Bertram, 1975; Langer, Michman & Librach, 1975). In their study of 303 subjects over the

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age of 60 years in Melbourne, Australia, Bergman, Wright & Hammond (1991) found that 91–96% of the dentate subjects required improvement in their oral hygiene habits.

Despite the fact that edentulousness is rapidly decreasing in all western countries, the majority of today's elderly in Finland, for example, are still edentulous and wearing complete dentures (Ranta, 1987; Nevalainen *et al.*, 1996). Most of the denture-wearers report cleaning their dentures frequently. Regardless of their cleaning efforts, however, soft debris, bacterial plaque and dental calculus are often found on denture surfáces (Manderson & Ettinger, 1975; Smith & Sheiham, 1979). Budtz-Jørgensen & Bertram (1970) showed that poor denture hygiene and *Candida* infection are very common among elderly denture-wearers.

Although the total number as well as the relative proportion of the elderly is rapidly increasing, information about oral mucosal health and oral hygiene habits among the home-living elderly is limited, and epidemiologic studies in this field have focused mainly on the institutionalized elderly (Manderson & Ettinger, 1975; Vigild, 1987; Ekelund, 1988; Jorge-Junior *et al.*, 1991). Our purpose in this study was as follows: to determine the prevalence of common oral mucosal lesions among the home-living elderly in Helsinki and to determine differences in the presence of these lesions between the sexes, and among three different age-groups of the study population; to study the correlation between mucosal lesions and the number of medications used daily; to examine the presence of mucosal lesions related to different types of removable dentures; and to estimate the implications of oral hygiene habits for the existence of mucosal lesions among the study population.

Materials and methods

Population

In 1990 and 1991 we examined, from a large prospective medical and dental cohort study, the oral mucosal status of 364 randomly selected individuals born in 1904, 1909 and 1914 and living at home in Helsinki. We report here the oral mucosal status of the 338 subjects whose oral hygiene habits were evaluated by an interview (Table 1). More detailed information about the material has been reported elsewhere (Närhi *et al.*, 1992; Nevalainen *et al.*, 1996).

Table 1. Study group according to age and sex

Age	76 years old	81 years old	86 years old	All
Men	45	31	15	91
Women	116	69	62	247
Total	161	100	77	338

Oral mucosa

Four faculty members at the Institute of Dentistry registered mucosal lesions using a modified scheme recommended by the WHO (Kramer *et al.*, 1980). Mucosal lesions in mouth corners, buccal and palatal mucosa, and tongue were determined, after which their association with removable dentures was noted. Diagnosis was based only on clinical observation; no biopsies were taken. Prevalence of the following mucosal lesions is reported in this article: inflammation, ulcers, leukoplakia of the buccal mucosa; varicose veins, plaque-like lesions, and ulcers of the tongues; angular cheilitis; inflammation, ulcers, and papillary and fibrotic hyperplasia related to removable dentures.

Type of dentition

To study the association between dentition type and oral mucosal lesions, we divided the subjects with removal dentures into the three following subgroups: those with complete dentures (CD), those with acrylic removable partial dentures (ARPD), and those with metallic removable partial dentures (MRPD). Detailed information on these subjects' dental status is reported elsewhere (Nevalainen *et al.*, 1996).

Interview

Subjects' oral hygiene habits and their use of medications was determined from a structured questionnaire filled in before the oral examination began. Medication use was also confirmed by physicians who examined all subjects before the dental study (Valvanne, 1992).

Statistical methods

Statistical analyses of the results were performed by means of the StatView+Graphics program*. Contingency table analysis was used to test the

*BrainPower, Inc., Calabasas, CA, U.S.A.

association between several variables, after which the difference between two distributions was tested with the Chi-squared test. The number of oral mucosal lesions and medications used daily were correlated by the Spearman rank correlation analysis. Multiple regression analysis was performed to explain the presence or absence of oral mucosal lesions by several independent variables.

Results

One or more lesions were found in 128 of all subjects (38%). Fifty-one per cent of the edentulous subjects with complete dentures and 31% of those with removable dentures and some natural teeth had some mucosal changes. The three most common mucosal lesions not related to the use of removable dentures were coated changes of the tongue (7%), angular cheilitis (6%), and varicose veins under the tongue (4%). Inflammation under removable dentures as well as angular cheilitis was more frequent in women than in men, but no other sex-related differences were observed. There were also no differences in the prevalence of mucosal lesions among the three age groups (Table 2).

