Self-perceived Oral Function in Elderly Residents in a Suburban Area of Stockholm, Sweden

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Purpose: The primary aim was to describe self-perceived oral health and function in a group of adults aged 75 to 84 years. The secondary aim was to study the agreement between self-reported oral function and clinical findings.

Material and Methods: A 5% sample (150 subjects) was selected at random from the total population (2,910) of 75 to 84-year-old residents in suburban Stockholm, Sweden. The inclusion criterion was that the individual lived independently, without any community assistance. A questionnaire covering self-perceived chewing ability, mouth dryness and bleeding gums was sent by mail. The total response rate was 86%. Of these 129 respondents, a 25.0% subsample was randomly selected for clinical examination by a dental hygienist. No radiographs were used.

Results: The average age of the individuals was 78.7 years (SD 2.71). Most were satisfied with their oral status and function: > 75.0% reported good chewing ability, correlating with the number of remaining teeth and dentures. Mouth dryness was reported by 41.5% of respondents to the questionnaire; one case was diagnosed in the subsample which underwent clinical examination. Bleeding gums were reported by 11.8% of respondents; clinical examination disclosed bleeding on probing in all participants. Mouth dryness and bleeding gums were not associated with chewing ability.

Conclusion: Most subjects reported satisfactory chewing ability. Deterioration in oral function correlated with fewer remaining teeth and removable dentures. In relation to the clinical findings, mouth dryness was 'over-reported' and bleeding gums were 'under-reported'.

Key words: elderly, oral health, oral function, chewing ability, mouth dryness, self-reported health

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The proportion of elderly in Sweden is increasing rapidly, as in most of the industrialized countries (The National Public Health Report, 2001). Ageing is a complex combination of biological, psychological and social processes. The ageing process is insidious, with great individual variations. The elderly today are generally healthier than earlier generations. Living conditions have improved and many people live more active lives. It is also important to note that in general people tend to live longer and are therefore likely to experience more disease than during a shorter lifetime. A consequence of improved living conditions is that many diseases occur later in life.

Pronounced variations in the health of the elderly may be predetermined by conditions earlier in life,

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such as socio-economic factors and the standard of education. This applies to both general and oral health (Heyden, 1990; Ship, 1999). As the overall standard of living has improved, oral health and appearance have become more important to all individuals (Strauss and Hunt, 1993). Good oral health and well functioning teeth enhance the quality of life, food and eating habits, and therefore improve general health (WHO, 1980; Locker, 1992; Steele and Walls, 1997). Several studies confirm that oral health is of social, functional and nutritional importance in later life (Strauss and Hunt, 1993; Kiyak, 2000).

The rate of edentulousness is decreasing among the elderly in Sweden. The proportion of individuals retaining their natural teeth, albeit restored with fillings, crowns and bridges, is increasing (Ahacic et al, 1998; Unell et al, 1998; Österberg et al, 2000). Functional natural dentition in the elderly is associated with lower mortality risk than either an inadequate natural dentition and/or dentures. As a component of general health, oral health has an important influence on the everyday life of the elderly (Appollonio et al, 1997).

It has also been shown that edentulousness is significantly associated with a person's perception of oral health. Other factors which impact on perceived oral health are the ability to chew, oral and facial pain symptoms, dry mouth, and the psychosocial impact of oral diseases. Studies by Locker (1997) and Locker et al (2002) disclosed that the only clinical indicator shown to be associated with changing perception of oral health was loss of teeth. Other complaints about deteriorating oral health were related to pain caused by dentures.

Mouth dryness is an important determinant of oral health in the elderly and is associated with masticatory problems and dissatisfaction with overall oral health (Locker, 1993; Macentee et al, 1997; Nederfors et al, 1997). Bleeding gums indicate gingival inflammation and increased risk for disease progression in patients with periodontitis. In this context, our working hypothesis was that perceived chewing ability among elderly people was associated mainly with the number of remaining teeth and with mouth dryness.

The primary aim of the study was to describe self-perceived oral health and function in a group of adults aged 75 to 84 years. The secondary aim was to study the agreement between self-reported oral function and clinical findings.

MATERIAL AND METHODS

Subject Selection

During the spring of 2000, 150 individuals aged between 75 and 84 years were randomly selected from the total population of this age among residents of the municipality of Huddinge, south of Stockholm. The selected group represented 5.2% of the total number (2,910) in this age group living in the municipality as at 1 January 2000. The inclusion criterion was that the individual lived independently, i.e. he or she lived at home and did not receive community care support.

