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Research Article

Oral Care, Oral Health and Associated Nutrition Related Problems in Icelandic Nursing Home Residents

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Abstract

Background and aims: Old adults in nursing homes have often poor oral health and malnutrition. The aim of this study was to investigate the associations between oral health and nutrition related problems in Icelandic nursing home residents.

Methods: This cross-sectional study included older adults (> 67 years, N = 82) from two nursing homes from the Reykjavik capital area, Iceland. Two dentists performed a clinical examination using the Oral Health Survey form and a clinical dentist collected further data. Information on nutrition related problems (possible range from 0 to 8) were retrieved from the Oral Health Impact Profile.

Results: The mean decayed, missed and filled teeth (DMFT) index was around 26, however, still 42% of participants rated their oral health as good. Two thirds of the participants were in need of dental therapy and a similar proportion of participants had the last dentist's visit > 1 year ago. More than 40% had complete dentures and the number of nutrition related problems was 4.8 ± 2.5.

According to age and sex adjusted analysis, poor DMFT was significantly related to difficulties to chew, avoiding certain foods, stop eating food and to not being able to eat, however, not to changes in taste perception. Having complete dentures was very similarly associated with these nutrition related problems. Length of residence was related to changes in taste perception and difficulties to chew, however no significant relations could be seen between need for dental therapy, last dentist's visit and nutrition related problems.

Conclusion: In Icelandic nursing home residents oral health is poor and there is a great need for improved oral care. The frequency of nutrition related problems related to malnutrition is high and poor oral health is significantly associated with these problems as it is length of residence.

Keywords: Oral Health; Malnutrition; Old Adults

Introduction

Older adults living in long term care facilities often face difficulties in approaching dental care when needed, which increases the risk for poor oral health in this group. High expenses related to a dentist's visit, ignoring the importance of appropriate oral care, mobility limitations and anxiety related to the discomfort of dental interventions have been speculated to be related to a low frequency of dental care access [1]. Additionally, a limited enthusiasm of some dentists to bring dental service to institutionalized old adults can worsen oral health in this group [1].

Thus, not surprisingly, research has been shown that older adults staying in nursing homes have poor oral health status [2]. Further typical characteristics of nursing home inhabitants, e.g., multi-morbidity, help needed for oral hygiene, functional limitations in hands as well as polypharmacy, have been reported to further negatively affect oral diseases older adults [3].

Several studies have indicated that a poor oral health status is related to higher odds of malnutrition [4]. The frequently observed loss of teeth and/or failure of dental rehabilitation can be related to a loss of chewing abilities and potentially to a decrease of intake of nutritious food. Residents of institutions who have become completely toothless face great restrictions in their dietary choices and experience less satisfaction when eating, unintentional weight loss as well as a risk of being undernourished [5].

Recognizing the growing number of old adults living in long term care facilities as well as the the relevance of oral health status for the general health as well as potentially for nutrition status in older adults, the aim of this study was to investigate the associations between oral care, oral health and nutrition related problems in Icelandic nursing home residents.

Materials and Methods

Subjects and study design

This cross-sectional study included older adults (67 years and older, N = 82) who were recruited from two nursing homes from the Reykjavik capital area in Iceland which were run by the same operator and thus offered comparable facilities and services for residents. The participants were permanent residents at the nursing homes. Potential participants were excluded from participation if they had a diagnosis of dementia or if they were bedridden. After presenting the study's objectives at the nursing home facilities, residents could volunteer for study participation. The head nurses from the wards confirmed that potential participants met the inclusion criteria.

The study was authorized by the Icelandic National Bioethics Committee (nos. 12-207 and 12-207-1) and reported to the Data Protection Committee (no. 6204) and has therefore been performed in accordance with the ethical standards as described by the Declaration of Helsinki 1964 and its later amendments. The subjects gave their written informed consent before participation in the study.

Study conduct

Two dentists performed a clinical examination at the nursing homes in an examination room which was equipped with an adjustable chair for the participants, including examination lights, multi-purpose mouth mirrors, periodontal scalers, fluoride varnish, disposable brushes, alcohol and disinfectants, and disposable personal protective equipment (rubber gloves, face masks). If a participant had caries, fluoride varnish was applied to the treatment area. The same materials and utensils were used in both homes.

A clinical dentist collected further oral health related and general data from the participants using various self reported questionnaires, although participants received support when needed in answering the questionnaires.

