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ORIGINAL ARTICLE

Impact of New Complete Dentures on Dietary Intervention and Masticatory Performance in Geriatric Patients

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ABSTRACT

Objectives: To evaluate the impact of new complete dentures on masticatory efficiency and dietary quality among geriatric patients and compare outcomes with national and international literature.

Methodology: Thirty edentulous geriatric patients (≥60 years) received new complete dentures. Masticatory efficiency was measured using a color-change chewing test, whereas dietary quality was evaluated using a validated diet score. Assessments occurred at baseline and 8 weeks post-insertion. Paired t-tests analyzed changes, and Pearson correlation assessed the relationship between functional improvement and diet.

Results: Masticatory efficiency increased significantly from 49.2 ± 3.1 to 72.4 ± 3.3 ($p < 0.001$). Diet quality improved from 33.4 ± 2.5 to 48.2 ± 3.1 ($p < 0.001$). A moderate positive correlation ($r = 0.62$) was found between increases in chewing efficiency and dietary
score. Participants reported enhanced ability to chew firm foods, increased confidence, and reduced avoidance of nutritious food items.

Conclusion: Complete dentures significantly restore chewing function and moderately enhance diet quality. However, optimal nutritional improvement requires integration of prosthodontic treatment with dietary counseling and structured follow-up support.

Keywords: Edentulous, complete denture, geriatric patients, masticatory performance, dietary intervention.

INTRODUCTION

Edentulism remains a highly prevalent condition among geriatric populations worldwide. In older adults, the loss of natural teeth dramatically reduces masticatory efficiency, limits food choices, and contributes to altered dietary patterns that may lead to poor nutrition, frailty, and systemic decline. The association between denture wearing and malnutrition has been documented across various populations, emphasizing the critical role of oral rehabilitation in maintaining geriatric health[1].

Mastication is an essential physiological process enabling the breakdown of food, enhancing digestion, stimulating saliva, and facilitating nutrient absorption. When older adults lose their dentition, they tend to avoid harder and fibrous foods such as fruits, vegetables, meats, and nuts. Reduced intake of these nutrient-rich items leads to deficiencies in protein, micronutrients, and dietary fiber, ultimately contributing to poor health outcomes such as sarcopenia and immunosuppression[2]. Complete dentures remain the most accessible and widely used treatment in fully edentulous patients, especially in low-resource settings. When crafted well, dentures can significantly improve occlusal stability, chewing performance, and overall comfort[3].

International research demonstrates strong associations between improved denture function and enhanced dietary diversity. Studies from Japan, Europe, and North America show that increased masticatory ability leads to higher consumption of fruits, vegetables, and complex proteins[3,6,8]. Additionally, denture improvements have been shown to positively impact general health markers and eating satisfaction[4]. However, national studies from Pakistan and India report more modest nutritional gains, with many older adults continuing soft, carbohydrate-rich diets despite restored chewing ability[2,7]. These findings suggest that socioeconomic, cultural, and behavioral factors heavily influence nutritional outcomes. Moreover, evidence suggests that complete dentures alone may not yield substantial improvement in nutritional status unless accompanied by dietary counseling. Randomized controlled trials demonstrate that simple nutritional advice combined with new dentures leads to better increases in protein and vegetable consumption than dentures alone[5]. Physiological factors such as reduced sensory input, decreased salivary flow, ridge resorption, and neuromuscular decline further influence the rate of adaptation to dentures[9,14]. Psychosocial factors, including fear of denture instability, embarrassment while eating, and social isolation, also affect dietary behavior among elderly patients.

Given these complexities, this study evaluates how new complete dentures influence masticatory efficiency and dietary intake among geriatric patients and compares these results with national and international literature to inform clinical and public health strategies.

