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The effect of prosthetic rehabilitation and simple dietary counseling on food intake and oral health related quality of life among the edentulous individuals: A randomized controlled trial

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ABSTRACT

Objective: To investigate the combined effect of complete denture renewal and simple dietary advice.

Methods: A randomized controlled trial was performed with edentulous patients who required new complete dentures. All participants received complete denture treatment. In addition, the intervention group received dietary advice in a pamphlet form, while the control group received advice pertaining to the care and maintenance of the dentures. The advice was given by dentists for each group. The participants' food intake was assessed at baseline and 3 months after intervention using a diet history questionnaire and an oral health related quality of life assessment measured using the Japanese version of the Oral Health Impact Profile for edentulous people (OHIP-EDENT-J).

Results: Among 70 participants who were randomized, 62 participants finished all parts of this trial. At baseline, there was no significant difference in the food intake between the two groups. At the 3-month assessment, the intervention group showed significantly greater intake of chicken ($P = 0.013$), fish with bones ($P = 0.012$), and carrots and pumpkins ($P = 0.025$) compared to the control group. However, at baseline and at the 3-month assessment, there was no significant difference in the OHIP-EDENT-J scores between the groups, but the OHIP-EDENT-J scores significantly improved for both groups at the 3-month assessment. There were more significant improved dimensions of OHIP-EDENT-J in the intervention group than in the control group at the 3-month assessment.

Conclusions: Simple dietary advice combined with complete denture treatment could improve food intake of edentulous patients.

Clinical Significance: The present study suggests that brief dietary advice provided by dentists can improve food intake of edentulous elderly. This simply diet advice is much easier compared to customized forms, might enable normal dentists provide patients it. The result of this study broadens possibility of nutritional counseling in daily clinical practice.

1. Introduction

Tooth loss results in selective food avoidance [1,2]. In a study on Japanese subjects, it was found that those who lost molar occlusion with natural teeth consumed fewer vegetables and more confectionaries than those who retained occlusal contact [3]. Japanese edentulous individuals have a significantly lower intake of vegetables and dairy products than people who have more than 25 teeth [4]. These studies indicate that a higher proportion of edentulous individuals have insufficient food intake compared with that in their dentate counterparts. Inadequate intake of fruits and vegetables is thought to increase the risk of systemic diseases, such as cardiovascular disease, diabetes, and some cancers [5–7]. Therefore, edentulous individuals may carry a higher risk of several diseases due to their insufficient food consumption. Furthermore, insufficient food consumption, especially a deficiency of meat in elderly individuals is associated with a high prevalence of frailty, which is a geriatric syndrome characterized by slowness, weakness, fatigue, low physical activity, and unintentional

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weight loss [8]. Recently, frailty in elderly individuals has become a pressing social issue in aged or super-aged societies, including Japan.

Restoration of an edentulous arch with a complete denture is the general prosthetic treatment. Many studies have suggested that dietary counseling is needed in addition to prosthetic treatment [2,4,9,10] because a nutritional state is likely influenced by an individual's food choice rather than masticatory function [11] and tends to be overestimated by the individual [12]. Provision of new complete dentures in combination with tailored dietary counseling by a nutritionist resulted in a significantly improved fruit and vegetables intake in a randomized controlled trial [13]. However, in clinical settings, it is difficult to deliver tailored dietary counseling to each patient due to limitations regarding the dentist's time, knowledge, and equipment. Therefore, more simple and uniform advice, such as in a pamphlet form, is required. In a cohort study, the combination of using denture adhesive and a dietary advice pamphlet produced significant improvement in the intake of fruits and vegetables [14]. Although it is unclear whether the reported change in the food intake was influenced more by the use of denture adhesive or by simple dietary advice, it was suggested that simple dietary advice in pamphlet form may improve food intake.

Moreover, it is likely that a combination of prosthetic rehabilitation and dietary counseling contributes to an improvement of the patient's oral health-related quality of life (OHRQoL). Tailored dietary counseling was provided for patients wearing implant-supported overdentures and complete dentures in a previous study [15], but no significant change was observed after dietary counseling in the patients wearing complete dentures. In the study, their OHRQoL scores may have already been high at baseline because they did not seek replacement of their dentures, which may have resulted in no significant change for complete denture wearers.

