

The functionality of masticatory apparatus and the sense of depression in patients over 55 years of age living in a family environment and social care centres

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Summary

Aim. The aim of this study was to determine the relationship between the masticatory apparatus functionality and a sense of depression in patients over 55 years of age living in a family environment and the Social Care Centres (SCC).

Methods. Shortened version of the Geriatric Depression Scale (GDS) was used to assess the wellbeing of patients and their state/sense of depression. The clinical evaluation of masticatory function was performed during one appointment in the natural light. The clinical criterion for the retention of masticatory function, adopted by the World Health Organization was a contact between at least 20 opposing teeth, natural or artificial.

Results. Among patients with a low number of GDS points (0–5), statistically significantly higher proportion of people living in family houses (69.4%) maintained functionality of masticatory apparatus than of people living in SCC (23.5%). In contrast, among patients with a higher number of GDS points (6–15), statistically significantly higher proportion of patients living in SCC (70.8%) did not maintain functionality of masticatory apparatus than of those living in family houses (41.7%).

Conclusions. Patients with a sense of depression living in Social Care Centres were more likely to report lack of functionality of masticatory apparatus than patients with a sense of depression living in family houses. The presence of a growing sense of depression significantly affected a lower rate of preserved functionality of masticatory apparatus or vice versa.

Key words: the functionality of mastication, Geriatric Depression Scale, depression

The study was not sponsored

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Introduction

Depression is one of the most common, the most important and the least recognized health problems in elderly people [1, 2]. If the treatment is proper, in most cases it is possible to cure the illness. Population studies show that up to 25% of adults report symptoms of depression [1]. Symptoms of depression are three times more common in people over 65 years of age than in the rest of the population [3, 4].

In case of the elderly people, their reactions to the events and circumstances of life associated with aging, diseases and decreased physical fitness are assumed to be the main cause of the majority of depressive disorders. In addition, a change in the social function, property status, health, and social relationships is also influential. Too many changes can be overwhelming and can lead to the development of depression or exacerbate its symptoms. Retirement, bereavement and informal care or living in a social care centre or old age home also has an impact on the psychosocial status of the elderly people.

Depression and mental health problems are often seen as a matter of “secondary importance”. However, their effects are not limited only to emotional disorders, but they affect many aspects of patients’ life. Depression can exacerbate or modify the course of many diseases, lead to poor compliance with recommendations on medication and make somatic symptoms, related to other chronic diseases, more severe [5]. Depression is sometimes perceived, both by patients and people related to them, as a sign of weakness of character and inability to cope with everyday life. The onset of depression is often insidious and therefore it may be difficult to diagnose [6]. Stress and deterioration of physical condition are the factors accelerating the development of depression in the elderly people [7]. Deterioration of general health is a major cause of impaired performance affecting the ability to perform daily activities unassisted (e.g. walking, proper nutrition, dealing with personal hygiene, unassisted washing and getting dressed) [8].

Reduced activity, mobility and ability to overcome stress occur in elderly people due to the lower reserve of energy. Independent functioning is a critical indicator of health and well-being. Decreased physical condition and weaker neuromuscular coordination adversely affect older people’s ability to live independently and significantly affect the risk and the need for institutionalization. It is worth to mention that the life of the elderly people in social care centres is significantly different from the life of their peers living in family houses [9–14].

Undoubtedly, one of the main criteria of relative satisfaction and optimism, characterizing the quality of life is to maintain full health and functioning of masticatory apparatus, which provides social and biological benefits in terms of aesthetics, comfort, chewing ability, taste and speech [15–17]. Dietary habits and foods consumption are important throughout lifetime, but they are of particular importance in the elderly people. Any nutritional deficiencies may lead to increased incidence of various diseases and infections. There is a relationship between mastication ability and physical fitness. Mastication ability affects the degree of physical fitness and quality of daily life [11, 18].

A possibility of comprehensive, free dental treatment is currently very limited. Oral cavity health condition of people living in social care centres is worse than of those living individually or with the closest ones [11, 17, 18]. The General Assembly of the World Dental Association at the conference in Singapore in 2009 issued the following statement [19]:

“1. Toothlessness and poor health often coexist. No causal link has been found. 2. Loss of all teeth causes changes in the perception of an oral cavity, which can be only partially compensated by using dentures. 3. Total loss of teeth can be hard to accept, therefore careful psychological preparation by a dentist is recommended before tooth extraction. 4. The use of the prosthesis can positively contribute to the overall well-being and daily functions of the oral cavity of toothless patients. 5. The prosthesis owners often modify and limit the choice of foods and, therefore, their diet may be improper as compared to the people with dentition” [19].