The questionnaire was sent by mail, together with written information about the study and a prepaid reply letter. A first reminder was sent two weeks later. A second reminder, including a new questionnaire was sent after one month. Those who did not reply after the second reminder and had a telephone number were contacted by telephone.

The study was approved by the local Ethics Committee at Huddinge University Hospital.

The Questionnaire

The questions used in this study were based on a questionnaire, 'Subjective Oral Health Status Indicators' developed and used by Locker and Miller (1994). The present study focused on chewing ability, mouth dryness and bleeding gums (Table 1). The questionnaire also contained questions about gender, age, country of origin, educational level and civil status.

Clinical Examination

Of those who answered the questionnaire, 25%, selected at random, were invited to participate in the clinical examination: all 32, 15 women and 17 men, consented. An experienced dental hygienist carried out the clinical examination. No radiographs were taken.

Clinical examination included the following variables: number of remaining teeth; presence of dentures (implants); hygiene index (HI-index); bleeding on probing (BOP); pocket depth; tooth mobility; presence of calculus; caries lesions and mouth dryness. The HI-index and BOP were expressed as

a percentage of the total dentition (Love et al, 1975; Ainamo and Bay, 1975). Pocket depth was measured with a Hu-Friedy (PCPUNC-15, Hu-Friedy. Liemen, Germany) calibrated periodontal probe: depths 4–5 mm and ≥ 6 mm were recorded. Tooth mobility was registered and scored from 1–3. The highest value in each subject was chosen. Supra- and sub-gingival calculus was registered during pocket measurement. Caries lesions were registered visually, with the aid of a probe and mouth mirror. No radiographs were used.

The clinical criteria were: manifest caries – the probe fastens on surface irregularities; and initial root caries – a blast of air discloses a frosted, chalky surface. Mouth dryness was evaluated by the so-called 'mirror-test' (Henricsson et al, 1990): a back-of-a-mouth mirror was drawn along the inside of the cheek and the highest value for friction in each subject was recorded according to the following three-point scale:

- Grade I – no obvious friction: the mouth mirror slides easily along the buccal mucosa
- Grade II – some friction
- Grade III – high friction: the mouth mirror tends to adhere to the mucosa.

Table 1 Questions on oral health presented to 129 participants in the study

1. Chewing ability
   Are you usually able to:
   Chew a piece of fresh carrot?
   Bite off and chew a piece of whole fresh apple?
   Chew firm meat such as steaks or chops?
   Chew fresh bread?
   Chew fresh lettuce salad?
   Chew boiled vegetables?
   Answer format: yes/no
2. Mouth dryness
   In the last four weeks have you had the following problem:
   Dryness of mouth?
   Answer format: yes/no
3. Bleeding gums
   In the last four weeks have you had the following problem:
   Bleeding gums?
   Answer format: yes/no

Statistical Analysis

The statistical significance of the differences between the individuals who answered the questions about chewing ability was calculated with (the chi-square independent) Fisher exact test. The sample was small and the expected values were less than 5. In order to allow cross-tabulation, the material was stratified into two groups according to the number of remaining teeth: those with ≤ 15 teeth, and those with ≥ 16 teeth. Similarly, the material was stratified according to those with dentures and those without.

RESULTS

In all, 150 questionnaires were issued: 90 (60%) were returned immediately, 31 (21%) after the first reminder, and 5 (3%) after the second reminder. Three subjects (2%) agreed to answer questions by telephone. The total response rate was 86%. Nine of the remaining 21 subjects declined to participate, 2 had recently died and one was living in a nursing home and was therefore excluded. The remaining nine individuals gave no reason for refusing to participate. The ages of the respondents ranged from 75 to 84 years, mean age 78.7 years (SD 2.7). Personal data for the whole group (n = 129) is presented in Table 2.

The Questionnaire

Self-estimation of oral function disclosed that most of the participants considered their chewing ability to be satisfactory. Of the 129 individuals who responded to the questionnaire, 76% claimed that they could bite into and chew raw carrots, and all 100% were able to chew cooked vegetables. Self-reported ability to chew is presented in Table 4. Mouth dryness was perceived by 41.5% of those answering the questionnaire and 11.8% were aware of bleeding gums. The data are not shown.

