Prosthetic Rehabilitation of Edentulism Prevents Malnutrition in Nursing Home Residents

Andreas Zenthöfer, DMD^a/Peter Rammelsberg, DMD, PhD^b/ Tomas Cabrera, DDS^a/Alexander Hassel, DMD, PhD^c

To investigate the association between prosthetic rehabilitation and malnutrition in institutionalized elders, 255 nursing home residents were recruited for this study and underwent a comprehensive dental examination. The body mass index (BMI) was administered to estimate the nutritional condition. Participants with BMI < 20 kg/m² were categorized as malnourished (n = 33), whereas all others were categorized as adequately nourished (n = 222). The number of teeth present and the prevalence of prosthetic rehabilitation were significantly lower in malnourished participants (P < .05). Malnutrition risk was 4.6 times higher for participants who were edentulous and did not wear dentures. Adequate replacement of teeth is important to prevent malnutrition in institutionalized older people. Int J Prosthodont 2015;28:198–200. doi: 10.11607/ijp.4016

alnutrition is a major geriatric concern directly Maffecting the activities of daily living (ADLs) and leading to an increased risk for falls, hospitalization, and mortality.1 However, few studies have investigated the impact of dental status on malnutrition. It has been suggested that the number of natural teeth present and wearing of complete dentures influences the selection of food intake due to limited chewing ability, ie, less consumption of vegetables and fruits.² Furthermore, substantial associations among tooth loss, inadequate number of occluding tooth pairs, and the risk of being underweight and malnourished have been demonstrated.^{3,4} Although malnutrition was found to be present in up to 20% of nursing home residents,⁵ the literature lacks reports on the interrelationship of dental status and malnutrition in this community. This study, therefore, aimed to investigate these associations.

Materials and Methods

This study obtained ethical approval from the local review board of the University of Heidelberg (S-002/2012). A total of 263 residents from 14 nursing homes were included.

Correspondence to: Dr Andreas Zenthöfer, INF 400, 69120 Heidelberg, Germany. Fax: +49 6221 56-5371. Email: andreas.zenthoefer@med.uni-heidelberg.de

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Participants were examined by two dentists, whose interexaminer agreement was tested (Cronbach alpha > 0.86). The Revised Oral Assessment Guide (ROAG) was applied to determine the fit as well as the retention of dentures.⁶ Using ROAG, 1 = inadequate dentures with visible swinging or spontaneous loss of retention, whereas all others were categorized as 0 = sufficient.

Nutritional status was determined using body mass index (BMI). As recommended in the literature, cutoff value of BMI < 20 kg/m² was used for classification of malnutrition.⁵

Care dependency was measured by use of the Barthel Index (BI), which features an evaluation of ADLs ranging from 0 (total dependency) to 100 (independent) points.⁷

Regression models were compiled for the dependent variable malnutrition (yes/no) with the categorized sociodemographic predictors, edentulous or not, and denture status. In addition, a second regression model was calculated for denture wearers to estimate the effect of denture quality (retention/fit) on malnutrition risk.

Results

Eight participants were fed by stomach tube and were excluded from statistical analysis. Thus, records were available for 255 participants. Mean age of the participants was 83.2 ± 9.1 years and 69% were female. See Table 1 for participants' characteristics. Of the sample, 72.9% wore dentures of any kind and 39.5% were edentulous (Fig 1).

The bivariate analysis between the predictors and groups well nourished/malnourished can be seen in Table 1. Significant differences between both groups

^aAssistant Professor, University of Heidelberg, Dental School, Department of Prosthodontics, Heidelberg, Germany.

^bChair, University of Heidelberg, Dental School, Department of Prosthodontics, Heidelberg, Germany.

^cAssociate Professor, University of Heidelberg, Dental School, Department of Prosthodontics, Heidelberg, Germany.



Fig 1 Distribution of prosthetic restorations in well-nourished and malnourished participants (chi-square test for differences of distributions).