Currently there are not many publications on the relationship between functionality of masticatory apparatus and a sense of depression depending on the living environment of patients over 55 years of age.

Material

Study group consisted of 226 patients, including 106 patients living in two Social Care Centres (SCC) and 120 patients living in family houses. The study included patients who agreed to participate in the project. Among the respondents there were 110 men and 116 women aged 55 to 101 years. The mean age of the SCC residents was 73.8 years, while the mean age of respondents living in family houses was 67.4 years.

Method

Shortened version of the Geriatric Depression Scale (GDS) by Yesavage (1983) [20] was used to assess the well-being of patients and their state/sense of depression. Patients responded unassisted to 15 questions by circling the selected answer “YES” or “NO”. Patients were informed about taking into account the last two weeks. According to the key of depressive points, patients were classified with accordance to the recommendations of the author of the scale: 0–5 points – no sense of depression, 6–15 points – the sense of depression with increasing severity. Participation in the study was anonymous. Patients filled in the questionnaires unassisted. In addition, respondents answered questions about satisfaction with oral cavity health. The survey included 202 patients. In case of 24 patients living in Social Care Centres the survey was partially or completely skipped due to various chronic systemic diseases. The clinical evaluation of masticatory function was performed during one appointment in the natural light. The clinical criterion for the retention of masticatory function, adopted by the World Health Organization was a contact between at least 20 opposing teeth, natural or artificial [21]. The study design was approved by the Pomeranian Medical University Bioethics Committee (BN-001/137/07).

Analysis of the material was performed in three age groups: 55–64, 65–74 and over 75 years. Comparisons of the investigated variables for two independent groups were performed using Student's t-test. The incidence of categories of qualitative variables was compared using the χ^2 test of independence or χ^2 test of independence with Yates' correction. Acceptable probability of the first kind error (the significance level of the test) was $p = 0.05$.

Aim

The aim of this study was to determine the relationship between the masticatory apparatus functionality and a sense of depression in patients over 55 years of age living in a family environment and the Social Care Centres.

Results

In all the examined patients, it was found that 56.6% of them had their own teeth, and 43.4% of them was toothless. Edentulism occurred twice as often in patients living in SCC (59.4%) than in patients living in family houses (29.2%). This difference was statistically significant ($p < 0.001$).

Table 1. **Numbers and percentages of patients with maintained functionality of masticatory apparatus among patients living in SCC and in family houses**

Place of residence	Functionality based on teeth:						Total	
	natural		natural and artificial		artificial			
	n	%	n	%	n	%	n	%
Social care centre	2	1.9	16	15.1	8	7.5	26/106	24.5
Family house	17	14.2	23	19.2	38	31.7	78/120	65.0
Total	19	8.4	39	17.3	46	20.4	104/226	46.0

$p < 0.001$

Maintained functionality of masticatory apparatus was found in 24.5% of patients living in SCC and in 65% of patients living in family houses ($p < 0.001$). Functionality based on natural or artificial teeth occurred significantly more often in patients living in family houses than those living in SCC. In case of functionality based on natural and artificial teeth no statistically significant differences were observed between the two studied groups. Satisfaction with oral cavity health was declared by 22.7% of respondents living in SCC, and nearly 2 times more respondents living in family houses (43.3%) ($p < 0.01$). Eating problems associated with the teeth or dentures condition were declared significantly more often by patients living in SCC (58.5%), compared to the respondents living in family houses (49.2%) ($p < 0.05$).

Table 2. The relationship between satisfaction with oral cavity health and the presence of teeth in patients living in SCC and those living in family houses

Satisfaction with oral cavity health	Type of dentition								Total			
	present				edentulism							
	SCC		family house		SCC		family house		SCC		family house	
	n	%	n	%	n	%	n	%	n	%	n	%
Yes	11	11.2	38	31.7	13	13.3	14	11.7	24	24.5	52	43.3
No	29	29.6	47	39.1	45	45.9	21	17.5	74	75.5	68	56.7
Total	40	40.8	85	70.8	58	59.2	35	29.2	98 ¹	100.0	120	100

¹ 8 patients living in SCC did not answer this question in the survey

$p < 0.01$

Table 2 illustrates the relationship between satisfaction with oral cavity health and the type of dentition. It shows that patients living in SCC who were toothless more frequently showed dissatisfaction with oral cavity health than respondents living in family houses. This difference was statistically significant ($p < 0.001$).