Clinical Examination

Information about general health, diseases, and medication was collected at the clinical examina-

Table 2 Personal data for all individuals answering the questionnaire, n = 129

Gender	N	%	Mean age	SD	Primary School %	Grammar School %	University %	Sweden %	Nordic/other countries %	Married %	Single %	Partner %
Women	76	59	78.5	2.88	71	21	8	88	12	34	65	1
Men	53	41	79.0	2.44	60	30	10	96	4	67	29	4
All subjects	129	100	78.7	2.71	67	24	9	91	9	47	50	2

tion. 'On medication' only was registered when the respondent did not know which type of medication he/she used. Of the respondents 72% were not on any medication; 9% took 1 or 2 different types; 3% took from 3 to 5 types; and 16% took from 6 to 10 different medicines. Most of the participants felt healthy, but some reported various ailments, such as forgetfulness, back- and knee-pain. Disease states such as heart disease, hypertension, joint pain, respiratory diseases, cancer ventriculi and stoma after colostomy were also reported.

The mean number of remaining teeth was 16 (± 9.0). Twelve subjects had dentures of some type; two were edentulous and wearing full upper and lower dentures; four had full upper and partial lower dentures; and 6 had partial dentures in both upper and lower jaws or in only one jaw. Two subjects had dental implants: one had a single implant and one had both maxillary and mandibular implants.

Mouth dryness was noted by 47.8% of the respondents to the questionnaire, and by 21.9% of the subsample which underwent clinical examination. However, the mirror test disclosed dry mouth (grade II) in one subject in this subsample. Bleeding gums were reported by 11.6% of the subjects who answered the questionnaire, and by 12.5% of the subsample which underwent clinical examination. The clinical findings showed that all individuals bled on probing: BOP ≥ 50% was recorded in 67% and periodontal pockets ≥ 6 mm were recorded in 40%. Manifest caries lesions were registered for 30% of the participants in the clinical examination group and initial caries lesions for 20%.

Calculus on the incisors was registered for 53% of the participants in the clinical examination and general calculus for 43%. Mobile teeth were registered for 13.3% of the participants in the clinical examination. These data are presented in Table 3.

The ability to chew was related to the number of remaining teeth and to denture-wearing. It was most difficult to chew raw carrots. Apples, firm meat and fresh bread were less difficult. Fresh salad was easier and everyone was able to chew cooked vegetables (Table 4). All those who reported satisfactory chewing ability had more than 16 remaining teeth. The two individuals with implants were satisfied with their chewing ability. Denture wearers reported more limited chewing ability than subjects without dentures. The number of remaining teeth and removable dentures showed an impact on chewing ability.

Statistical analysis disclosed no significant association between chewing ability and mouth dryness or bleeding gums, or caries, calculus and/or mobile teeth. There was good agreement among the total group of respondents to the questionnaire and those selected for clinical examination with respect to chewing ability and bleeding gums, but not for mouth dryness. Gender, educational level and civil status showed no significant association with chewing ability, mouth dryness and bleeding gums (data not shown).

DISCUSSION

Most of the participants in the study considered themselves able to chew all food, including raw vegetables such as carrots. Self-perceived chewing ability was closely related to the number of remaining teeth: no participant with more than 15 remaining teeth had any problems chewing. Half the denture wearers reported adequate chewing ability, including hard and fibrous foods. Two participants included in the dentate group had dental implants, and reported no chewing problems.

Table 3 Clinical conditions registered for 25% subsample

Clinical examination	Mean	SD
Number of remaining teeth	16.0	9.0
Percentage of sites showing visible plaque**	60.5	29.9
Percentage of sites bleeding on probing**	68.6	26.3
Number of pockets 4–5 mm depth**	17.5	16.9
Number of pockets ≥ 6 mm depth**	3.0	5.9
	Number of subjects with indicated conditions	% of subjects with indicated conditions
Edentulous	2	6
Removable dentures of any type	12	37.5
Dental implants*	2	6
Dry mouth	1	3
Any tooth with increased mobility	4	12.5
Calculus – incisors**	16	53.3
Calculus – general**	13	43.3
Manifest caries lesions***	9	30
Initial caries lesions***	6	20

* = One man had a single dental implant and one woman, who was edentulous, had maxillary and mandibular implants. They were included in the dentate group
** = Two were edentulous and were therefore excluded from this group
*** = Two were edentulous and one woman had maxillary and mandibular implants. They were therefore excluded from this group

Table 4 Self-reported chewing capacity related to number of remaining teeth, dentures

