

Original Research Article

Self-Perceived Oral Health of Elderly People Living Independently in Stockholm, Sweden: A Questionnaire Study

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Abstract: The aim of this study was to determine how elderly people (75 years +) living in their own homes perceive their oral health and to assess their awareness of the availability of domiciliary dental services and their perceived need for such services. This quantitative study comprised 63 participants who were patients at three private dental practices in Stockholm, Sweden. The questionnaire covered oral health, oral care habits and their perceived need and knowledge of domiciliary dental care. Ninety-one per cent of the participants managed their daily oral hygiene unassisted, 63% reported good oral health and 75% reported good general health. The most common oral problems encountered in the last six months were dental calculus (68%), xerostomia (41%) and receding gums (25%). Those who used an electric toothbrush reported better oral health than those who used only a manual toothbrush ($p=0.02$). There was a linear correlation between self-perceived general health and oral health. Most of the participants (93%) had not previously heard about domiciliary dental services and 82% did not perceive a need for such services. Thus, the majority of the participants reported good oral health, with a correlation between perceived general health and oral health. However, there is a need to raise awareness about domiciliary dental services in independent elderly people.

Keywords: Aging, domiciliary dentistry, general oral health, oral care.

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INTRODUCTION

Many countries are experiencing a steady increase in the number and proportion of older people in their populations (WHO 2017). In Sweden the proportion of people 80 years and older is expected to increase by 50% in coming years (SCB 2018). It is also predicted that as the population continues to age, increasing numbers of older people will need care (The Swedish National Board of Health and Welfare, 2019 & He *et al.*, 2015). Moreover, the proportion of 80-year-olds who live in their own homes is increasing. They will require dental care especially preventive measures, to maintain their dental health longer in life and to minimize the impact of oral diseases on their quality of life (The Swedish National Board of Health and Welfare, 2019 & Grönbeck-Linden *et al.*, 2016).

As the ageing process is frequently complicated by systemic diseases, elderly people may find it increasingly difficult to access dental care in the

traditional dental practice setting. In Sweden, there is a recall system, whereby patients are contacted on a regular basis to reduce the risk, especially with increasing age, that patients lose contact with their dental care provider (Grönbeck-Linden *et al.*, 2016). Homebound elderly people usually have an increased need for care and assistance with activities of daily living, such as personal hygiene and toothbrushing. In the course of the above-mentioned study, Grönbeck-Linden *et al.* (Grönbeck-Linden *et al.*, 2016) noted that more than 20% of participants over 80 years of age lost contact with their dental care provider.

The number of elderly people, 74-90 years old, who retain their natural dentition, has increased. Their dentitions may be heavily restored, for example with crowns and dental implants. In a study by Bakker *et al.* (Bakker *et al.*, 2020), 98% of participants reported having their natural dentition with some prosthetics, or their natural dentition, restored with fillings and crowns. In this context, there is an increased need for

preventive measures to maintain good oral health (National Board of Health and Welfare, 2019). Elderly people exhibit increased plaque accumulation and decreased salivary flow, exacerbated in those on medication: for example, polypharmacy of at least four medicines (Närhi *et al.*, 1992). The most common oral diseases among the elderly are caries and periodontitis. Roots exposed by gingival recession are susceptible to root caries (Lockhart *et al.*, 2009 & Edman *et al.*, 2016).

Oral health is an important aspect of health and well-being and affects both general health and quality of life. Overall, oral health in Europe has improved, thus increasing numbers of elderly people are retaining their natural dentitions lifelong (Stock *et al.*, 2016). With increasing age, there is often an increase in oral diseases, because elderly people are less able to maintain adequate oral hygiene. This is exacerbated by the side effects of medication and the onset of systemic diseases (Holmen *et al.*, 2012 & Hänsel *et al.*, 2003). Close cooperation between medical and dental teams is required to maintain good oral health in the elderly (Wårdh *et al.*, 2014).

Under the Swedish dental system, elderly people who have increased care needs, due to disability and / or disease, are entitled to an annual outreach free oral health assessment (Swedish National Board of Health and Welfare, 2010 & The Swedish Agency for Health Technology Assessment and Assessment of Social Services, 2015). Furthermore, delivery of dental care for elderly people with high care needs is required to meet the following criteria: treatment is to be pain free and infection-free and allow the patient to eat without discomfort and to have an acceptable appearance (Swedish National Board of Health and Welfare, 2014 & The Swedish Agency for Health Technology Assessment and Assessment of Social Services, 2015).