Inflammation under the dentures was the most frequent denture-related mucosal change and these were primarily related to maxillary complete dentures (Tables 2 & 3).

The total number of mucosal lesions correlated positively with the number of subjects' daily medications ($r_s = 0{\cdot}23$, $P < 0{\cdot}05$).

Ninety-six per cent of those with complete dentures and 98% of those with removable dentures and some natural teeth reported cleaning their dentures once or more often per day (Table 4). Brushing the dentures under streaming water was the most popular cleaning method, which was performed alone or combined with some other cleaning method by 74% of the subjects.

Of the edentulous subjects, 86% reported cleaning the soft tissues under their dentures every day, with 92% of the subjects with removable dentures and some natural teeth also cleaning their denture-bearing mucosa. Cleaning of the oral mucosa showed a significant negative relationship with the presence of oral mucosal lesions (coefficient, –0·11; *t*-value, 2·543; $P < 0{\cdot}012$), but no association was observed between the presence of mucosal lesions and daily cleaning frequency or different denture cleaning methods.

Discussion

Most mucosal changes in the elderly are related to the use of dentures (Ekelund, 1988; Vehkalahti *et al.*, 1991), a fact confirmed in the present study population. Denture stomatitis, related to trauma from dentures, as well as yeast infection, is probably the most common mucosal lesion of the elderly (Vigild, 1987; Budtz-Jørgensen, 1990). Our study supports this, with inflammation under removable dentures the most frequent of all mucosal lesions among the study population. Inflammation of the denture-bearing mucosa is a typical form of denture stomatitis; denture stomatitis is usually related to abundant yeast growth at the oral mucosa–denture interface. Angular cheilitis is another typical yeast-related infection frequently found among the elderly. In our study population 6% of all the subjects had angular cheilitis. Both lesions were more frequent in women than in men. The difference between data by gender may result from the differences in general health. Yeast-related oral diseases are associated with the body's defence mechanisms – in immunocompromised hosts, their occurrence increases dramatically. We have reported previously that in the present population men used significantly fewer medicines than did the women (Närhi *et al.*, 1992). In elderly individuals with removable dentures, the frequent use of hyposalivatory medications has been found to predispose to oral mucosal diseases (Kreher *et al.*, 1991). Similarly, in our study population, mucosal lesions correlated positively with the number of medications used daily. Multiple use of medications decreases salivary output with the subsequent consequences.

Traumatic ulcers are small, painful lesions that most commonly develop within 1–2 days after the insertion of dentures, but may also be found in subjects with old, ill-fitting dentures. The most common cause of these lesions is overextended denture flanges (Budtz-Jørgensen, 1981). In some cases mucosal ulcers can be symptomless, with patients unaware of their presence. In this study population, practically all ulcerations were related to complete dentures and were more frequent in the lower jaw. Because the number of mucosal ulcers was not very high, they are not considered to be the main mucosal problem among this population. However, the association between mucosal ulcers and squamous-cell carcinoma should always be kept in mind when treating patients with this type of lesion (Silverglade & Stablein, 1988).

Table 2. Oral mucosal lesions among the elderly in Helsinki

	Men (n = 91)		Women (n = 247)		Total (n = 338)	
	n	(%)	n	(%)	n	(%)
No mucosal lesions	58	(64)	152	(62)	210	(62)
Buccal mucosa						
leukoplakia	3	(3)	8	(3)	11	(3)
inflammation	4	(4)	6	(2)	10	(3)
ulcers	1	(1)	6	(2)	7	(2)
Tongue and floor of mouth						
varicose veins	5	(5)	8	(3)	13	(4)
coated changes	9	(10)	16	(6)	25	(7)
ulcers	2	(2)	2	(1)	4	(1)
Angular cheilitis	1	(1)	19	(8)*	20	(6)
	Men (n = 63)		Women (n = 197)		Total (n = 260)	
	n	(%)	n	(%)	n	(%)
Lesions related to removable dentures						
inflammation	9	(14)	57	(29)*	66	(25)
ulcers	5	(8)	13	(7)	18	(7)
papillary hyperplasia	6	(9)	12	(6)	18	(7)
fibrotic hyperplasia	2	(3)	5	(3)	7	(3)

*$P < 0{\cdot}05$, difference between men and women.

