

# RELATIONSHIP BETWEEN PROSTHODONTIC TREATMENT AND NUTRITIONAL STATUS: A REVIEW

Basnet BB<sup>1\*</sup>, Limbu LK<sup>1</sup>, Alhaji MN<sup>2</sup>, Rokaya D<sup>3</sup>

## Affiliation

1. Assistant Professor, Department of Prosthodontics, Crown Bridge. B.P. Koirala Institute of Health Sciences, Dharan, Nepal
2. Lecturer, Department of Prosthodontics, Faculty of Dentistry, Tamar University, Dhamar Yemen.
3. PhD Scholar, Dental Biomaterial Science, Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand.

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### \* Corresponding Author

Dr Bishal Babu Basnet

Assistant Professor

Department of Prosthodontics

B. P. Koirala Institute of Health Sciences, Dharan, Nepal

Email: [bidrum43@gmail.com](mailto:bidrum43@gmail.com)

<https://orcid.org/0000-0002-0472-7229>

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## ABSTRACT

Pertinent literature search about changes or effects of prosthodontic treatment on nutritional status was performed. The articles were electronically and hand searched in all available journals including research works, reviews, randomized controlled trials and systematic reviews. The information were obtained to answer the question whether denture therapy has a role in altering nutritional intake or not. Most articles agreed that the risk of malnutrition is elevated by being edentulous. However, there were contrasting results about improvement of nutrition by providing prosthodontic treatment. Thus, many authors have emphasized the role of nutritional counseling along with denture therapy for the benefits of geriatric patients who undergo the inevitable process of being edentulous.

## KEYWORDS

*Denture prosthesis, mini nutrition assessment, nutritional status*



## INTRODUCTION

Prosthodontics is defined as the specialty replacing missing dentition and contiguous maxillofacial structures.<sup>1</sup> Prosthodontic treatment not only replaces form, functions and esthetics in orofacial region but also enhances the psychological and social levels of dentally handicapped individuals. The oral health is an important entity of general health. Terming it as the fundamental factor, World Health organization (WHO) emphasizes on oral and dental health maintenance throughout life for improving quality of life.<sup>2</sup> Older people are vulnerable to restrict their diet. Significant increase in dietary intake of lipids, carbohydrates and fibers is seen in fully dentate individuals in comparison to complete denture wearers.<sup>3</sup>

Oral rehabilitation is one of the methods to replenish malnutrition.<sup>4,5</sup> There are clear evidences that edentulism is associated with poor diet, compromised nutrition and also lower level of subjective well-being.<sup>6,7</sup>

The literature search was performed electronically and also hand searched with the terms, using Medical Subject Headings (MeSH) and free text words. The words used were “nutritional status”, “nutrition”, “mini-nutritional assessment”, “denture therapy”, “removable prosthodontic treatment”, “fixed prosthodontic treatment”, “implant therapy”. The search was limited to only English articles. The reference lists of identified articles and relevant papers were also be assessed. The Cochrane database, Medline and Google were used for collecting the articles. The search strategy is depicted in flow diagram (figure 1)

## Measurement of nutritional status

Mini nutritional assessment (MNA) was used by many authors to test and evaluate nutritional aspect in prosthodontic patients and was found to be a valid and sensitive tool.<sup>1,8-11</sup> Oral health impact profile (OHIP), oral health related quality of life (OHRQoL), closed-ended questionnaire and chewing efficiency were also used to determine the level of nutritional status.<sup>4,12,13</sup>