Table 1	Participants'	Characteristics in the W	ell-Nourished and	Malnourished G	roup (n = 255)
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	Well-nourished ($n = 222$)	Malnourished ($n = 33$)
Female, n (%)	151 (68.0)	25 (75.8)
Age (y), mean (SD)	83.0 (8.9)	84.3 (10.1)
Comorbidities, mean (SD)	3.4 (2.3)	37 (24)
Number of drugs, mean (SD)	6.6 (3.5)	5.9 (3.6)
Barthel Index, mean (SD)	48.8 (30.1)	37 7 (26 9)**
Body mass index, mean (SD)	27.4 (5.5)	18.1 (1.3)***
Number of teeth present, mean (SD)	6.9 (8.3)	4.7 (7.4)*
Prevalence of rehabilitation of missing teeth with corresponding denture, frequency (%)	198 (89.2)	21 (63.6)***
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Unpaired *t* tests. **P* < .05. ***P* < .01. ****P* < .001.

could be detected based on the number of teeth present, BI, and prosthetic rehabilitation (P < .05). The logistic regression model for all participants revealed

a 4.6 times higher malnutrition risk for participants without prosthetic rehabilitation when being edentulous (P < .001; Table 2).

Table 2Logistic Regression Model for
Malnutrition as Dependent Variable and
Dichotomized Independent Confounders in
All Participants (n = 255)

Confounder	m(b)	95% CI	Р			
Age	1.5	0.7-3.6	.313			
Sex	0.8	0.3-2.1	.690			
Comorbidities	0.9	0.4-2.0	.808			
Number of drugs	0.6	0.3-1.4	.225			
Care dependency (BI)	2.4	0.8-7.4	.131			
Dentate/edentulous	1.0	0.5-2.2	.991			
Denture status	4.6	1.9-11.2	.001			

m(b) = odds ratio (risk analysis); CI = confidence interval; BI = Barthel Index.

Table 3Logistic Regression Model for
Malnutrition as Dependent Variable and
Dichotomized Independent Confounders in
Denture Wearers Only (n = 186)

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Confounder	m(b)	95% Cl	Р	
Age	1.4	0.5-3.8	.530	
Sex	1.0	0.3-3.0	.971	
Comorbidities	1.2	0.5-3.3	.667	
Number of drugs	0.5	0.2-1.3	.137	
Care dependency (BI)	3.4	0.9-12.7	.063	
Dentate/edentulous	0.9	0.3-2.3	.805	
Denture retention	0.8	0.3-2.1	.639	
Denture fitting	1.2	0.5-3.2	.682	

m(b) = odds ratio (risk analysis); CI = confidence interval; BI = Barthel Index.

The second model for only participants with dentures revealed no predictors for malnutrition, including denture retention and denture fit (P > .05; Table 3).

Discussion

The results of this study indicated that tooth replacement is associated with nutritional condition in institutionalized older people. In concordance with previous findings, wearing no dentures when being edentulous led to a greater malnutrition risk.³ Although in bivariate analysis a significant difference was apparent between participants with and without malnutrition in terms of the number of teeth present, this effect fades after controlling for denture status in the regression model. This indicates that the relationship between tooth loss and malnutrition should not be overestimated. Interestingly, no impact of retention or by fit of dentures on the prevalence of malnutrition could be found. This might be explained by the frequent use of denture adherence agents; further, older institutionalized denture wearers may be accustomed to wearing poorly fitting dentures.

This study also found that an increase of dependency is related to malnutrition, which is in line with previous literature.^{1,4,5} However, the developing malnutrition includes complex, multifactorial pathways with mutual interrelationships of functional and cognitive impairment, tooth loss, denture wearing, age, sex, and comorbidities.⁴ With regard to the anthropometric instrument used in this recent study, the BMI has been considered a useful indicator, primarily in older people, because its application is quick and easy. On the other hand, the BMI provides only a global estimation of nutritional condition in comparison to more sophisticated tools such as the Mini Nutritional Assessment (MNA). Nevertheless, previous research has shown that BMI and MNA are highly correlated.

Conclusions

Inadequate replacement of teeth and wearing no dentures while being edentulous are associated with a substantially higher risk of malnutrition in institutionalized older people. Prevention of tooth loss and adequate replacement of teeth should be monitored to prevent the risk of malnourishment.

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