Table 3. Denture-related oral mucosal changes

	CD (n = 213)		ARPD (n = 27)		MRPD (n = 7)	
	n	(%)	n	(%)	n	(%)
Maxilla						
inflammation	41	(19)	6	(22)	1	(14)
ulcers	4	(2)	0	(0)	2	(29)
papillary hyperplasia	12	(6)	1	(4)	0	(0)
fibrotic hyperplasia	3	(1)	0	(0)	0	(0)
	CD (n = 158)		ARPD (n = 30)		MRPD (n = 16)	
	n	(%)	n	(%)	n	(%)
Mandible						
inflammation	12	(8)	5	(17)	0	(0)
ulcers	10	(6)	0	(0)	0	(0)
papillary hyperplasia	3	(2)	1	(3)	0	(0)
fibrotic hyperplasia	5	(3)	0	(0)	0	(0)

CD, complete denture; ARPD, acrylic removable partial denture; MRPD, metallic removable partial denture.

The majority of oral mucosal lesions are benign in nature, but they may become malignant, especially if local or systemic predisposing factors exist. Leukoplakia, for example, is one such precancerous lesion. In their study of floor-of-the-mouth leukoplakia, Kramer, El-Labban & Lee (1978) demonstrated the high risk of malignant transformation of these lesions. In the present study population, leukoplakias were found in ten subjects (3%), which corresponds with previous findings (Axéll, 1976).

In their study of 233 elderly people from four different residential homes in the United Kingdom, Hoad-

Table 4. Denture hygiene habits among the study group

	$n = 236$	%
Rinsing with water	35	15
Brushing under streaming water	175	74
Brushing with tooth- or denture-paste	53	22
Use of disinfectant solutions	6	3

Several methods were used by same subject.

Reddick, Grant & Griffiths (1990) found that 79% of the subjects with complete dentures cleaned their prostheses daily, a figure that was lower than among the present study population. In the same study, the least-clean dentures were found among the elderly living in old peoples' homes where the residents cleaned their dentures without assistance. However, Hoad-Reddick *et al.* (1990) also observed that mucosal lesions were as frequent in the institutionalized as in the home-living elderly. The cleaning frequency of teeth and dentures does not tell us much about the efficacy of oral hygiene habits.

Daily oral hygiene has been reported to be the prime preventive method for control of mucosal inflammation (Budtz-Jørgensen, 1979). Bloem *et al.* (1984) reported a statistically significant improvement in the oral mucosa of an edentulous patient who followed a home-care regimen of tissue-brushing for sixty days. In the present study, mucosal cleaning showed a significant association with the presence of mucosal lesions. Although the majority of the edentulous complete-denture wearers reported cleaning their dentures and the underlying soft tissues regularly, many of them still showed mucosal changes. The preventive effect of cleaning may not be as good in the elderly as it is in younger subjects. It is obvious that reduced sight and reduced manual dexterity of the elderly will lead to poor oral hygiene. It has been suggested that the elderly believe that they should clean their teeth properly, but are not aware of the poor results of their efforts (Murtomaa & Meurman, 1992). Mechanical cleaning should be combined with the use of effective chemical aids. More effort should be directed to the development of more effective oral hygiene methods for the elderly, and elderly patients should be carefully instructed how to perform good oral and denture hygiene. Oral information alone is not an effective method to enhance denture hygiene; the physical demonstration of how to remove denture plaque has been shown to result in long-term improvement (Ambjornsen & Rise, 1985). In old peoples' homes, professional help with cleaning the dentures is recommended. It should be remembered that oral mucosal lesions are of multifactorial origin. A patient with mucosal changes may have inadequate oral hygiene habits as well as ill-fitting dentures, but may also have some underlying systemic diseases that lead to mucosal lesions (Axéll, 1992). The oral mucosa should therefore be frequently examined in edentulous individuals.

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