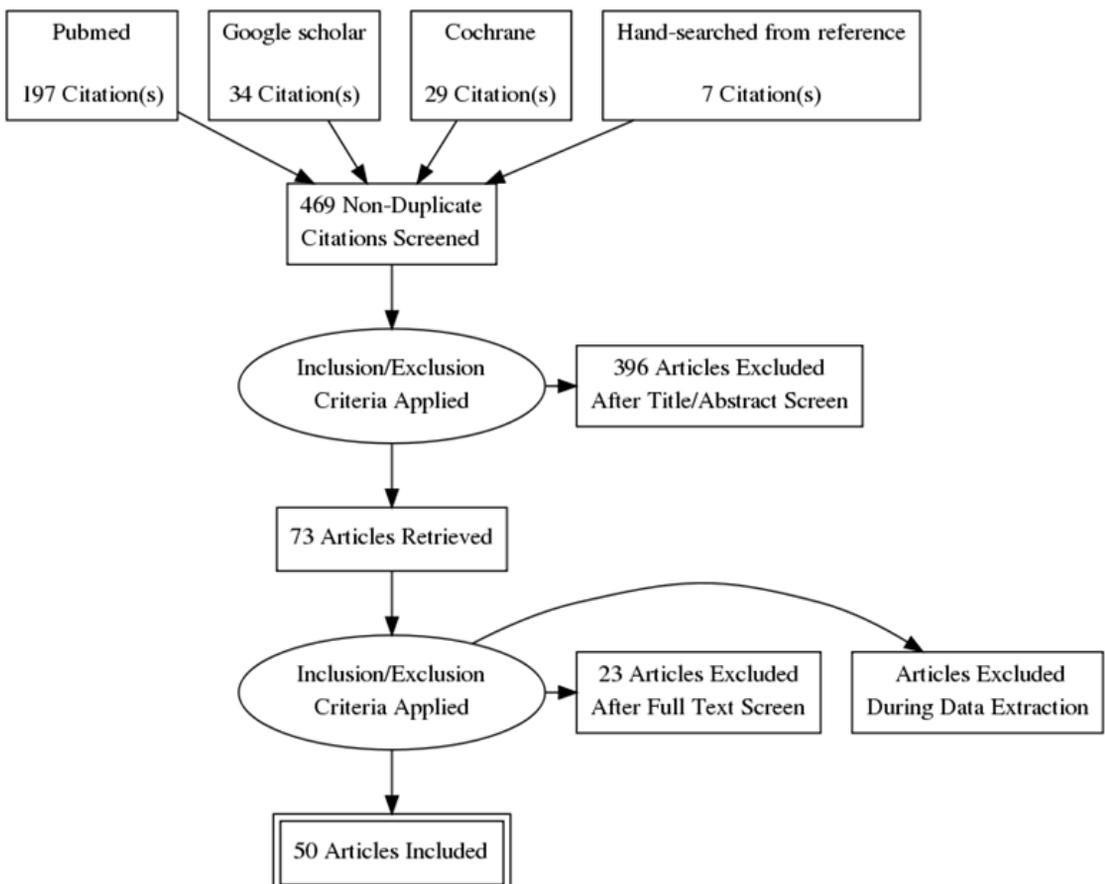
## Effects of being edentulous

Dental status greatly influences the perceived ability to take number of foods and having few teeth (less than 21 teeth) or no teeth without replacement increases vulnerability to malnutrition.<sup>14</sup>

Poor oral hygiene can increase the difficulty in eating hard foods and thus, decreases eating pleasure.<sup>15</sup> When comparing fully dentate to fixed prosthesis wearers, higher level of energy, protein, fat, carbohydrate, calcium, phosphorus and thiamin was consumed by fully dentate group while, other foods rich in fiber and electrolyte did not have significant difference.<sup>16</sup>

Totally edentulous patients without dentures are vulnerable to malnutrition.<sup>5</sup> Twenty-four hour dietary intake showed that mastication, chewing and food choice can be influenced by dentulousness and quality of denture.<sup>7</sup>

Poorest nutritional status was reported in edentulous patients without dentures, whereas edentulous patients



**Figure 1:** Search strategy used in this review

with dentures can consume the recommended energy and micronutrients.<sup>17</sup> In contrast, another study revealed that the elevated Body Mass Index (BMI) due to eating high-calorie selected foods, was found in edentulous patients.<sup>18</sup>

### Effects of prosthodontic treatment

According to a study conducted in a sample size of 35 patients, food consumption behavior was not affected by prosthodontic therapy as provision of complete denture had reduced the chewing difficulties but didn't have a role in reduction of malnutrition.<sup>14</sup> Another follow-up study suggested that prosthetic treatment alone is not sufficient to provide an improvement in MNA, serum parameters, OHIP and masticatory efficiency test.<sup>13</sup> Consistent with these studies, the other also did not find correlation with any prostheses to the prosthodontic treatment.<sup>19,20</sup>

Though masticatory function was seen to be improved in new denture users but there was no significant difference where both the new denture and old denture users had almost 100% of total intake of energy and nutrition.<sup>21</sup> Choice of food (food rich in fat, micronutrients, hard to chew food) was also affected by denture replacement. However, total energy intake, anthropometry and biochemical indices experienced no significant impact.<sup>22</sup>

It was also found that prosthetic treatment improves nutritional status as higher MNA was reported in edentulous patients after treatment with complete dentures.<sup>23,24</sup>

Kikutani et al examined a group of 716 elderly patients with the use of MNA-SF and Barthel index to evaluate nutrition.<sup>25</sup> It was concluded that occlusal status was significantly related to malnutrition risk. The limited daily activity was sorted as a confounding factor.