Measurements

Clinical examination

The results from the clinical examination of oral and dental health were recorded using the Oral Health Survey form (OHS) according to the standards of the World Health Organization. The OHS instrument has been widely used to monitor dental and oral diseases and also to examine the need for prevention and measures to maintain the dental health of residents in residential and nursing homes. For the present study, the following variables from the clinical examination were used: Need for oral therapy (yes vs. no), complete dentures (yes vs. no), decayed, missed and filled teeth (DFMT) index.

The dental index was recorded as DMFT, which is a measure of the number of damaged, filled or lost teeth in an individual. Information was recorded on 28 of the 32 teeth, i.e., third molars were not included in the evaluation. An index of 0 means that the individual has all 28 teeth present and they are undamaged, while a DMFT 28 means that all 28 teeth are damaged, filled or lost [6].

Self rated oral health

The participants rated their oral health in three categories: good vs neutral vs bad.

Oral Health Impact Profile (OHIP)

OHIP is a 49 items questionnaire consisting of 7 subscales which assesses the social impact of poor oral health. It measures people's perception of the impact of oral disorders on their well-being, i.e., functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability and handicap caused by oral conditions. The questions are answered using a Likert scale (0 = never, 1 = very rare, 2 = sometimes, 3 = often, 4 = very often), thus, OHIP results into a score between 0 and

196 and higher scores indicating higher negative impact on well being due to poor total health [7].

Information on eight nutrition related problems was retrieved from single questions from OHIP

- Do you have experienced changes in taste perception because of problems with your teeth, mouth, or dentures?
- Do you have less taste perception because of problems with your teeth, mouth, or dentures?
- Do you have difficulties to chew because of problems with your teeth, mouth, or dentures?
- Do you have difficulties with your digestion because of problems with your teeth, mouth, or dentures?
- Do you avoid food because of problems with your teeth, mouth, or dentures?
- Do you have to stop eating because of problems with your teeth, mouth, or dentures?
- Are you unsatisfied with food because of problems with your teeth, mouth, or dentures?
- Are you not able to eat because of problems with your teeth, mouth, or dentures?

These nutrition related answers were dichotomized into "yes" and "no". The summary score of these possible nutrition related problems had a potential range from 0 to 8.

Background variables

Data on background variables, i.e., gender, age, education, length of residence (≤ 1 year vs. > 1 year), help with oral hygiene, smoking, etc. were collected using questionnaires.

Statistical analysis

The data were analysed using statistical software (SPSS, version 26.0, SPSS, Chicago, IL, USA). Normality of data variables was checked using the Kolmogorov-Smirnov test. Data are presented as mean ± standard deviation (SD).

Differences between groups at baseline were calculated using independent samples' t-test (normally distributed variables) or Mann-Whitney-U test (not normally distributed variables) and chi-square test for categorical variables.

Associations between length of residence, oral care and nutrition related problems were investigated using logistic regression models adjusted for age and sex. Associations between oral health and nutrition related problems were also investigated using logistic regression models. All estimates were reported as odds ration (OR) with 95% confidence intervals (95% CI). The level of significance was set at $P < 0.05$.

Results

The characteristics of the participants can be seen in table 1. The characteristics of male and female participants were similar (with exception of education). The mean DMFT index was around 26 and more than 55% had at DMFT of 28, however, still 42% of participants rated their oral health as good. Around two thirds of the participants were in need of dental therapy and a similar proportion of participants had the last dentist's visit more than one year ago. More than 40% had complete dentures and the mean number of nutrition related problems was 4.8 ± 2.5.

		Men			Women		
Variable	**(n = 28)**			**(n = 45)**			**P-value***
Age (years)	86.6	±	5.7	86.9	±	5.9	0.817
smoking (yes)		17.9%			8.9%		0.257
Basic school education		50.0%			82.2%		0.004
Widowed/alone/not married/divorced		92.9%			95.6%		0.622
Length of residence more than 1 year		50.0%			44.4%		0.644
Good self rated oral health		39.3%			46.7%		0.176
DFMT index	25.5	±	3.9	25.8	±	2.9	0.765

DFMT index = 28		57.1%			55.6%		0.929
OHIP	34.4	±	20	36.3	±	19.9	0.691
Frequent dry mouth		60.7%			66.7%		0.606
In need for oral therapy		67.9%			66.7%		0.916
Last dentist visit more than 1 year ago		64.3%			64.4%		0.989
Complete dentures		42.9%			40.0%		0.809
Receive no help with cleaning dentures or teeth		66.7%			79.5%		0.410
Nutrition related problems	4.6	±	2.7	5.0	±	2.3	0.579

Table 1: Characteristics of the participants.

