MASTEROPPGAVE

Health literacy in elderly in Northern Norway- association with socioeconomic status and general health/oral health

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Abstract

Objective: The aim of this study was to investigate whether oral health and health literacy are associated which diseases, medication, self- reported health/oral health and socioeconomic factors in a group of people ranging from 50 to 80 years of age.

Materials and methods: The study consisted of 61 patients, 27 men (52-78 years; M=61.6 years) and 34 women (51-80 years; M=61.0 years). They had oral examination including dentition status by DMFT (decayed, missed, filled teeth), plaque index, gingival index and stimulated saliva sampling. A questionnaire was completed regarding demographic and social status, educational level, as well as self-reported health and self-reported oral health. Health literacy level where assessed by utilizing the Adult Health Literacy Instrument for Dentistry (AHLID).

Results: By using multiple regression analyses we found an association between health literacy and the use of medication. Furthermore, there are also associations between self- reported health, and income.

Conclusion: We can confirm earlier studies that those with low health literacy level tend to be more ill and that those with higher self-reported health have higher levels of education and income. Consequently, we find it important to establish the literacy level and other relevant factors for every patient in order to provide the best treatment for each individual.

Thus, we interpret our result that it is important to know a person's literacy level, and consider complex factors to be sure that each individual get information regarding own oral health, and can understand, interpret and act in a correct way.

Keywords: health literacy, oral health, health, elderly

Introduction:

In order to treat patients the best possible way, dental personnel and patients have to communicate and understand each other. A key fundament in oral health care is good communication between patient and the clinical personnel. Both oral health self- care and clinical dental care are factors that contribute to disease prevention. The patients also need to be aware of the preventive regimes and services in order to benefit from them (1).

Health literacy

Today there are numerous definitions of health literacy, and there seems to be no commonly accepted definition (2). In this study, health literacy was understood like in its original sense, *the ability to read and comprehend essential health-related materials* (3).

Information may be offered both orally and written. In many cases the information is first given orally, preceded by the handover of some printed material to convey directions and instructions (4). Examples may be prescriptions for medication, post- operative instructions and information about oral problems (5). To which degree a patient understands and interpret this information, is referred to as *literacy* (4).

Health literacy is important, because poor levels of literacy contribute to disease, which has consequences both for the patient and the taxpayers. Patients with low literacy have less knowledge of health and health status than those with higher level (6), they are less likely to follow preventive regimens than patients with higher literacy level (1), and seldom identify themselves as struggling with literacy (6). Those at highest risk for low literacy level are individuals 65 years or older and individuals with less than high school education (1). .

Situation in Norway

The life expectancy in Norway is quite high (women: 83.4 years and male: 79.4 years (14)), and the number of old people over 65 years increase (7). Differences in socioeconomic status influences health (8). According to a study of an elderly population, individuals without a high- school education had worse psychological and mental health status than those with a high- school degree (9).

Self- reported Health

 A study of Norwegian pensioners discovered that 76.5 % of non- institutionalized subjects over 65 years of age appraised their oral health as good, and 78.9 % reported good general health (10). High age does not correspond to assessment of bad self- reported health. Rather the degree of a normal daily living, including good physical performance, influences to what extent elderly report good health. There was no significant correlation between objective health and self- reported health (11).

General Health

There is a close relationship between overall health and oral health (5). Oral diseases share common risk factors, such as unhealthy diet, tobacco use and harmful alcohol use, along with other chronic diseases like cardiovascular diseases (CVD), cancer, chronic respiratory diseases and diabetes. It has been seen that people with CVD have generally worse periodontal (gum and surrounding tissue) conditions than that of the healthy individual, and those with periodontal disease seem to have a higher risk of developing CVD. An association between diabetes and increased risk for the occurrence and progression of periodontal disease has also been found (12).

Frequent oral health problems

The most common oral diseases are caries and periodontal disease. They are both plaque- induced, and can to some degree be prevented or controlled (5).

Dental caries experience (enunciated by DMFT), prevalence of periodontal disease, objective/subjective dry mouth and oral precancer/cancer is used as an indicator of good or bad oral health. Bad oral health may cause social problems, problems with chewing and therefore also nutrition problems, that can affect people's daily activities and well- being. Poor oral health and poor general health are interrelated, because of common risk factors (12).

Many elderly today have natural teeth. In Norway one in five over 60 years is today edentulous. In 1975 this applied to over 60%. At the same time the prevalence of periodontal disease and caries increased among individuals with natural teeth (13). Chronic diseases and high consumption of medication may have negative influence on oral health (14), and taken this into consideration, the treatment of elderly is quite complex, and gives dental personnel many challenges.

