

ORIGINAL ARTICLE

The usefulness of psychometric tests in dental treatment of patients aged above 65

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Abstract

Objective. The aim of this study was to analyze the occurrence of some psychological disorders in elderly people in three different social settings and to evaluate the impact of those problems on the adaptation of denture wearers to removable prostheses. **Materials and methods.** The study was conducted in three social settings: the geriatric clinic of a university hospital, nursing homes and a Third Age University school (TAU). Each group consisted of 70 randomly selected individuals. Of the total number of 210 subjects, 183 persons wore maxillary removable dentures while 150 had mandibular prostheses. Some symptoms of psychological disorders were diagnosed on the basis of results provided by two tests: GHQ and GDS. For identification of an inter-relationship between the use of removable dentures and the psychic status, the difficulties in adaptation to removable dentures were evaluated. **Results.** Statistical analysis showed that the number of individuals with depressive symptoms was significantly lower in the group of TAU students than among the nursing home residents. No statistically significant difference in the occurrence of depression was found between the group of hospital patients and the students of TAU. A comparison of the GDS test results with the incidence of denture use difficulties indicated a significant inter-relationship. **Conclusions.** The GHQ and GDS tests may prove useful in the prosthetic treatment of those removable denture wearers who complain of oral discomfort without manifesting any visible causes. The proportion of elderly with signs of psychic disorders is significantly lower among TAU students than nursing home residents and hospital patients.

Key Words: *Depression, elderly people, prosthetic treatment*

Introduction

Epidemiologic studies have shown a rapid increase in the number of people aged above 65 during the last decades [1]. The process of aging is an irreversible phenomenon whose course is modified by various environmental factors that affect the human body throughout its existence. The geriatric population is characterized by poly pathology, which is a simultaneous occurrence of several disease processes. That problem is combined with senile physiological changes affecting both the physical and psychic status of elderly individuals [2]. According to statistics, older age is an important risk factor for depression in the general elderly population [3]. The type of depression which begins after the age of 65 is called late-life depression (LLD), manifesting itself as dysphoria (with signs of irritability, fatigue, apathy) and

anhedonia (inability to experience pleasure). LLD is often connected with poor oral hygiene, advanced periodontal disease, rampant caries and xerostomia [4]. Individuals with depression are also dissatisfied with their life quality and complain of impaired oral cavity health [5,6].

It has been demonstrated that some chronic and psychic disorders may affect adaptation to dentures [7–9]. As it is more difficult for patients with prolonged diseases to adapt to new restorations, they require more follow-up examinations compared to healthy patients. That is caused by the fact that chronic diseases tend to affect oral cavity health, leading particularly to changes in the oral mucosa, reduced salivation and faster resorption of the osseous base of the mandible or maxilla [7]. A vital role is also played by psychological factors. Quran et al. [9] and Fenlon et al. [10] found a relationship between

Table I. The number and percentage of subjects in the social settings studied and GHQ scores.

Social setting	Individuals with psychic disorders (GHQ ≥ 3), <i>n</i> (%)	Individuals without psychic disorders (GHQ < 3), <i>n</i> (%)	Total, <i>n</i>
Hospital (Group 1)	36 (51.4)	34 (48.6)	70
Nursing homes (Group 2)	30 (42.9)	40 (57.1)	70
Third Age University (Group 3)	16 (22.9)	54 (77.1)	70
Total number for three groups and mean percentage	82 (39)	128 (61)	210

neuroticism and dissatisfaction with dentures. Shrivastava et al. [11] proved that patients exhibiting marked anxiety were less satisfied with their prostheses. Those findings demonstrate that adaptation to removable prostheses depends on many factors which may influence the effect of prosthetic treatment [7,9]. De Baat et al. [8] define the process of adaptation to removable dental restorations as the patient's ability to accept the replacement or improvement of dentures that satisfy technical and aesthetic requirements in such a manner that there is no reason for persistent complaints or dissatisfaction. An increasing number of the elderly in the general population indicates a greater need for prosthetic treatment in this age group and for an interdisciplinary approach to that complex problem [12].

Since the psychic problems of aging individuals may affect results of prosthetic treatment, collaboration between specialists in various fields has the potential to provide successful oral rehabilitation by ensuring a better understanding of the needs of patients with dental loss.

For the purpose of this study two psychometric tests were used: Goldberg's General Health Questionnaire (GHQ-12) and the Geriatric Depression Scale (GDS). The former is a screening examination that allows identification of signs of poor psychic well-being and, therefore, may be used to find some signs of anxiety or depression [13]. The Geriatric Depression Scale, according to Yesavage et al. [14] is the most widely applied self-administered diagnostic tool for identification of depression in the elderly [15,16].