Domiciliary dental services can be defined as dental care provided in the patient's home (Lundqvist *et al.*, 2013). One of the disadvantages of this system is that to date availability is limited, and the elderly people who lose contact with their dental care provider may not get the help they need (Gabre & Wårdh, 2011). A major advantage of domiciliary dental care is that the patient is spared the discomfort or inconvenience of being transported to a conventional dental clinic, instead being visited at home by a dental team. Domiciliary dental services are not new and differ from county to county in Sweden: there are no guidelines for what care is to be provided during a domiciliary dental appointment. There is only limited research into domiciliary dental services for elderly people living independently in the community.

The aim of this study was to investigate how elderly people (75 years +) living independently at

home perceive their oral health and to document their knowledge of oral health and their perceived need for domiciliary dental services.

MATERIAL AND METHODS

This study has an explorative, quantitative design, based on a questionnaire covering oral health, oral care habits, information, and the need for “domiciliary dental services” for elderly people. The study was approved by the Regional Ethics Committee in Stockholm, Sweden, no: 03518.

Information about the proposed study was sent via email to 23 dental clinics in the Stockholm region, both public and private. Three private dental practices consented to participate in the study. The author (Farah Yahya, FY) contacted these clinics for a personal meeting with the team and informed them about the study, both verbally and in writing. Data collection was done in collaboration with each clinic and after agreement with the head of the clinic. The clinic managers read the letter of information and then gave their written consent to its distribution. At all clinics, signed information sheets about the study were placed in the waiting room in a closed box with a special insert to protect the participants' anonymity. The receptionist at each clinic was well informed about the study and was able to answer any questions from the patients. The author (FY) had the opportunity to visit the clinics from time to time and collect the questionnaires. The questionnaires were distributed while the patients were in the waiting room during the autumn of 2019 until the spring of 2020.

Participants

Sixty-three participants were consecutively enrolled from three dental practices. The inclusion criteria were that the participant had to be aged 75 years or older and be living in her/his own home regardless of whether they received domestic help or daily help from a relative. As it was a requirement for inclusion in the study that the participants did not have any cognitive impairments, a Pfeiffer test (Pfeiffer, 1975) was administered to measure cognitive suitability. The Pfeiffer test, Short Portable Mental Status Questionnaire, Appendix III (SPMSQ), (Pfeiffer, 1975) consists of 10 questions intended to determine the degree of intellectual impairment and cognitive ability. The Swedish translation of the test was used in this study: the number of correct answers, rather than the number of incorrect answers was recorded.

All participants who were included in the study, had minor impaired or unimpaired cognitive ability according to the Pfeiffer's index assessment. The test was administered by dental staff at the clinic and the author (FY) was available by phone to answer any questions.

Two of the potential participants were excluded because they did not meet the inclusion criteria and two did not return the questionnaire. In all, 59 subjects were included in the study: twenty-one attended a small private practice, and thirty-eight were patients at two larger private practices.

Questionnaire

The questionnaire consisted of 35 questions in six sections, covering demographic data, questions about general health and oral health and oral care routines. There were also questions about their experience of dental care and perceived need for domiciliary dental services.

The questions were based on those in a previous study of self-perceived oral health in elderly people (Andersson *et al.*, 2004). The questions about accommodation were drawn from the National Board of Health and Welfare (Swedish National board of Health and Welfare, 2019). Most of the questions had closed answer alternatives and some questions had a comment field. The last question was an open question where the participants were free to comment.

The questionnaire was tested on four people over 75 years of age who met the inclusion criteria. They reported that the information about the study and the questionnaire was clear and understandable. Some minor adjustments were subsequently made to some of the questions. The test subjects were not included in the study. An information letter was inserted as a first page together with the questions, so that the participants could read and approve information about the study before answering the questions. At the end of the questionnaire, a Swedish version of Pfeiffer's test was inserted.