METHODOLOGY

This prospective study recruited 30 completely edentulous patients aged ≥60 years January 2022 to July 2023 from the Prosthodontic Department, Rehman College of Dentistry, Peshawar

Inclusion Criteria

1. Complete edentulism for ≥6 months
2. No systemic conditions affecting mastication Willingness to participate.
3. First-time denture users or users of ill-fitting dentures

Exclusion Criteria: Neuromuscular disorders, TMJ dysfunction, severe xerostomia, cognitive impairment baseline assessment

Masticatory Efficiency: A standardized color-change chewing gum test was used. Patients chewed the gum for 20 cycles, and the colorimetric shift produced a score (0–100).

Dietary Quality: A validated questionnaire assessed intake of fruits, vegetables, proteins, whole grains, sugary foods, and processed foods.

Nutritional Screening: BMI and MUAC were recorded.

Denture Fabrication: Conventional complete dentures were fabricated through standard clinical procedures: Preliminary and final impressions, jaw relation records, try-in processing, polishing and delivery. Follow-ups were performed at 24 hours, 1 week, 4 weeks, and 8 weeks.

SPSS 23.0 version was used for statistical analysis. Paired t-tests analyzed changes between baseline and post- treatment scores. Pearson correlation assessed the relationship between improved mastication and diet. $p \leq 0.05$ was considered statistically significant.

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RESULTS

Thirty patients (60% female, 40% male; mean age 67.4 ± 5.2 years) completed the study.

Baseline Status: Participants showed poor chewing ability (mean 49.2 ± 3.1) and low dietary quality (33.4 ± 2.5). Most relied on soft diets such as mashed vegetables, porridge, soaked bread, and lentils. Many avoided harder foods due to pain, discomfort, or fear of denture instability.

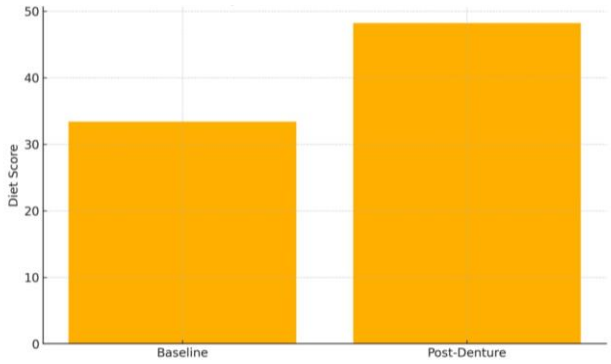

Figure 1: Diet quality score before and after dentures

Table 1: Comparison of Masticatory Efficiency (Baseline vs Post-Denture) Variable

Baseline Mean ± SD	Post-Denture Mean ± SD	Difference	p-value
49.2 ± 3.1	72.4 ± 3.3	+23.2	<0.001

Table 2: Comparison of Dietary Quality (Baseline vs Post-Denture) Variable

Baseline Mean ± SD	Post-Denture Mean ± SD	Difference	p-value
33.4 ± 2.5	48.2 ± 3.1	+14.8	<0.001

Improvements in Mastication: A statistically significant improvement was observed ($p < 0.001$). Patients reported: Easier chewing of apples, guavas, carrots. Improved ability to chew meats Reduced fatigue during chewing Enhanced bolus formation

Dietary Changes: Diet quality improved significantly ($p < 0.001$). Patients increased intake of: Cooked and soft vegetables and fruits, egg and lean protein dishes. Consumption of processed and refined foods decreased moderately.

Correlation Analysis: A moderate positive correlation ($r = 0.62$) was found between masticatory improvement and dietary enhancement.

DISCUSSION

The present study demonstrates that new complete dentures significantly enhance masticatory efficiency and moderately improve nutrition-related dietary behavior among geriatric patients. These findings reinforce the essential role of prosthodontic rehabilitation in restoring oral function in fully edentulous individuals, but they also highlight that functional improvement alone does not automatically translate into substantial dietary modification. The expanded discussion examines the results in the context of global literature, explores physiological and psychosocial determinants of adaptation, and reflects on clinical implications for prosthodontic and geriatric healthcare.