The aim of this study was to conduct a comparative analysis of the occurrence of some psychic disorders

in elderly people in three different social settings and to evaluate the impact of those problems on the adaptation of denture wearers to removable prostheses.

Materials and methods

The study was conducted by the staff of the Gerodontology Department, Poznan University of Medical Sciences, in three social settings: the geriatric clinic of a university hospital (group 1), nursing homes (group 2) and a Third Age University school (group 3). In order to exclude individuals with impaired cognitive abilities from the analysis, a Folstein et al. [17] Mini Mental State Examination (MMSE) test was administered before the beginning of the study. Each group consisted of 70 randomly selected individuals aged 65 and above, with the mean age of 77.43 (SD = 6.69) in group 1, 79 (SD = 7.96) in group 2 and 72.7 (SD = 4.66) in group 3. The average age of TAU students was significantly lower than the age of patients from other environments ($p < 0.0001$).

Of the total number of 210 subjects (145 women and 65 men), 183 persons wore maxillary removable dentures while 150 had mandibular prostheses. The examination evaluated both complete and partial denture wearers. The number of edentate individuals in group 1 was 47.1%, in group 2 it was 58.6% and in group 3 it was 20%.

Psychic disorders were diagnosed on the basis of results provided by two tests: Goldberg's General Health Questionnaire (GHQ-12) and Yesavage's Geriatric Depression Scale (GDS-15). Individuals who scored above 2 points (GHQ ≥ 3) on the GHQ-12 were classified as those with symptoms of psychic disorders and patients receiving more than 5 points on the GDS-15 were diagnosed to show symptoms of depression [13,14].

The state of the prosthetic base and removable prostheses was assessed by one dentist in a dental examination. The examiner was instructed before the examination according to the WHO Basic Methods for Oral Health Surveys. First, the examiner-dentist examined a group of 10 subjects with a wide range of levels of disease status. Next, it was determined how consistently the diagnostic criteria had been applied by examining a group of 20 subjects twice (the group presenting a complete range of conditions expected to

Table II. A comparison of the number of subjects with signs of psychic disorders (GHQ ≥ 3) between each social setting.

Social settings compared	Two-fraction test		Result
	<i>u</i>	<i>p</i>	
Hospital vs nursing homes (group 1 vs 2)	1.19	0.24	No difference
Hospital vs Third Age University (group 1 vs 3)	3.73	0.0002	Significant difference
Nursing homes vs Third Age University (group 2 vs 3)	2.55	0.01	Significant difference

Table III. A comparison of the social settings according to GHQ test results.

	Hospital (group 1)	Nursing homes (group 2)	Third Age University (group 3)
<i>n</i>	70	70	70
Min	0	0	0
Max	12	12	11
Median	3.00	2.00	1.00
Mean	3.26	2.80	1.67
SD	2.83	2.82	2.52
Variable coefficient	0.87	1.01	1.51

be assessed in the main survey). By comparing results of the two examinations the examiner was able to obtain an estimate of the extent and nature of the diagnostic criteria.

An intra-oral clinical evaluation of the dentures was based on a grading scale that expressed the correctness of the position of the prosthesis in relation to the anatomical structures as follows:

- Very good status: very good denture adhesion to the prosthetic base, very good denture retention and stability, correct occlusal plane, correct vertical dimension of the bite.
- Good status: good denture adhesion to the prosthetic base, correct occlusal plane, reduced vertical dimension of the bite.
- Satisfactory status: poor adhesion, incorrect occlusal plane, reduced vertical dimension of the bite.
- Unsatisfactory status: lack of denture adhesion to the prosthetic base, lack of denture stability, reduced vertical dimension of the bite.

In order to identify a possible inter-relationship between the use of dentures and the psychic status, the difficulties in adaptation to removable dentures reported by the patients were evaluated.

Problems such as functional discomfort, taste disturbances, improper speech articulation, limited masticatory function or unsatisfactory esthetics were assessed. The subjects were asked to choose from them the one that they found to be the cause of their greatest discomfort, considering the maxilla and the mandible separately. Next, a comparative analysis of the studied aspects was conducted by means of a

non-parametric chi-square test and the relationship between the variables was assessed, taking into account psychic well-being. The significance level accepted for this study was $p = 0.05$.

The results of objective clinical examinations, the subjective opinions of the patients and the psychometric tests provided the basis for an analysis aimed at assessing a possible association between psychic condition and adaptation to removable dentures in the three social settings.

Because results of the study were quantitative data, parametric and non-parametric tests were used for statistical analysis. For a comparison of study results the following statistical tests were used: a two-fraction parametric test, a parametric *Z*-test based on normal distribution, an ANOVA parametric test and a non-parametric chi-square test. The differences between results to be compared were considered statistically significant when $p \leq 0.05$.