Therefore, this randomized controlled clinical trial was conducted to clarify the effect of the combination of complete denture treatment and simple dietary advice on food intake among elderly Japanese edentulous patients who requested new complete dentures. The null hypothesis was that there would be no difference in food intake between the group that received simple dietary advice and the control group that did not receive dietary advice, in addition to provision of new complete dentures for both groups.

2. Materials & methods

2.1. Trial design

This study was a double-blind randomized controlled clinical trial. The detailed information of this study's protocol was described in a previous publication [16], and followed the 2010 Consolidated Standards for Reporting Trials (CONSORT) statement. The trial protocol was approved by the Ethics Committee of the Faculty of Dentistry, Tokyo Medical and Dental University (TMDU; Registration No. 1144), and is registered in the University Hospital Medical Information Network Center (UMIN-CTR Clinical Trial, Unique Trial No. UMIN000017879). All subjects gave written informed consent prior to participation.

2.2. Participants

The participants were edentulous individuals who sought replacement of their dentures. The recruitment step was described in a previous report [16]. The participants fulfilled the following requirements:

Inclusion criteria

- edentulous.
- sought replacement of their dentures due to dental issues.
- able to visit the hospital unassisted.
- able to understand written and spoken Japanese, and respond to a questionnaire.

Exclusion criteria

- had an infectious disease.
- received professional nutritional counseling.
- lived in an institution (i.e., they could not control their diet).
- had an oral disorder (e.g., xerostomia, temporomandibular joint arthrosis, oral dyskinesia, etc.).
- had a psychiatric disorder or diagnosis of dementia.

2.3. Interventions

All participants were randomly allocated either to the dietary intervention group or to the control group. Maxillary and mandibular complete dentures were fabricated for all participants by three clinicians using a conventional technique. The clinical steps for both groups were the same. In the dietary intervention group, participants received their new complete dentures and 20 min of simple dietary advice in pamphlet form. The pamphlet was a geriatric version of the Japanese food guide published by the Japanese Ministry of Agriculture, Forestry and Fisheries that indicates 'what' and 'how much' should be eaten in a day. It uses a graphic of a spinning top, a traditional Japanese toy, to illustrate the proportions of each food group that should be consumed daily, similar to the 'food pyramid' typically presented to Western audiences [17,18]. In the control group, participants also received their new complete dentures, and received 20 min of advice in pamphlet form as to how to care for their new dentures. The pamphlet was prepared in accordance with the guidelines published by the American College of Prosthodontists [19]. Advice provided given twice: on the day of the trial insertion, and again on the day of delivery of the new complete dentures.

2.4. Outcomes

Assessments of outcome measures were performed at baseline and at 3 months after the final denture adjustment. The final adjustment was defined as that when all three clinicians and the participant judged that there was no need for further adjustment.

Food intake was measured using a brief-type self-administered diet history questionnaire (BDHQ). The BDHQ is a shorter version of a self-administered diet history questionnaire (DHQ), which is a 16-page questionnaire to estimate the dietary intake of 150 food and beverage items. The BDHQ is a 4-page questionnaire that takes approximately 10–15 min to complete. The participants were asked to report their intake frequency of food and beverage items during the preceding month in a multiple-choice format. The BDHQ consisted of the following five sections: (i) intake frequency of food and non-alcoholic beverage items; (ii) daily intake of rice and miso soup; (iii) intake frequency of alcoholic beverage items and amount of each alcoholic beverage; (iv) usual cooking methods; and (v) questions regarding general dietary behavior. The intake of 58 foods and beverage items was calculated using a nutritional value calculation program dedicated to BDHQ. The validity of the BDHQ has been reported [20,21].

The OHRQoL was measured using the Japanese version of the Oral Health Impact Profile for edentulous (OHIP-EDENT-J). The OHIP-EDENT-J was developed for use with Japanese edentulous patients, and is a 19-item instrument that assesses patient reported dysfunction, discomfort, and disability associated with oral conditions. Patients were asked to report the frequency of occurrence of the listed oral health problems during the past month. The items were scored on a 5-point scale: 0, never; 1, hardly ever; 2, occasionally; 3, fairly often; and 4, very often. The summary scores ranged from 0 to 76, and a lower score indicates either a better OHRQoL or a reduced impact on quality of life. The OHIP-EDENT-J includes seven subscales: functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap. The reliability and validity of this scale have been reported [22].

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