Table 3. Numbers and percentages of patients without depressive disorders (GDS ≤ 5) and with depressive disorders (GDS $> 5 \leq 15$) in the three age subgroups in both studied groups

Age [years]	GDS points							
	≤ 5				$> 5 \leq 15$			
	SCC		family house		SCC		family house	
	n	%	n	%	n	%	n	%
55–64	7	8.5	34	28.4	17	20.7	15	12.5
65–74	4	4.9	22	18.3	12	14.6	16	13.3
≥ 75	6	7.3	16	13.3	36	43.9	17	14.2
Total	17	20.7	72	60.0	65	79.3	48	40

$p < 0.05$

No symptoms of sense of depression were significantly more often found in patients living in family houses (60.0%) compared to subjects living in SCC (20.7%), and a sense of depression with increasing severity was statistically more frequently found in subjects living in SCC (79.3%) than in those living in family houses (40%). It was found that in patients over 75 years of age a sense of depression was statistically significantly more frequent among SCC residents (43.9%) than in those living in family houses (14.2%), $p < 0.05$.

Table 4. Relationship between masticatory apparatus functionality and the number of GDS points in patients living in SCC and in family houses

Masticatory apparatus functionality	GDS points							
	0–5				6–15			
	SCC		family house		SCC		family house	
	n	%	n	%	n	%	n	%
Yes	4	23.5	50	69.4	19	29.2	28	58.3
No	13	77.0	22	30.6	46	70.8	20	41.7
Total	17	100	72	100	65	100	48	100

$p < 0.01$

Among patients with a low number of GDS points (0–5), statistically significantly higher proportion of people living in family houses (69.4%) maintained functionality of masticatory apparatus than of people living in SCC (23.5%). In contrast, among patients with a higher number of GDS points (6–15), statistically significantly higher proportion of patients living in SCC (70.8%) did not maintain functionality of masticatory apparatus than of those living in family houses (41.7%).

Discussion

Society aging, that has been observed for a certain period, is a universal phenomenon which needs to be faced because of its unquestionable impact on health care costs and quality of patients' life [22]. Among the factors affecting the quality of elderly patients' life, Xavier in the first place puts the general and mental health condition, while the factors positively modifying the quality of life include physical activity, financial security and participation in family and social life [23].

This study aimed at finding the relationship between the oral cavity health condition and the presence of depressive symptoms determined on the basis of the GDS. Analyzing the clinical condition of the oral cavity of the studied seniors it was found that 43.4% of patients had edentulism. In respondents living in SCC the percentage of toothless people was 59.4%, and in those living in family houses this percentage was two times lower (29.2%). Such a large disparity between two groups occurred probably due to a different awareness of patients living in family houses and those living in SCC regarding the methods and treatment options, and limited access to dental care among SCC residents. Also, the fact that the mean age of the respondents living in SCC was higher than of those living in family houses – 73.8 and 67.4 years respectively, could have an impact on such a significant difference in the proportion of toothless people.

Despite the fact that the whole world observe a decrease in the percentage of edentulous elderly people, nationwide monitoring of oral cavity health shows that this trend does not apply to Poland. In recent years there has been observed an increase in the number of edentulous elderly people aged 65–74, which in 2009 was 43.9% [24]. In studies conducted by Gałczyńska-Rusin of 2011 edentulism was found in more than

50% of patients looking for treatment in the Department of Geriatric Dentistry, whereas among hospitalized patients in 37% [25]. Analyzing both groups together, edentulism was found in 45.2% of cases, which is similar to studies conducted by Jodkowska [24]. In our study, the percentage of edentulous people was 43.4% for patients over 55 years of age. This may be affected by the financial situation of older people. Seniors the most often benefit the reimbursement forms of dental treatment. Tooth extraction is still the basic method of pain treatment. For the majority of respondents from Szczecin and surrounding area in a paper published in 2008 [18] range of treatments reimbursed by the National Health Fund is insufficient [18]. Kabat in his studies also demonstrated that the most common reason for the decision on the patient's tooth extraction was a pain, and one in every four respondents from Szczecin and every fifth respondent from the West Pomeranian Province removed the tooth due to economic reasons, but they were aware that the tooth could be saved. In the works of foreign authors it was showed that among Americans aged 65–74 years, the proportion of edentulous persons was 46.1% [26]. It should be noted that this work was published 20 years ago, and the rates of edentulous people are similar to the values obtained in our research. In New England, in a study conducted 10 years later, in comparison to the above mentioned data, the percentage of edentulous people aged over 70 years was 37.6% [17]. These data are more optimistic than those obtained in our study, despite the time interval. This may result from a different approach to the treatment of dental patients in other countries, or this is the result of preventive and educational activities used since the early teenage years.