*P-value based on chi square test for categorical variables, independent samples t-test for normally distributed continuous variables and Mann Whitney U test for not normally distributed continuous variables.

Table 2 shows the association between length of residence, oral care and nutrition related problems. In this age and sex corrected analysis, length of residence was related to changes in taste perception, less taste and difficulties to chew, however no significant relations could be seen between need for dental therapy, last dentist's visit and nutrition related problems.

Variable	Outcome	OR	95%CI		P-value
Length of stay more than one year	Change in taste perception	3.19	1.13	9.01	0.029
	Difficulties to chew	2.82	1.04	7.64	0.041
	Less taste perception	3.57	1.28	9.99	0.015
	Difficulties in digestion	2.61	0.98	6.96	0.056
	Avoid food	1.38	0.49	3.87	0.543
	Stop eating	2.09	0.79	5.48	0.135
	Unsatisfied. with food	2.36	0.88	6.38	0.089
	Not able to eat	0.67	0.23	1.97	0.466
In need for oral therapy	Change in taste perception	2.21	0.79	6.21	0.133
	Difficulties to chew	2.26	0.82	6.19	0.114
	Less taste perception	0.86	0.31	2.41	0.774
	Difficulties in digestion	1.97	0.71	5.49	0.195
	Avoid food	1.39	0.48	4.03	0.543
	Stop eating	1.04	0.38	2.82	0.941
	Unsatisfied. with food	2.33	0.84	6.43	0.103
	Not able to eat	1.04	0.33	3.23	0.948
Last visit to dentist more than one year ago	Change in taste perception	1.09	0.38	3.09	0.873
	Difficulties to chew	1.35	0.49	3.70	0.556
	Less taste perception	1.24	0.45	3.42	0.682
	Difficulties in digestion	1.18	0.44	3.18	0.750

	Avoid food	0.86	0.29	2.56	0.786
	Stop eating	1.56	0.57	4.27	0.392
	Unsatisfied. with food	1.16	0.42	3.20	0.778
	Not able to eat	1.16	0.42	3.20	0.778

Table 2: Associations* between length of stay, oral care and nutrition related problems.

*Analysis based on logistic regression adjusted for sex and age.

Table 3 shows the associations between oral health and nutrition related problems. Poorer DMFT status was significantly related to difficulties to chew, avoiding certain foods, stop eating food and to not being able to eat, however, not to taste perception. Having complete dentures was very similarly associated with nutrition related problems. Having frequently a dry mouth was related to stop eating and being unsatisfied with food.

Variable	outcome	OR	95%CI		P-value
DFMT 24-27 teeth**	Change in taste perception	1.68	0.37	7.69	0.507
DFMT 28 teeth**		2.07	0.67	6.41	0.207
	Difficulties to chew	1.43	0.34	6.14	0.626
		5.25	1.64	16.82	0.005
	Less taste perception	1.69	0.38	7.58	0.492
		1.79	0.59	5.42	0.303
	Difficulties in digestion	3.14	0.67	14.67	0.145
		3.31	1.00	10.96	0.050
	Avoid food	4.59	0.92	22.80	0.063
		9.00	2.56	31.76	<0.001
	Stop eating	2.02	0.43	9.44	0.371
		3.06	0.93	10.06	0.065
	Unsatisfied with food	3.13	0.68	14.38	0.142
		4.32	1.37	13.64	0.013
	Not able to eat	3.13	0.68	14.38	0.142
		4.32	1.37	13.64	0.013
Having complete dentures	Change in taste perception	1.42	0.52	3.89	0.498
	Difficulties to chew	3.89	1.32	11.50	0.014
	Less taste perception	1.52	0.56	4.10	0.410
	Difficulties in digestion	1.23	0.48	3.16	0.670
	Avoid food	6.61	1.72	25.34	0.006
	Stop eating	4.62	1.68	12.72	0.003
	Unsatisfied. with food	5.46	1.74	17.16	0.004
	Not able to eat	5.46	1.74	17.16	0.004
Having frequently a dry mouth	Change in taste perception	1.34	0.48	3.72	0.576
	Difficulties to chew	1.06	0.39	2.87	0.912
	Less taste perception	1.61	0.59	4.40	0.349
	Difficulties in digestion	1.12	0.42	2.98	0.824

	Avoid food	2.04	0.71	5.81	0.184
	Stop eating	3.65	1.23	10.78	0.019
	Unsatisfied. with food	3.15	1.14	8.75	0.028
	Not able to eat	2.79	0.96	8.16	0.061

Table 3: Associations* between oral health and nutrition related problems.