Results

Based on the General Health Questionnaire (GHQ-12) it was found that 51.4% of the hospital patients and 42.9% of the nursing home residents manifested symptoms of psychic disorders. The lowest percentage of individuals scoring above 2 points in that examination, 22.9%, was observed in the group of Third Age University students (Table I).

Statistical analysis demonstrated that the number of persons with psychopathologic symptoms ($\text{GHQ} \geq 3$) identified among the hospital patients and the nursing home residents was significantly greater than in the group of Third Age University students. No statistically significant difference in that respect was noticed between the nursing home residents and the hospital patients (Table II).

Regarding the mean GHQ-12 test scores, a statistically significant difference between the Third Age University students and the hospital patients was observed ($p < 0.003$). Test results above 3 points in the group of hospital patients suggested a greater frequency of psychic disorders in that social setting (Table III).

Based on the Geriatric Depression Scale (GDS-15) it was found that 33% of the nursing home residents and 30% of the hospital patients manifested symptoms of depression. The lowest number of individuals

Table IV. The prevalence of depression disorders ($\text{GDS} \geq 6$) in the social settings studied.

Social setting	Individuals with depression disorders ($\text{GDS} \geq 6$), <i>n</i> (%)	Individuals without depression disorders ($\text{GDS} < 6$), <i>n</i> (%)	Total, <i>n</i>
Hospital (Group 1)	21 (30)	49 (70)	70
Nursing homes (Group 2)	23 (32.9)	47 (67.1)	70
Third Age University (Group 3)	13 (18.6)	57 (81.4)	70
Total number for three groups and mean percentage	57 (27.1)	153 (72.9)	210

Table V. A comparison of the number of subjects with signs of depression disorders ($GDS \geq 6$) between each social setting.

Social settings compared	Two-fraction test		Result
	<i>u</i>	<i>p</i>	
Hospital vs nursing homes (group 1 vs 2)	0.36	0.72	No difference
Hospital vs Third Age University (group 1 vs 3)	1.59	0.11	No difference
Nursing homes vs Third Age University (group 2 vs 3)	1.96	0.05	Significant difference

with signs of depression, 19%, was observed in the group of Third Age University students (Table IV).

Statistical analysis showed that the number of individuals with depression symptoms was significantly lower in the group of Third Age University students than among the nursing home residents. No statistically significant difference was found between the group of hospital patients and the students of Third Age University (Table V).

A comparison of the three groups in terms of the mean GDS-15 test scores indicated no statistically significant differences between them ($F = 2.08$, $F_{cr} = 3.04$, $p = 0.13$) (Table VI).

Further analysis involved a comparison of the psychometric test results and problems with the use of removable dentures.

Statistical analysis demonstrated a significant inter-relationship between the GDS scores and difficulties experienced while using removable maxillary or mandibular restorations. Individuals with signs of depression were found to suffer more frequently from problems with adaptation to removable prostheses (Table VII).

A comparison of the GHQ test results with the incidence of denture use difficulties indicated no inter-dependence at a significance level of 0.05. However, patients with poorer psychic well-being ($GHQ \geq 3$) faced problems when adapting to removable dentures, particularly in the mandible, but this difference was not significant ($p = 0.06$) (Table VIII).

Discussion

The results obtained in this study were similar to those reported by other authors and confirmed that psychic disorders are often diagnosed in elderly people [18,19]. In a study reported by Cullum et al. [20], 34% of aged hospital patients scored 6 or more points on a GDS test. Michopoulos et al. [21] diagnosed a severe stage of depression in 14% of old patients hospitalized in surgery and internal medicine departments.

In the study reported in this paper it was confirmed that elderly residents of nursing homes suffer more

frequently from psychic disorders than older people living independently, which is consistent with results obtained by Rabins et al. [22].

These findings may be interpreted by assuming that people with psychic disorders are placed in nursing homes because of their general health status or that the severity of a psychic disorder depends on the type of social setting [18,19,22].

Since psychometric tests allow determination of the risk of psychic disorders, they may be useful in the evaluation of those states in people living in various social settings. It has been found that residents of hospitals or nursing homes have greater dental needs than non-institutionalized senior citizens [23–25]. Depending on the type of care facility, between 41–70% of edentulous institutionalized elderly need new complete dentures and there is a great need for a comprehensive program of prosthetic care in that group of patients [25,26].