Poor oral cavity health among patients living in SCC is the result of a large medical negligence of both the interested parties as well as the health care system. It should be definitely emphasized that the patients themselves often are not interested in the treatment of teeth and their health needs are often limited only to get rid of the pain. In Poland there are no health-preventive actions that would be directed to the oldest patients.

The functionality of masticatory apparatus is one of the determinants of well-functioning stomatognathic system. Our study shows that among all the people only less than a half (46%) maintained masticatory apparatus function (Table 1). In SCC it was present in 24.5% of the residents, and among patients living in family houses in 65% of patients respectively. Types of teeth for which masticatory apparatus function was maintained were also distinguished, and only 8.4% of functions resulted from the contact between natural teeth, 17.3% was related to the presence of contact between natural and artificial opposing teeth, and 20.4% to the contact between artificial teeth only. In more than a half of the respondents masticatory apparatus function was not maintained. Such a high percentage of people who did not have the normal function of the masticatory apparatus indicate that the importance of the role of oral cavity in the overall context of general health is still underestimated. Problems with pronunciation and foods consumption still appear to be something “natural” for seniors, something resulting from age, not negligence. Not all the participants were aware of consequences that may be related to this, and to make matters worse, not all of them demonstrated the need to change this.

Iwanicka-Frankowska [21], in the studies from the years 1998 and 2002 conducted in Poland, found that masticatory function was maintained in 70.1% and 69.4% of respondents respectively. The study involved patients aged 65–74 years. Data from the West Pomeranian Province from 2002 (61.5%) are close to the values that were obtained in patients living in family houses, and at the same time more than twice as high compared to the percentage of people with maintained masticatory apparatus function living in Social Care Centres obtained in this paper. Lower values of the indicator in our study compared to the national mean value may also derive from less awareness of seniors of the need and possibilities of prosthetic treatment.

Satisfaction with oral cavity health was declared by 22.7% of respondents living in SCC, and by nearly two times more patients living in family houses (43.3%) ($p < 0.01$) (Table 2). Subsequently problems with eating related to the teeth or dentures condition were significantly more often declared by patients living in SCC (58.5%), compared to the patients living in family houses (49.2%) ($p < 0.05$). It can be noticed that worse oral cavity health of Social Care Centres residents influences the perception and functioning in both physical life and in the assessment of the concept of satisfaction and quality of life related to health, which combines biological and psychological aspects of health. Analyzing the relationship between satisfaction with oral cavity health and types of teeth, it was found that patients living in SCC who were toothless more frequently showed dissatisfaction with the oral cavity health condition than respondents living in family houses. This difference was statistically significant ($p < 0.001$).

The emerging issue of life satisfaction is undoubtedly related to the emotional and mental health condition of patients. In our study, it was found that 79.3% of respondents living in SCC and 48% of those living in family houses had a sense of depression with increasing severity (Table 3). The remaining patients did not show symptoms of depressed mood and a sense of depression. Also, the sense of depression has been increasing with age, and the highest was reported in patients aged over 75 years, both in patients living in SCC and in family houses. Studies by Koczorowski and Jundził-Bieniek conducted with the use of 15 points GDS showed that the highest proportion of people with depressive features occurred in people living in Social Care Centres (33%), and in a hospital environment (30%) [27]. The lowest number of people with depressive traits was reported among over 65 years old Third Age University students currently living in family houses. Szybalska et al. in a study on approximately 1800 respondents aged over 55 found the symptoms of moderate to severe depression in 25% of men and 35% of women [28]. She proved that there is a positive correlation between age and the GDS results. In the youngest age group (55–59 years), symptoms of depression were related to approx. 20% of respondents, while among the oldest, over 90 years old, approx. 46% showed symptoms of depression. They have also shown that depressive symptoms are related to the family situation. Among people living alone symptoms of depression were more common than among those living with the family (36.9% vs. 27.9%; $p < 0.005$). Symptoms that were in favour of the diagnosis of depression were found in more than a half of the respondents living in Social Care Centres. These studies also showed a positive correlation between financial situation and the incidence of depressive symptoms.