*Analysis based on logistic regression adjusted for sex and age.

** As compared to DFMT 12 - 23 teeth.

Discussion

This study investigated the associations between oral care, oral health and nutrition related problems in Icelandic nursing home residents. We found that oral health is poor in these older adults and that there is a great need for improved oral care. The frequency of nutrition problems which are often a precursor of malnutrition is high and poor oral health is significantly associated with these problems as it is length of residence. However, we could not find any associations between need for dental therapy and nutrition related problems.

Appropriate oral care and oral rehabilitation are important for the maintenance of good oral health in older adults [8]. It has been previously reported that nursing home participants have difficulties in either taking care about their own teeth/dentures by themselves and they do not always get the help needed for this task [9,10]. Further, it has also been suggested that old adults at care facilities do not have good access to a dentist's service [8,9]. Our results support these previously observed findings as the great majority of participants in our study did not receive support from staff for daily oral hygiene. Also, around two thirds of the participants were in need for dental therapy and a similar proportion reported the last visit to a dentist to be more than one year ago. It has been previously shown that older adults in long term care facilities have a high prevalence of a variety of oral health concerns [11,12].

Oral health is a crucial pillar of general health [13] and poor oral health has also been associated with nutrition related problems along with malnutrition in older adults [14]. Biofilm accumulation, dental caries and periodontal diseases have also been reported to decrease dietary intake and to increase the risk of malnutrition [15]. Our participants had very poor dental status with a mean DMFT index around [26] and nearly half of the participants had complete dentures. Not surprisingly, a high DMFT status and having complete dentures were both significantly related to higher odds of nutrition related problems.

Similar results were reported from a cross-sectional study from the United Kingdom, where around 50% of nursing home residents had poor oral function, which was associated with malnutrition [16]. In our study, the odds were particularly high for difficulties to chew and avoiding food due to oral health, but lower and/or not significant for changes in taste perception or less taste. As both high DMFT and having complete dentures were related to the majority of nutrition related problems, either of them can restrict dietary intake of affected older adults and predispose them for malnutrition [17] which by itself has been reported to be an important predictor of negative health outcomes [18].

It was unexpected that neither the last dentist's visit > 1 year ago nor needing dental therapy were significantly related to any of the nutrition related outcomes. It is possible that, considering the high DMFT and the high proportion of complete dentures, a visit to the dentist does not necessary change the likelihood of experiencing nutrition related problems in this group of older adults given the poor state of oral health they were in. However, it should be mentioned that the numbers indicated that need for dental therapy to be related to higher odds of several nutrition related problems, although the calculation did not reach statistical significance, probably related to the limited statistical power of the present study.

Interestingly, length of residence was negatively related to taste perception in our participants. As this result is based on an age-adjusted analysis, higher age in participants who have higher length of residence does not explain this relationship. However, length of residence might by related to general poorer health and thus to a higher amount of medication [19], which both can negatively affect taste perception in old adult [20,21], although this remains speculative, as we did not have information on general health status or medication use of our study participants.

Strengths and limitations

It is a limitation of this study that it is of cross-sectional design and thus cannot identify the direction of an observed association,

i.e., what is a cause and what is a consequence in a relationship of two variables. Further, given the limited sample size, statistical power was not enough to be able to detect several increased odd ratios as significant.

Unfortunately, there was no data available on body weight or nutrition status of the study participants, which would have strengthened the results of our study. But we think that our study still provides valuable information about old adults in long term care facilities in Iceland, highlighting the urgent need of improved oral care and considering the high frequency of nutrition related problems, also highlighting the emphasis on appropriate nutrition in order to maintain good nutrition status and health in old adults.

Conclusion

This cross-sectional study in Icelandic nursing home residents showed that oral health is poor in this older adults and that there is a great need for improved oral care. The frequency of nutrition related problems related to malnutrition is high and poor oral health is significantly associated with these problems as it is length of residence.

Conflict of Interest

The authors declare no conflict of interest.

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