A principal finding of this study is the substantial improvement in masticatory efficiency scores after denture insertion, with an average increase of over 23 points. This enhancement mirrors the results of international studies demonstrating that new and well-fitted dentures significantly improve chewing ability, bite force distribution, and bolus manipulation[3,4,6]. Stjernfeldt et al.[3] emphasized that masticatory performance plays a direct role in overall dietary health, particularly when older adults transition from soft, nutrient-poor foods to firmer, high-fiber foods. The marked functional recovery observed in this study suggests that dentures successfully restore the mechanical aspects of chewing in elderly patients. Functional improvements described by participants greater ease chewing meat, apples, and fibrous vegetables reflect not only the mechanical adaptation to dentures but also increased patient confidence. Similar findings were reported by Wöstmann et al.[4], who noted that prosthodontic interventions positively influence oral comfort and self-esteem. These subjective experiences are crucial because improved chewing ability alone may not lead to significant dietary changes if patients fear pain, denture instability, or embarrassment. Patient-reported outcomes in this study, including increasing confidence during meals, align with the broader understanding that successful denture adaptation encompasses technical, psychological, and behavioral components.

Although dietary quality scores improved significantly, the change was more modest compared to the substantial improvement in masticatory efficiency. This discrepancy is consistent with results from South Asia and other low-resource settings, where dentures provide functional improvement but do not immediately shift dietary patterns[2,7]. Dietary behavior is shaped by multiple influences culture, affordability, food accessibility, cognitive preference, and long-established habits many of which remain unchanged despite prosthetic rehabilitation. Several participants in this study continued favoring soft foods, even though they physically could chew firmer items. This aligns with the findings of Shah et al.[7], who observed that South Asian elderly adults retain traditional soft-texture diets due to cultural norms and long-term adjustments to edentulism. Even after denture treatment, these patterns often persist without external guidance. Komagamine et al.[5] provided compelling evidence through a randomized trial demonstrating that dentures alone do not ensure nutritional improvement unless combined with dietary advice. In their study, the group receiving dentures with guidance exhibited significantly greater increases in protein and vegetable intake than the denture-only group. Our results support this conclusion: the moderate rise in diet quality implies that dentures provided the physical capability to diversify diet but lacked accompanying educational reinforcement necessary to maximize nutritional benefit.

Adaptation to dentures is significantly influenced by the physiology of aging. Declines in oral muscle strength, dexterity, and sensory perception can limit how effectively dentures translate into chewing performance. Tada and Miura (9) highlighted the role of swallowing efficiency and tongue pressure, showing that diminished oral motor function may hinder the transition to harder foods. Similarly, reduced salivary flow in older adults commonly due to medications or systemic conditions impairs lubrication during chewing, making fibrous foods more difficult to process[14]. These physiological limitations may explain why several participants in this study did not show dramatic improvements in diet despite restored function. Another factor is ridge resorption. Patients with severely resorbed ridges often experience denture instability, requiring longer adaptation periods and more adjustments. Although our study included follow-ups, some participants demonstrated slower improvement trajectories, which is consistent with international literature suggesting that anatomical variation heavily impacts denture success[18]. This underscores the importance of personalized follow-up and denture adjustment schedules.

Beyond physiology, psychosocial factors play a critical role in dietary transformation. Many elderly individuals develop emotional coping mechanisms such as anxiety around eating in public or fear of denture displacement. These concerns often persist despite improved denture fit and function. Patient feedback from this study revealed concerns such as denture movement, difficulty chewing in social gatherings, or fear of embarrassment. Similar psychosocial patterns have been documented in gerodontology research, where self-confidence and emotional well-being influence oral health–related quality of life and dietary