In other studies, it was shown that mental well-being had an impact on satisfaction with life [29]. However, this relationship was statistically insignificant, although the level of probability was very high. Gałczyńska-Rusin, in her dissertation concluded, using an abbreviated version of the GDS, that among patients looking for treatment in Gastroenterology Clinic depressive symptoms were related to 24.6% of them, whereas among patients hospitalized in other departments occurrence of depressive symptoms was related to 33% of patients [25]. This indicates the impact of general illness and hospitalization on the occurrence of symptoms of a depression. Subsequent authors have noted other relations, namely that the people living in Social Care Centres which were often visited by relatives showed a significantly lower rate of depression compared to those who did not have contact with relatives [30]. Bidzan et al. found a statistically significant relationship between the level of intellectual, physical, and social activity and the GDS score. People who showed a high degree of both intellectual, physical and social activity scored lower in the GDS, compared to those who were characterized by a low degree of individual activity [31].

In our study we paid particular attention to the relationship between the sense of depression and functionality of masticatory apparatus in patients over 55 years of age (Table 4). It was found that among patients with a low number of GDS points (0–5, no symptoms of sense of depression) statistically significantly higher proportion of people living in family houses (69.4%) maintained the functionality of masticatory apparatus than of people living in SCC (23.5%). In contrast, in patients with a higher number of GDS points (6–15) statistically significantly higher proportion of patients living in SCC (70.8%) did not maintain masticatory apparatus functionality than of those living in family houses (41.7%). It can be concluded that the occurrence of sense of depression with increasing severity significantly affected lower rate of maintained functionality of masticatory apparatus, or vice versa. Among patients with a sense of depression (GDS 6–15) living in family houses 41.7% did not maintain functionality of masticatory apparatus and in Social Care Centres 70.8% respectively. This difference was statistically significant. Unfortunately we were unable to reach papers, which would touch on the relationship between depression and functionality of masticatory apparatus in patients over 55 years of age. On the other hand, it indicates the usefulness of our research on this topic.

Geriatric Depression Scale (GDS) is a tool designed specifically for self-assessment of sense of depression in people over 55 years of age [32, 33]. This test can be a simple element of the examination, useful in dental practice because it gives a possibility of pre-interpretation to which the expert knowledge is not necessary. Without any doubts, readability for patients and brevity are advantages of this scale. Filling in the questionnaire takes an average of 8–10 minutes [27]. Great prevalence of depressive symptoms in our study and studies conducted by other authors points to the need to include mental health assessment to elderly patients routine examination [28]. It should be added that the GDS questionnaire can be only a subsidiary tool in the assessment of the sense of depression in seniors. High scores obtained during the examination can be only an introduction to the diagnosis of depression and possible treatment. Without a confirmation by specialized clinical trial the patient cannot be too hastily

and definitively classified as suffering from depression or not. Dentist who examined a patient over 55 years old with high GDS score may be the first who will direct the patient for further in-depth diagnosis and possible treatment. In everyday dental practice a dentist can often meet symptoms of depression such as pain, especially in the area of the head, neck and occiput, dry mucous membranes. Linking frequent ailments of older patient, which are not clinically diagnosed in dental practice, with certain mental health disorders is therefore very deliberate in dentistry [27]. Demographic projections related to the aging of the population is a basic prerequisite for the use of geriatric assessment in clinical practice of dentistry [28].

Conclusions

1. The low rate of maintained masticatory apparatus functionality was observed both in seniors living in family houses and those living in SCC, although it was significantly lower in patients living in Social Care Centres, which demonstrates high needs of prosthetic treatment and rehabilitation of masticatory apparatus of these individuals and of insufficient therapeutic effects in public health services.
2. Patients living in Social Care Centres were characterized with a lower level of mental condition and they were more often unsatisfied with the oral cavity health condition than respondents living in family houses.
3. Patients living in Social Care Centres, who had a sense of depression, were more likely to report lack of masticatory apparatus functionality than patients with sense of depression living in family houses.

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