Quantitative reduction in the saliva flow rate is defined as hyposalivation, while the subjective complaint of dry mouth is classified as xerostomi. These two are related, but not always. The main reason for decreased saliva flow is pharmacotheraphy (15), but also diseases (e.g Sjøgrens syndrom, diabetes) and radiation- theraphy (16). Hyposalivation is a well-recognized risk factor for dental caries. There are a relationship between medication intake, complaints of dry mouth, salivary flow rate and composition, and the rate of tooth demineralization in situ (17).

The drugs most responsible for xerostomi and hyposalivation are tricyclic antidepressants, antipshycotic, atropinics, beta-blockers and antihistamins (12, 18). Also a combination of 3 medications or more (which may or may not include any of the previous mentioned medications) can cause hyposalivation. Nearly 60% of drug- users in Norway over 70 years used more than 5 different drugs (15).

The encounter between patient and dentist or dental hygienist, is an opportunity for patients to receive oral health information, guidance, and learn skills for their self-care in order to reduce the risk of developing oral diseases (1). However, information may be presented without checking that

the presentation is clear and that communication has been successful. In addition, some patients are not willing to reveal that they have trouble understanding information or that they do not know a term that appears to be known by others (19).

In order to present the information adapted to the patients' level of understanding, during the counseling, the health literacy level has to be known to the dental personnel. If the level of literacy is considered, it is possible to reduce inequalities in oral health (20).

According to Rudd (2005) it is important to find the link between health literacy and oral health (5). Thus, the aim of our study was to investigate whether diseases, medication, self-reported health and self-reported oral health were associated with health literacy and whether this was associated with oral health in a population 50 to 80 years of age. Furthermore, we wanted to investigate the association between health literacy and socio-economic status. In addition we wanted to find out how self-reported health is associated with the same factors as health literacy. At the same time we wanted to look for correlations between health literacy and self- reported health. Based on the information above, our hypothesis is that elderly patients with a low health literacy level have worse oral health, more diseases and a higher use of medications than those with higher literacy level. We also hypothesize that self-reported health/oral health and socioeconomic factors are associated.

Materials and Methods:

Study subjects

This study was a part of the study "Oral health in adults: associations with attitude, literacy and psychological factors", accomplished in 2010- 2012, at the Institute of Clinical Dentistry (IKO), University of Tromsø and Public Dental Service Competence-Center of Northern-Norway (TkNN). Participants had to master the Norwegian language and be over 20 years of age. One- hundred and forty-six adults gave their informed consent to participate in the total study, among them two were excluded as they did not fit the inclusion criteria, eight were not available for participation in the data collection period, and six did not complete the questionnaire on background information, which gave a participation rate of 130 adults. The final number of participants in this study was sixty- one adults aged 51 to 80 years of age, of them 27 men, 52-78 years (mean: 61.6) and 34 women, 51- 80 years (mean: 61.0).

Survey procedure

All participants were recruited from a waiting list of persons seeking care at the University Dental Clinic in Tromsø, Norway. Subjects were contacted by telephone, and asked if they would like to participate. Those who accepted to participate received an enquiry, which had to be signed and returned, and then they were contacted by phone again to make an appointment. All study participants gave their signed, informed consent before inclusion in the project.

Assessment of health literacy

Health literacy level, to what extent participants was able to understand oral health information, were assessed by utilizing the Adult Health Literacy Instrument for Dentistry (AHLID) (Molund, manuscript in preparation). This instrument was adapted from the instrument used to measure general literacy by the Organization of Economic Co-operation and Development (OECD) (21). The AHLID consists of printed materials on oral health information, like prescriptions, information brochures on oral diseases and post-operative letters already in use in Norwegian dental clinics. Participants were asked to read the ten selected texts one by one, followed by a question from each of the materials. Since the AHLID measurement is not supposed to be a test of participants' memory, they were in titled to keep each text to be able to search for the right answer after the question was asked. The texts and questions had different levels of difficulty required to distinguish between different health literacy levels:

- Inadequate health literacy level; Respondents scored on a level considered not sufficient in order to cope with today's oral health information demands.
- Marginal health literacy level; Respondents scored on a level considered the minimum for understanding important oral health information.

- Adequate health literacy level: Respondents scored on a level considered adequate, and will be able to cope with available oral health information.

The assessments took place in a suitable room free from disturbing noises, as well as any kind of dental equipment. The same researcher conducted all assessments.