This study demonstrated that a high score on the GDS was significantly correlated with the number of problems reported by removable denture wearers. A greater number of individuals with signs of depression complained of difficulties connected with the use of their restorations compared to those without any depression symptoms despite a similar anatomic and morphologic status of the prosthetic base. Comparable results were presented by John et al. [27]. These findings support the evidence that psychological factors play a significant role in the acceptance of complete dentures [9]. The findings of this study and of research by other authors suggest that the application of GHQ and GDS tests may be helpful in dentistry. Persson et al. [28] found a relationship between a high GDS score and the dentition status, tooth loss and chronic pain whereas Anttila et al. [29] observed no link between depression, caries, dental loss or the periodontium status. However, the author identified some correlation between depression signs, a subjective negative evaluation of dentition, an increased consumption of carbohydrates and infrequent dental check-ups. In contrast to Anttila et al. [29], Hugo et al.'s [30] findings suggest that depressive

Table VI. A comparison of the social settings according to GDS test results.

	Hospital (group 1)	Nursing homes (group 2)	Third Age University (group 3)
<i>n</i>	70	70	70
Min	0	0	0
Max	14	12	12
Median	3.00	3.00	2.00
Mean	4.14	3.91	3.09
SD	3.28	3.46	2.91
Variable coefficient	0.79	0.88	0.94

Table VII. Problems with the use of removable prostheses as against GDS test scores.

GDS score	Absence or presence of adaptation problems		Total
	No problems	Problems	
<i>Maxillary denture</i>			
< 6 individuals without depression signs	94 (70.1%)	40 (29.9%)	134
≥ 6 individuals with depression signs	26 (53.1%)	23 (46.9%)	49
Total number	120	63	183
Chi-square test ($\chi^2_{cr} = 3.84$)	χ^2 4.61		
	p 0.03		
<i>Mandibular denture</i>			
< 6 individuals without depression signs	61 (53.5%)	53 (46.5%)	114
≥ 6 individuals with depression signs	9 (25%)	27 (75%)	36
Total number	70	80	150
Chi-square test ($\chi^2_{cr} = 3.84$)	χ^2 8.93		
	p < 0.003		

symptoms are significant predictors of untreated caries.

Although Ide et al. [31] observed that GHQ-12 scores weren't associated with the oral health status measured by clinical indicators, they found a connection between some oral symptoms and psychic well-being.

Since the GHQ is mainly applied for diagnosing disorders in people utilizing generally available health-care facilities, it is believed that it may also be used in the dental office [32]. As far as the GDS is concerned, it is characterized by great reliability and validity confirmed by many clinical studies. The GDS may be a useful instrument for dentists because it permits a preliminary interpretation of certain aspects of the psychiatric status, without any need for specialist

psychological knowledge, when applied as part of routine history-taking during the examination of an older patient [27,28]. The most important advantages of the GDS are that it is easy to understand for the patient and not time-consuming, with a completion time of 8–10 min.

According to Philling [32], the psychic disorders usually seen by the dentist include depression, anxiety, conversion hysteria and body image disturbance. The most common signs accompanying depression that dentists encounter in their medical practice are such somatic symptoms as pain in the head, especially in the occiput or the nape and mouth dryness, whose causes may be difficult to diagnose [33,34]. Therefore, it is necessary to establish any links between those complaints of the patient that are not associated

Table VIII. Problems with the use of removable prostheses as against GHQ test.

GHQ score	Absence or presence of adaptation problems		Total
	No problems	Problems	
<i>Maxillary denture</i>			
< 3 individuals without depression signs	77 (70.6%)	32 (29.4%)	109
Individuals with poorer psychic well-being (GHQ ≥ 3)	43 (58.1%)	31 (41.9%)	74
Total number	120	63	183
Chi-square test ($\chi^2_{kr} = 3.84$)	χ^2 3.07		
	p 0.08		
<i>Mandibular denture</i>			
Individuals without symptoms of psychiatric disorders (GHQ score < 3)	49 (52.7%)	44 (47.3%)	93
Individuals with poorer psychic well-being (GHQ ≥ 3)	21 (36.8%)	36 (63.2%)	57
Total number	70	80	150
Chi-square test ($\chi^2_{kr} = 3.84$)	χ^2 3.56		
	p 0.06		

with symptoms visible in the oral cavity, such as pressure sores or areas of irritated or swollen tissue and some psychic disorders that are often diagnosed in older adults.

Conclusions

- (1) Psychometric tests allow the dentist to identify those patients who, due to a greater risk of prosthetic treatment failure, may require a psychological examination before receiving removable dentures.
- (2) Social setting appears to have an influence on the status of psychosomatic health in older patients.
- (3) The proportion of senior citizens with signs of psychic disorders, including depression, is markedly lower among Third Age University students than nursing home residents and hospital patients.
- (4) Individuals who exhibit depression symptoms tend to complain of problems with the use of removable dentures significantly more often in comparison with persons without psychic disorders.

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