STATISTICAL ANALYSES

A power analysis was undertaken to estimate the number of objects needed for an imaginary two sample interference for answer variables coded with the numbers 1-5. In order to detect differences between two variables with average values of 2.0 and 3.0, with standard deviations of 1.0 with $p=0.05$ and a power of 0.8, the number of objects required in each group was 16. Thus, a total of four times that value, i.e., 64 was selected as the number of study objects. The calculation was made using the on-line Power/Sample Size Calculator at the Department of Statistics, University of British Columbia.

The data were analysed using Excel. Including the Data Analysis Package (Microsoft, Redmond, WA). The answers to the questions were coded into numbers and entered into an Excel workbook spreadsheet. Both descriptive and analytical statistical methods were then applied to interpret the results of the study. Descriptive methods include calculation of average values and standard deviations.

When testing variables against each other, the null hypothesis was applied and F-test was used for testing the difference between variances, and t-test, for equal or different variances, was used for testing differences between variables. Linear regression was used to determine statistical correlations between variables.

RESULTS

The questionnaire was completed by 59 people (97%), 36 men and 23 women (61% and 39%, respectively). The age range was 75 to 97 years, average 81.8 years (Table 1). Ninety-one per cent of the respondents reported that they managed their oral hygiene unassisted: 49% used a standard manual toothbrush, 25% used an electric toothbrush and 25% combined both. Sixty-three per cent used interdental brushes and 65% used fluoride toothpaste (Table 1).

Seventy-six per cent reported that they attended dental appointments unaccompanied, while 9% had help from a transport service and 15% had the help of relatives. Fifty-three per cent of all participants had dental appointments twice a year; 2% attended only in an emergency e.g., toothache.

Those who used an electric toothbrush reported better oral health than those who used only a manual toothbrush ($p=0.02$), or those who used a manual toothbrush compared with those using a combination of both electric and manual toothbrushes ($p=0.002$) (Table 2). Furthermore, those who used only electric toothbrushes and those who used both electric- and manual toothbrushes, perceived that their oral health was better than those who used only manual toothbrushes ($p=0.0004$) (Table 2).

Sixty-three per cent of the respondents perceived their oral health to be good. The most common oral problems experienced during the last six months were dental calculus (68%), xerostomia (41%) and gum recession (25%) (Table 3). In a separate question about bleeding gums, 29% reported experiencing bleeding gums "sometimes or always". Those with regular oral hygiene habits perceived fewer oral problems. The results showed that those who brushed their teeth daily also used interdental cleaning more frequently and reported fewer oral health problems. They also perceived their oral health to be better and reported fewer problems with mouth dryness.

With respect to general health, 75% of the participants perceived their general health to be good and 78% underwent annual general health check-ups. Forty-three per cent of the participants reported cardiovascular problems, 34% diabetes and 32% reported no diseases. The average consumption of medications was 3.8 with a maximum of 17 medications per day and a minimum of zero.

A linear regression and correlation analysis showed that the perceived general health status as the independent variable, gave a linear correlation between perceived general health and perceived oral health, with a coefficient of determination (R^2) of 0.99 with p values in the range 0.005 to 0.007 (Figure 1).

Some of the participants mentioned problems with toothbrushing and oral hygiene because they found it difficult to hold a toothbrush, or because of tooth loss. The majority (82%) of the participants did not expressly state a need for domiciliary dental care: 93% were not aware that such a service was available. Furthermore, 85 % had not received any information from dental staff: of those who were aware of such a service, 10% had received information from dental staff and 5 % had received information from relatives or friends. In an

open question the participants were asked to comment about managing their oral hygiene and about domiciliary dental services.

With reference to the questions about domiciliary dental services the participants answered *“My dentist and dental hygienist had informed me about domiciliary dental services. I often had to cancel my dental appointments because of difficulties getting to the clinic”*.

Several of the participants commented on domiciliary dental services: *“I do not know what domiciliary dental services are”*, *“I want domiciliary dental services when needed”*, *“I will come to the dental office as long as I can remember the way and have the ability to get there”*.

Table-1: Participants' gender, age, accommodation, household composition and oral hygiene habits.