Questionnaires

In conjunction with the clinical examination, a questionnaire was completed regarding demographic status, social status, educational level, as well as self- reported health and self- reported oral health. The level of education was recorded into the following categories:

- Not accomplished high school and
- Accomplished high school and tertiary education

Health scheme

Before oral examination every patient had to clarify health information, including medications and diseases using a standardized "helseskjema" at TkNN. The information was recorded by a researcher in the project, and recorded into use of medication or not, and having a disease or not.

Oral examination

All the participants went trough a standardized clinical examination, which were performed by the same examiner. The clinical examination also included a stimulated saliva sample. The clinical examination for recording oral health status was carried out in a standard dental environment in a dental chair, using the dental chair light, a mouth mirror and a probe.

The oral health parameters used were dentition status by DMFT (decayed, missed, filled teeth) index (22), plaque index (23) and gingival index (24). All teeth (excluding third molars) were examined.

Ethical requirements

The Regional Medical Research Ethics Committee (RREC) approved the study in accordance with the Helsinki Declaration. The medical situation was considered, and if the clinical examination showed oral or medical disease the patient was informed and referred to a dentist or medical doctor for further examination and treatment.

Statistical analyses

Statistical Package for the Social Sciences (SPSS) version 19.0 for Windows was used for statistical analyses in the study. All data was already available in the computer- file. Pearson correlations and multiple regression analysis were used with backward regression (exclusion of the predictors in the order of their part- correlation to the dependent variable).

Results:

Table 1 shows the oral health characteristic, including DMFT, plaque index, gingival index and stimulated saliva, of the examined patients, as well as the age distribution.

Table 1: The age distribution and oral health characteristics of the examined patients

Table 1. Characteristics of examined patients				
	Mean	**Min**	**Max**	**SD**
Age	61.3	51	80	7.3
DMFT	22.6	13	28	3.2
Plaque index	0.49	0.0	1.75	0.39
Gingival index	1.22	0.26	1.95	0.35
Stimulated saliva	2.14	0.56	4.89	1.0

Figure 1 show the distribution of the dependent variable health literacy: 24% (n= 15) had an inadequate level, 56% had a marginal level (n= 34), and 20% reached an adequate health literacy level (n= 12).

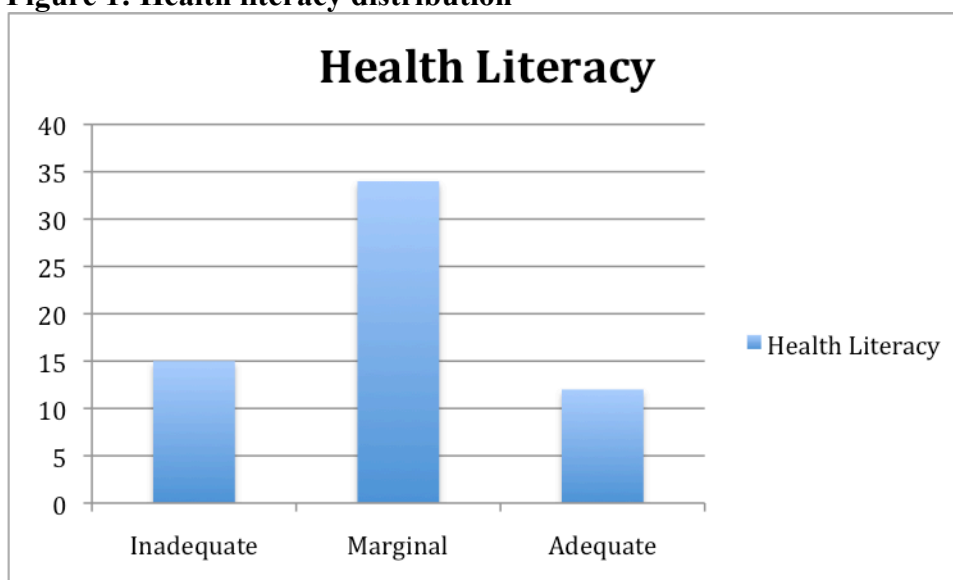**Figure 1: Health literacy distribution**

Table 2: Distribution of socioeconomic status and health variables

Table 2. Characteristics of examined patients		
Variables	**Frequency**	**Percentage**
Education		
≥ High school	46	75
< High school	15	25
Income		
< 200 000	3	5
200 000 – 399 999	20	33
400 000 – 599 999	18	29
> 600 000	20	33
Disease		
No disease	23	38
Disease	38	62
Medication		
No medication	23	38
Medication	38	62
Self- reported oral health		
Bad	3	5
Good	49	80
Excellent	9	15
Self- reported health		
Bad	4	6
Good	15	24
Excellent	42	70

The social status, here reported by education and income, was good for the major part of the participants. Seventy five % had completed high school, and 5% had very low income. Those who reported disease also used medication. Most of the participants reported of good oral health and excellent general health (Table 2).