Clinical Examination	The whole group	The participants who only answered the questionnaire	The clinically examined participants	Remaining teeth ≤ 15	p	Remaining teeth ≥ 16	Dentures	p	No dentures
Questionnaire Ability to chew	n = 129	n = 97	n = 32	n = 13		n = 19	n = 12		n = 20
Piece of fresh carrot	76.0%	74.2%	81.3%	54%	0.002	100%	58%	0.02	95%
Piece of whole fresh apple	84.1%	83.0%	87.5%	69%	0.02	100%	75%	Ns	95%
Meat such as steaks or chops	87.2%	87.1%	87.5%	69%	0.02	100%	75%	Ns	95%
Fresh bread	88.9%	88.3%	90.6%	77%	0.06	100%	83%	Ns	95%
Fresh lettuce	95.9%	96.7%	93.8%	85%	Ns	100%	92%	Ns	95%
Boiled vegetables	100%	100%	100%	100%	**/Ns	100%	100%	**/Ns	100%

NS = p > 0.05
* = Fisher exact test, one-tailed – the sample was not large and expected values are less than 5, therefore Fisher exact test was applied
** = The expected value was 0 therefore Fisher exact test could not be applied

Avlund et al (2001) have shown an association between the number of remaining teeth, chewing ability and general oral function in the elderly. Several recent studies have presented evidence of an association between a high number of teeth and/or well-fitting dentures and good chewing ability and more varied food intake (Marshall et al, 2002; Warren et al, 2002; Takata, 2004). Macentee et al (1997) showed that denture wearers were concerned about their ability to chew. The results of the present study, showing satisfactory chewing ability in older individuals with ≥ 16 remaining teeth, are in general agreement with these recent studies. The number of remaining teeth and/or satisfactory dentures showed an association with chewing ability and the consistency of the food, as hard, leathery and soft.

No other clinical conditions such as dry mouth, bleeding gums, plaque, periodontal pockets, calculus or caries showed an association with the ability to chew. Nor were socio-economic factors and gender associated with chewing ability, mouth dryness or bleeding gums.

In the questionnaire, almost half the respondents reported a sensation of mouth dryness, but on clinical examination, the mirror test disclosed mouth dryness in one of the 32 participants. One reason for this discrepancy might be that mouth dryness occurs mainly at night and on awakening (Caplan and Hunt, 1996). Another explanation could be the presence of minor salivary dysfunction, causing a sensation of dryness, which is too small to be discerned with the mirror test. Previous studies have shown that individuals with mouth dryness experience difficulty eating certain foods and are more likely to report problems chewing, eating and communicating (Locker, 1993; Caplan and Hunt, 1996; Sheiham and Steele, 2001). The symptoms of dry mouth are also strongly associated with age and medication (Nederfors et al, 1997). Good chewing ability is often related to little or no mouth dryness.

In this study self-awareness of a problem with bleeding gums was low: only 24% answered 'yes' to the question about having had a problem with bleeding gums during the last four weeks. The clinical examination disclosed that more than half the participants had bleeding on probing at more than 50% of sites and all bled at some sites on probing. Although a recent study by Buhlin et al (2002) disclosed better self-estimation of this condition in the same age group, our results are in agreement with earlier studies, which show that many individuals were unaware of their periodontal status. A need remains to develop self-reported oral health measures for the assessment of periodontal disease (Gilbert and Nuttall, 1999; Pitiphat et al, 2002).

Some of the participants reported various ailments such as forgetfulness, reduced hearing and vision, dorsal and knee pain. They also reported diseases such as cardiovascular disease joint pain and various cancer forms. Despite these problems, most of them felt healthy and had an active lifestyle. Similarly, with respect to their overall oral health, elderly people are in general reported to be satisfied, even with reduced dentitions (Meeuwissen et al, 1995).

As the number of dentate elderly in the community continues to increase, the importance of oral function to the individual's perception of general health and wellbeing is gradually emerging. General health and quality of life are enhanced by an adequate number of remaining teeth, and diminished by dry mouth and masticatory disorders (Budtz-Jørgensen et al, 2001). Perceived chewing ability and number of remaining teeth are related to physical fitness (Takata et al, 2004), while oral pain and chewing limitations cause reduced general functional capacity and lead to a deterioration in the quality of daily life (Gift et al, 1998). Thus, access to appropriate oral care is likely to improve the quality of life (Locker et al, 2002; Warren et al, 2002).

In conclusion, this study shows that most of the participants, a representative sample of elderly people living independently in a suburban environment, reported good chewing ability. Less than satisfactory chewing ability was related to fewer remaining teeth. In relation to the clinical findings, mouth dryness was 'over-reported' and bleeding gums were 'under-reported'.

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