habits[11]. Thus, psychosocial readiness may determine whether functional gains translate into behavior change. Additionally, cognitive habits shaped over years of edentulism are difficult to reverse. Many elderly individuals continue preparing food in softer textures even when harder foods become possible to chew. De Marchi et al.[15] emphasized that long-term avoidance behaviors persist despite denture placement because dietary preferences adapt to years of functional disability. Socioeconomic constraints are critical determinants of nutritional behavior in low- and middle-income countries (LMICs). In Pakistan and similar regions, food affordability influences diet more strongly than oral function. Protein-rich foods like meat, nuts, and dairy are more expensive than carbohydrate-based staples such as rice, chapati, and lentils. Even with improved chewing ability, many older adults remain unable to afford nutrient-dense options. This socioeconomic limitation explains the limited dietary shift observed in our study and others conducted in LMICs[2,7,15]. Cultural food preferences also shape dietary behavior. In South Asia, staple diets consist primarily of cooked foods with soft textures, such as lentils, rice, curries, and overcooked vegetables. Because these foods are familiar, inexpensive, and easy to chew even without dentures they remain prevalent despite improved oral function.

International studies from Japan[6,8,9], Europe[4,15], and Australia show stronger nutritional improvements after denture treatment partly because baseline diets include higher quantities of raw vegetables, fresh fruits, and nuts, enabling quicker transition to healthier patterns once chewing is restored. This study's results align with global findings in terms of masticatory improvement but differ in the magnitude of dietary improvement. Japanese studies show rapid dietary improvement due to structured dietary advice and high nutritional literacy[6,8]. European studies report improved intake of fruits, vegetables, and harder foods due to routine integration of nutritionists into prosthodontic care[4,12]. North American research highlights strong patient motivation to improve diets, often linked to overall health awareness[11]. In contrast, studies from Pakistan, India, Bangladesh, and Sri Lanka consistently demonstrate functional gains without proportionate dietary transformation due to cultural, economic, and educational factors[2,7]. Therefore, dental interventions must be tailored to local contexts for optimal outcomes.

The correlation analysis (r = 0.62) confirms that while improved mastication positively influences dietary diversification, it does not wholly determine it. The moderate strength of the correlation supports the idea that dentures provide capacity, but personal, social, and environmental factors determine usage. This finding aligns with Krall et al.[18], who noted that tooth replacement improves nutrient intake, but dietary choices depend on motivation, accessibility, and lifestyle. The evidence clearly supports a multidisciplinary model for geriatric oral healthcare, integrating: Prosthodontists; for functional rehabilitation, Nutritionists; for dietary counseling, Geriatric physicians; for systemic health integration and Psychologists; for support in social and emotional adaptation. Integrating these disciplines can enhance long-term outcomes by addressing structural, functional, behavioral, and psychosocial barriers simultaneously.

Clinical Recommendations Based on Study Findings

- Based on the results and literature synthesis, several recommendations emerge:
- Implement dietary counselling with denture delivery
- Simple guidance; increasing vegetables, soft protein sources, and gradual reintroduction of harder foods can boost nutritional outcomes.
- Mandate follow-up appointments
- Adjustments improve comfort, stability, and confidence, accelerating dietary transition.
- Address psychological barriers
- Encouraging patients to practice chewing at home before eating socially reduces anxiety.
- Patients with severe resorption may need additional retention strategies (e.g., adhesives or implant overdentures).

Strengths and Limitations: The strengths are objective measurement of masticatory efficiency, geriatric sample, integration of dietary assessment and comparison with global literature. The limitations of this study are short follow-up duration, limited sample size, no biochemical nutritional markers, absence of formal dietary counselling component. Future research should incorporate longer follow-up, larger sample sizes, and nutritional biomarkers (e.g., Hb, albumin, vitamin levels).

CONCLUSION

The results demonstrate that new complete dentures restore functional chewing capacity effectively, but meaningful dietary improvement requires a comprehensive and multidisciplinary approach. Dentures are necessary but not sufficient; behavioral reinforcement, socioeconomic support, and dietary education are essential to optimize geriatric health outcomes.

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