Correlation with health literacy and studied variables was calculated. A significant negative correlation could be seen for health literacy and use of medication. A high correlation, but not significant, could be found for self-reported health and health literacy. No significant correlation of the other variables could be found (Table 3).

Table 3: Correlation table health literacy

Table 3: Correlation with health literacy	
Variables	**Health literacy**
Medication use	-0.278*
Self- reported health	0.244
Sex	0.147
Age	- 0.174
Education	0.082
Income	0.105
Self- reported oral health	0.023
Gingival index	- 0.181
Plaque index	- 0.105
DMFT	0.039
Stimulated saliva	0.020
Disease	- 0.133
*p<0.05	

Multiple regression to predict health literacy based on the value for medication use and self-reported health (Table 3) resulted in a regression coefficient in the first model of R = 0.322 (R^2 = 0.104, adjusted R^2 = 0.073). A backward regression resulted in R = 0.278 (R^2 = 0.077, adjusted R^2 = 0.062) and medication use remaining in the equation; sig. 0.030* (β = -0.336).

Correlation with self-reported health and studied variables was also tested. A negative significant correlation was demonstrated for gingival index, DMFT and medication-use. A positive significant correlation could was found for income. A high positive correlation, but not significant, was found between self-reported health and health literacy. No significant differences could be found for self-reported oral health, or the other variables tested (Table 4).

Table 4: Correlation table self- reported health

Table 4: Correlation with self- reported health	
Variables	**Self- reported health**
Health Literacy	0.244
Income	0.408**
Gingival index	- 0.279*
DMFT	- 0.257*
Medication- use	- 0.324*
Sex	0.048
Age	- 0.225
Education	- 0.184
Self- reported oral health	0.171
Disease	- 0.181
Plaque index	- 0.150
Stimulated saliva- sample	- 0.065
*p<0.05, **p<0.01	

Self- reported health was tested in a multiple regression model based on the significant variables (including health literacy) in the correlation table (Table 4). The beta- weights and significances are presented in Table 5. The regression coefficient in the first model was R = 0.541 (R^2 = 0.293, adjusted R^2 = 0.227). A backward regression resulted in the final model: R = 0.480 (R^2 = 0.230, adjusted R^2 = 0.203). The results were income sig.0.004** (β = 0.363) and medication use sig. 0.070 (β = - 0.224) (Table 5).

Table 5: Regression analyse self- reported health

Table 5: Multivariate regression analyses with self-reported health as dependent variable		
Variables	**Standardized Coefficients**	**Sig.**
	Beta	
Income	0.363	0.004**
Medication use	- 0. 224	0.070

The relationship between health literacy and self- reported health was shown in a cross tabulation (Figure 2). Most of the participants scored on marginal health literacy level, and excellent self-reported health.

Figure 2: Association between health literacy and self- reported health

Health literacy and self- reported health, Cross tabulation

| | | Self- reported health | | | |
		Bad	Good	Excellent	Total
Health Literacy	Inadequate	4,9% (n=3)	6,6 % (n=4)	13,1% (n=8)	24,6% (n=15)
	Marginal	0% (n=0)	16,4% (n=10)	39,4% (n=24)	55,8% (n=34)
	Adequate	1,6% (n= 1)	1,6% (n= 1)	16,4% (n=10)	19,6% (n=12)
Total		6,5% (n=4)	24,6% (n=15)	68,9% (n=42)	100% (n=61)

Discussion:

Statistical analyses

The use of both correlation coefficients and multivariate statistical analyses when studying variables associated with health literacy was in our opinion fruitful. The correlation coefficients gave the basic information of associations, while the multivariate methods showed their interrelations. In the statistical analyses the variance in the final model of the regression analyses was quite low, but this is normal in clinical studies.

Health literacy

This study has highlighted that an assessment of health literacy was important because people with low literacy level showed a high medical consumption. A high intake of medications is an expression of underlying diseases. Chronic diseases have been found to reflect current poor health status, and the relationship with health literacy might be the result of negative effects of low literacy throughout life (25, 26).