Another comparative study showed that presence of few teeth in the oral cavity was associated with lower intake of fish and fruits, lower BMI, low mid arm circumference (MAC), low serum albumin in non-denture wearers. After denture replacement, only MAC was significantly associated with denture therapy. However, in participants who had both fewer teeth and no dentures, marked decrease of nutritional intake was observed.<sup>26</sup> Sadamori et al. divided their study sample into five groups and studied for two years taking the anthropometric and biochemical parameters. They concluded that it is necessary to have prosthodontic treatment for long-term maintenance of calorie intake. However, their study was focused in the people with dementia.<sup>27</sup>

Compared to denture wearers, non-denture wearers were found to have lower phosphorus, iron, potassium, niacin and Vitamin C intake.<sup>28</sup> Contrasting reports were also found making the role of prosthodontic therapy questionable in improvement of nutrition.<sup>3,29,30</sup>

In comparing various types of dental prostheses, implant therapy was shown to be beneficial for improving nutritional status.<sup>12, 16, 31-34</sup> Removable prostheses, however, were reported to have less contribution than fixed prostheses for subjective improvement in nutritional status.<sup>35</sup> In contrast, a study was done in a group of 135 patients

divided into four groups; Complete denture (CD), distal-extension removable partial denture (RPD); tooth-supported RPD and fixed partial denture (FPD) showed significant improvement of BMI and energy intake in CD groups. In this study, removable prostheses had better results in terms of protein, carbohydrate, calorie, iron and vitamin B. However, serum albumin increased in all groups.<sup>36</sup> RPD wearers were less capable for deriving nutrition in terms of mixing and shaping the bolus, and number of strokes while, level of fat, calcium and BMI were almost similar in removable partial dentures and fixed dentures wearers.<sup>37</sup>

Some other cross-sectional studies showed contrast results to the findings of the previous studies and concluded that dental implant does not necessarily improve the nutritional status, however can improve masticatory efficiency.<sup>12,31,38</sup>

Randomized controlled trials for comparing conventional CD and implant overdenture (IOD) showed insignificant improvement in nutritional status by implant over denture, however IOD wearers had improvement if we considered fiber intake.<sup>39-41</sup>

Another systematic review and meta-analysis also concluded insignificant benefits of implant overdenture over the conventional complete denture in terms of BMI, albumin or vitamin B.<sup>12,42</sup>

### Other factors

Several authors have emphasized on nutritional counseling as a part to improve nutrition along with prosthodontic therapy because denture alone was not the only factor for better nutrition in their studies.<sup>19,39,43-46</sup>

In denture wearing patients, changing to new dentures along with periodic counseling played an important role in increasing levels of energy, iron and vitamin C intake.<sup>43</sup>

With the use of denture adhesive improvement in taking vegetables, fruits was seen.<sup>44</sup> But the reinforcement with nutritional counseling was also done during adhesive provision.

Influence of number of artificial teeth in complete denture was also tested in a randomized controlled trial, which showed no significance of removing or adding the second molar artificial teeth.<sup>47</sup> Shortened dental arch was studied to assess the impact on nutrition, which showed objective improvement despite insignificant subjective perception.<sup>48</sup>

One month after prosthodontic treatment, MNA and hematological parameters were measured in a randomized controlled trial. This study comprised conventional and functionally orientated dentures in partially dentate groups. The results showed increase in vitamin B12, albumin, and MNA.<sup>49</sup>

Despite the denture therapy, some studies concluded that lack of appetite or limited daily activity play as confounding factors along with poor oral status and/or prosthetic status.<sup>25,50</sup>

### CONCLUSIONS

A review of various literature regarding nutritional status in prosthodontic patients was done in this study. Emphasis was drawn to the studies which had objectively assessed the role

of denture (fixed, removable or implant-supported) in improving nutritional status. Also, randomized controlled trials and systematic reviews were further analyzed to draw the inference. It was common finding that the nutrition is affected by edentulism and, hence, early prosthodontic rehabilitation has some role in decreasing the vulnerability to malnutrition. However, the mere provision of denture therapy alone cannot replenish the nutrition. Periodic counseling plays a vital role for the reduction of malnutrition risk in elderly patients.

## RECOMMENDATIONS

The studies on nutritional assessment after various

prosthodontic treatment is being done globally, however, very few studies are found in our parts of world. While the modern treatment like implant therapy has been found to be great boon for improvement of nutritional status according to these studies, conventional therapies like removable partial denture, fixed partial denture and conventional complete denture cannot be overlooked. Thus, it is recommended that more studies regarding the effects of conventional denture therapies need to be done and especially in the less developed regions of world.

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