Gender	N (%)
Women	23 (39)
Men	36 (61)
Age	
75-80 y	30 (51)
81-85 y	18 (30)
>85 y	11 (19)
Accommodation	
Own home	55 (93)
Other	4 (7)
Household composition	
Alone	21 (36)
With spouse	35 (59)
With children	6 (10)
Frequency of toothbrushing	
1-2 times a day	69%
More than twice a day	20%
3-4 times a week	3%
Once a week	7%
Never	0%
Interproximal cleaning	
Interdental brush	37 (63)
Toothpicks	24 (41)
Dental floss	19 (32)
Other	1 (2)
None	6 (10)
Use of oral care products	
Fluoride toothpaste	56 (95)
Fluoride rinse	20 (34)
Saliva stimulant	7 (12)
Saliva substitutes	1 (2)
Other	2 (3)

Table-2: Perceived oral health with reference to different kinds of toothbrush

Perceived oral health	N (%)	Average	SD (SEM)	p
Using only manual toothbrush	29 (50)	1.24	0.95 (0.18)	n/a
Using only electric toothbrush	15 (25)	1.93	0.80 (0.21)	0.02
Using both electric and manual toothbrush	15 (25)	2.20	0.56 (0.14)	0.002
Perceived oral health				
Using only manual toothbrush	29 (50)	1.24	0.95 (0.18)	n/a
Using electric	30 (50)	2.07	0.69 (0.18)	0.0004

n/a= not applicable

Table-3: Perceived oral problems during the six months expressed in percentages (%). It was possible to answer more than one option.

	%
Dental calculus	68
Oral dryness	41
Receding gums	25
Swollen/bleeding gums	16
Bad breath	14
Tooth loss	14
Toothache	13
Ulcer/pain in the mucosa	9
Caries	7
Coatings/discolourings	7
Tongue coatings	2
Other problems	11

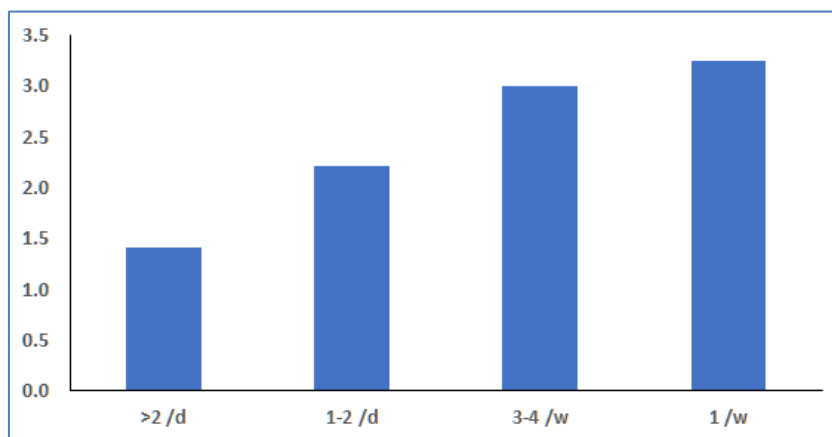


Fig-1: Degree of self-perceived oral health problems during the last 6 months compared to reported frequency of toothbrushing. d = times per day, w = times per week. y-axis = average number of reported oral problems.

DISCUSSION

The aim of the present study was to explore how independent elderly people perceive their oral health and to determine their knowledge of domiciliary dental services and their understanding of the need for such a service. The results showed that 63% of the participants perceived their oral health to be good and the majority (91%) managed their daily oral hygiene unassisted. Similar findings are reported in a recent interview study (Koistinen *et al.*, 2021) where the participants were generally satisfied with their oral health and wanted to manage their daily oral care independently. They had a strong desire to remain independent for as long as possible. Also, nearly 80% of the participants in the current study visited their dentist unaccompanied Public Dental Health Service and half of them attended twice a year. This is also in accordance with a study by (Dederig & Henning, 2013) reporting that 67.5 % of all persons aged 75 and older in Scandinavia reported good oral health.