Our result was in accordance to Rudd that claimed: "The health literacy skills among older adults do vary based on education, health- related limitations and access to resources", and their results confirmed that low socioeconomic status may influence health literacy in a bad way (5). Socioeconomic status also influences prevalence of disease, with a higher rate of health problems in the low- economic group, including oral health problems. The health problems was not directly related to low income or educational level in it self, but low socioeconomic status often leads to a lifestyle that have consequences for health (27). Low literated patients have a risk of not receiving proper treatment, because they do not understand the instructions given by health personnel (28). In this group most of the participants had good socioeconomic status. 25% of the participants had low education, and 5 % in poverty (below 50% of median income, which in Norway, 2011 was 411 000) (33).

There were no significant association of oral health and health literacy in our study. The reason for this may be that the generation over 50 years of age, especially in Northern Norway during childhood had low access to oral health care, not access to fluoride, and many had also bad economy that resulted in poor oral health (7). The poor oral health status in Northern Norway was confirmed in a survey from 1979 (29). The generation in this study had already high caries-experience, but most of the participants had more than 20 teeth. Studies have shown that 9- 10 pairs of occluding teeth might be enough to maintain masticatory function, occlusal support and dental stability for most elderly people (30, 31), so the patients in this study may have good prerequisites to maintain good oral function. Thus, health literacy level in our study could not explain any changes in oral health probably because of pre-existing bad oral status, and overall good socioeconomic status today.

We believe that it is important to study health literacy, because it is a signal to health care personnel whether the information they give reach its target, the patients. It can also help dental care personnel to improve health-enlightenment, and thereby improve oral health status among the patients. The main goal of finding health literacy level is to minimize inequalities in health, despite of socioeconomic differences (27).

Self- reported health

We found a significant correlation between self-reported health, and gingival index and DMFT. However, this could not be found in the following multiple regression analyses. Anyhow, the results from the correlation could be a marker that it is important of viewing the mouth as part of the rest of the body. Furthermore, in this study we only had 61 patients, which also raise the question that our results might be different if more patients were included.

In this study we found a significant correlation between self-reported health and medication-use, but the multivariate regression analyses did not give a significant result, only a tendency that medication use was important. Many of the patients in this study reported oral health as good, and reported general health as even better, which were in accordance to a study of Norwegian and Swedish pensioners (32).

There were no significant correlation between self- reported health and the saliva sampling. This may be because we only had stimulated saliva sample, and medication influences mostly non-stimulated saliva (18). Also, the patients themselves reported medication use, and it is possible that some patients missed to report medication, and therefore we did not have a total list of medications for each patient. According to this self-reported medication- list, there are only a few (n=6) who used more than 3 medications.

As the multiple regression analyses showed, self- reported health and socioeconomic status, described by income, was significant in our study. As mentioned earlier in this discussion, socioeconomic status is of importance for general health.

Connection between health literacy and self- reported health

The distribution of the dependent variable health literacy showed 24% with inadequate level, 56% had a marginal level, and 20% reached an adequate health literacy level. The distribution of the other dependent variable self- reported health was 6% reporting bad self- reported health, 24% good health, and 70% reported excellent health.

It is interesting that nearly half of the participants with inadequate health literacy level report of excellent self-reported health, but that might be a result of the patients' perception of health is often different from health personnel. Many people have an objective disease, but they report themselves as healthy, and vice versa.

Another surprising result was that one of the participants with adequate health literacy report of bad self- reported health, but that of course might be a result of a serious medical condition. Baker (1997) studied the relationship between patient reading ability of self- reported health and use of health services, and reported the percentage of *poor self-reported health* according to literacy level. In this study of 913 participants, 32.5% with inadequate level reported of poor self- reported health, 29.9 % with marginal level, and 17.7 % with adequate literacy level reported poor self-reported health (28). These results did not correspond with our results that may be due to a low number of participants. In total only 6% of the participants reported bad self- reported health, which may be a result of good socioeconomic status.

As expected most of the participants with adequate health literacy report excellent self-reported health, and those with marginal health literacy had either good or excellent self-reported health.

Conclusions:

In this study of ageing patients we have found an association between health literacy and medication-use that may be a sign of disease. However, we did not find a correlation between health literacy and the oral health variables. But a correlation between self-reported health and gingival index and DMFT was found. We also found a correlation between self- reported health and income and medication- use. The further analyses showed the importance of income and general health. The complex aetiology of oral diseases highlights the fact that general health and medication should be considered when treating patients. It is also important to know a persons literacy level, to be sure that each individual get information regarding own oral health, in a way that this person can understand and interpret, and act in a correct way.

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