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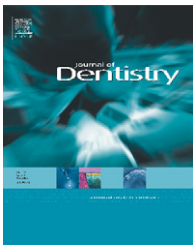

Influence of denture improvement on the nutritional status and quality of life of geriatric patients

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ARTICLE INFO

Article history:
Received 4 March 2008
Received in revised form
25 May 2008
Accepted 31 May 2008

Keywords:
Masticatory function
Nutritional status
Oral health-related quality of life
Denture improvement

ABSTRACT

Recent research suggests that there is a correlation between nutrition, oral health, dietary habits, patients' satisfaction and their socio-economic status. However, the dependent and independent variables have remained unclear.

Objective: This exploratory interventional study aimed to identify the impact of denture improvement on the nutritional status as well as the oral health-related quality of life in geriatric patients.

Materials and methods: Forty-seven patients who were capable of feeding themselves (minimum age: 60 years) and with dentures requiring repair or replacement were selected from a random sample of 100 residents of two nursing homes. Before and 6 months after the dentures were optimised a Mini Nutritional Assessment (MNA) and a masticatory function test were carried out. Nutritional markers (pre-albumin, serum albumin, zinc) were determined and an OHIP-G14 (Oral Health Impact Profile, German version) was recorded in order to determine the effect of the optimised oral situation on the patient's nutritional status and oral health-related quality of life.

Results: Despite the highly significant improvement in masticatory ability after the optimisation of the dentures, no general improvement regarding the nutritional status was observed since the albumin, zinc and MNA values remained unchanged and pre-albumin even decreased.

Conclusion: Since masticatory ability and masticatory efficiency are not the only factors affecting this, prosthetic measures alone apparently cannot effect a lasting improvement in nutritional status as masticatory ability and masticatory efficiency are not the only factors of influence. Nutrition is not only a matter of masticatory function, but also depends on other influencing factors (*e.g.* habits, taste and cultural customs as well as financial and organisational aspects).

1. Introduction

Several studies have described a correlation between the dental status, the masticatory performance[1] and the nutritional status of elderly patients.[2–5] Although masticatory performance tends to decline with decreasing number of teeth, the relationship between masticatory function and impaired food intake has been established more rarely for partially edentulous than for fully edentulous patients.[6,7]

Several studies report that an impaired ability to chew has a negative effect on food selection and diet[8–10] which is not necessarily reflected by the haematological analysis of

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0300-5712/$ – see front matter
doi:10.1016/j.jdent.2008.05.017

nutrition markers.[11] Although some authors demonstrated that masticatory performance does not affect general health,[12] recent research suggests that there is a correlation between nutrition, oral health, dietary habits, patients' satisfaction and their socio-economic status. However, the dependent and independent variables remain unclear.[13–16]

Most patients tend to overestimate considerably the condition of their dentition and nutritional status. Consequently, noticeable discrepancies between the subjective self-estimation of patients and objective evaluation of the dental status have been reported.[17,18]

In general, masticatory performance and oral health-related quality of life improve after optimising prosthetic restorations,[3,19] as reported in some studies. However, nutritional habits do not change significantly.[20] Nevertheless, it remains unclear whether improving a conventional prosthetic restoration affects the nutritional status, especially the blood-derived values of key nutrients.[13] The objective of the present study was hence to identify the impact of improvements in the prosthetic restoration on the nutritional status as well as the oral health-related quality of life.

The following two-fold null hypothesis was tested: optimising the condition of the prosthetic restoration does not improve the nutritional status (1) or the oral health-related quality of life of geriatric patients (2).

2. Methods

2.1. Patients

The dental status was examined and categorised in 100 randomly selected residents (age over 60) of two nursing homes in Olfen and Lüdinghausen, Germany (Table 1) using a four-grade evaluation scale.[21] Additionally, a medical history was recorded. The patients received a set meal for lunch and dinner but had the opportunity to ask for additional items of their choice. For breakfast, they could also select from different items.

From the random sample, the patients whose dental status was classified as being in need of improvement (Table 1, categories 3 and 4) and who were capable of feeding themselves ($n = 47$; 19 male = m and 28 female = f) were selected for this study. Patients addicted to medication, alcohol and/or drugs, suffering from malignant tumours, undergoing radiation therapy or who were unwilling to consent or incapable of consenting to participate in the study were excluded ($n = 13$; 6 m/7 f), thus leaving a total of 34 patients (13 m/21 f) for inclusion.

Table 1 – Evaluation of the dental status

Score	Description
1	Dentition/prosthesis in excellent clinical condition
2	Dentition/prosthesis in acceptable clinical condition[a]
3	Dentition/prosthesis requires treatment/repair/modification to prevent harm to the patient
4	Dentition/prosthesis is seriously defective and actually harms the patient, requiring immediate treatment/repair/modification

[a] Minimal deficits which do not require treatment.

Five patients (1 m/4 f) were provided with new full dentures, 12 received new removable partial dentures (4 m/8 f) and 3 (1 m/2 f) a new fixed restoration. In 14 cases (7 m/7 f), the existing restorations were optimised. In all patients, a follow-up examination was completed 6 months after treatment. The investigators (two dentists) were calibrated prior to the study.

The study was approved by the Ethics Committee of the Justus Liebig University, Giessen (Germany).

2.2. Methods

Both at the baseline examinations and at follow-up after 6 months, the dental status was evaluated and the following tests were performed:

- Mini Mental Status (MMS)[22] according to Folstein;
- Mini Nutritional Assessment (MNA)[23];
- Serum parameters: Ten millilitres of blood were taken from each patient to determine the serum values of pre-albumin, serum albumin and zinc. All blood samples were taken between 8 and 9 a.m. All patients had fasted for 12 h prior to sampling. Albumin and pre-albumin were measured by nephelometry, and zinc by atom absorption spectrometry;
- OHIP-G14[24,25];
- A test of masticatory function in order to evaluate the masticatory efficiency.[26]

2.2.1. MMS according to Folstein

The MMS[22] is a screening test for dementia diseases which tests time and 3D orientation, memory, ability to concentrate (attention, and ability to remember) and the coordination capacity. A maximum of 30 points is awarded in this test. Scores of 18–23 points indicate slight cognitive limitations and scores lower than 18 points signal severe cognitive limitations.

2.2.2. Mini Nutritional Assessment

The MNA[23,27,28] is a validated screening method for identifying the risk of malnutrition or deficient nutrition as well as verifying an insufficient level of nutrition. The assessment consists of 18 parameters (questions relating to the history, anthropometric data) with a maximum total of 30 points. Scores between 17 and 23.5 indicate a risk of deficient nutrition whereas scores lower than 17 are usually an indication of malnutrition.

2.2.3. Serum parameters

Albumin, pre-albumin and zinc are considered to be important nutritional markers. Albumin, which represents approximately 60% of the total plasma protein, maintains the colloid osmotic pressure in plasma, transports and stores multiple ligands and acts as a source for endogenous amino acids. The standard level in serum ranges between 3.5 and 5.5 g/dl.[29,30]

Pre-albumin is a transport protein for vitamin A and thyroxine. Its standard level in serum ranges between 16 and 35 mg/dl.[29]

Zinc is an essential micro-nutrient required for DNA synthesis, cell division and protein synthesis. Approximately 300 enzymes are known to contain zinc. It is assumed that several hundred nucleoproteins containing zinc are involved