Seventy-five percent of the participants in the current study perceived their general health to be good, although almost half had cardiovascular disease and more than 30 % had diabetes. Zhang *et al.* (Zhang *et al.*, 2018) reported that the incidence of diseases such as

high blood pressure, cardiovascular disease and diabetes increases with old age. Nearly 80% of the participants in the present study reported undergoing general health check-ups every year. According to the National Board of Health and Welfare (2020), adults with good general health also experience better oral health. This was also confirmed in the current study: those who considered their general health to be good also perceived their oral health to be good. Studies have reported the desire of elderly people to live independently for as long as possible and to be able to take care of themselves (Tkatch *et al.*, 2017, van Leeuwen *et al.*, 2019). Being independent and able to manage activities of daily living contributes to a sense of control (van Leeuwen *et al.*, 2019) and affects older people's perceptions of their health and well-being (Tkatch *et al.*, 2017).

In the current study, 69% of the participants reported that they brushed their teeth once or twice a day, 95% used fluoride toothpaste and 63% used interdental cleaning aids. In another Swedish study, (Norderyd *et al.*, 2015) reported that 75% of the 70-year-olds and older people attended private dental practices, that 85% of all participants brushed their

teeth twice a day with fluoride toothpaste and 40% of the 50- 80-year-olds used toothpicks.

Furthermore, the participants who used an electric toothbrush experienced significantly better oral health than those who used a manual toothbrush. Studies have confirmed that compared with a manual toothbrush, an electric toothbrush is more effective in removing dental plaque and controlling gingivitis (Jain 2013, & Grender *et al.*, 2020). Electric toothbrushes are also easier to hold, an advantage for elderly people whose manual dexterity may be impaired (Hitz *et al.*, 2011). Interproximal dental may also be difficult for those with limited manual dexterity.

Another interesting finding was that only 15% of all participants had received information about domiciliary dental services from dental personnel, relatives, or friends. Out of these, 18 % had expressed a need for domiciliary dental and oral care. There is a need to raise awareness about the availability of domiciliary dental services. Most of the participants stated that they did not know what domiciliary dental services were. Frail non-institutionalized seniors may be entitled to domiciliary dental services: this not only provides timely oral care in a safe home environment, but also ensures continued contact with dental care providers while avoiding unnecessary travelling to a fixed clinic (Lee *et al.*, 2004, National Board of Health and Welfare, 2020). Lundqvist *et al.*, (Lundqvist *et al.*, 2015) reported that domiciliary dental care for elderly nursing home residents has a lower societal cost and is more cost-effective than treatment at fixed clinics. They also emphasized that in order to meet the current and predicted need for oral health care in the ageing population, alternative methods of dental care delivery should be available. This indicates that there is a need for domiciliary dental services for mildly disabled independent elderly people who live in their own homes. This was also shown in the present study. The respondents cited the most common problems as dental calculus, oral dryness, and discomfort swallowing and chewing. Among care-dependent elderly in nursing homes, not only professional cleaning, but also education, such as oral hygiene instruction with “hands-on” training, is effective in controlling dental plaque, gingival bleeding and root caries (Girestam Croonquist *et al.*, 2020 & Sjögren *et al.*, 2016).

With increasing age and debility, a considerable number of elderly people may lose contact with their dental service providers. Thus, there is also a need to organize geriatric dentistry and clarify its place in the chain of care (Aström *et al.*, 2014). Dental care providers must collaborate with other healthcare professionals to create the prerequisites for good oral health (Walls, 2014). A new challenge in dentistry would be the development of person-centred care for older persons, in collaboration with nursing personnel

providing daily support through home care and in nursing homes (Ástvaldsdóttir *et al.*, 2018).

To our knowledge, there are few studies of domiciliary dental services for elderly people with mild disabilities who live independently. It is important that dental personnel are proactive in informing patients of different dental services available, at a time when the patient can still reflect on the alternatives. Further studies are warranted into the potential role of domiciliary dentistry for independent elderly people in the community.

Limitation

The recruitment of participants was based on convenience. Fewer women participated in the study and this limits generalization of conclusions. It would have been preferable to include more participants. However, during the ongoing Covid 19 pandemic, it was difficult to attend the dental clinics and the elderly were also discouraged from non-urgent dental attendance. The study collected data from elderly people who were able to visit the dental clinic, whereas the results may have been different if data had been collected from those who were unable to attend.

CONCLUSIONS

The majority of participants reported good oral health, and there was also a correlation between perceived general health and oral health. However, there is still a need to raise awareness among independent elderly people in the community that they may be entitled to domiciliary dental services.

Conflict of interest

The authors declare no conflict of interest.

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