Maximum Bite Force in Complete Denture Wearing Patients: A Preliminary Study

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ABSTRACT

Objective: To determine the Maximum bite force (MBF) in complete denture wearing subjects and to compare gender and sides.

Material and methods: Thirty healthy edentulous patients wearing the denture for at least 3 months were included in the study. The MBF registration was carried out on right and left side in the first molar region using a force transducer occlusal force meter (GM10, Nagano Keiki, Tokyo, Japan). The recorded data was analysed using SPSS version 20 (Chicago, USA) by applying chi-square tests with the Yates correction.

Results: The mean MBF in complete denture wearers was 404.9 ± 8.23 Newton (N) among males, 229.5 ± 2.32 for females, and 321.5 ± 6.31 N for the total group. The difference between the MBF among males and females was statistically significant (Chi-square = 12.9463 P = 0.0001). With regards to sides, in males the MBF on the right side was 409.6 ± 3.12 and 399.2 ± 4.32 on the left side with no significant difference. In females the MBF on the right side was 238.5 ± 8.54 and 226.8 ± 5.82 on the left side with no significant difference. A significant difference was observed when the MBF among sides was compared between males and females.

Conclusion: The mean MBF in complete denture wearers was comparable with other studies. A significant difference was noted between genders but no significant was observed between the sides.

KEY WORDS

bite force, complete denture, bite gauge

INTRODUCTION

Edentulism is termed as the loss of permanent dentition which may result from dental caries, periodontal pathologies, traumatic injuries and various other factors⁷.⁸.⁹. Considering about the steady increment in elderly individuals in the total populace, it has turned out to be vital to determine the change in muscular function related with aging⁴.⁶.⁷. Because of the loss of dentition and atrophic changes, the muscles of the elderly individuals undergo functional alterations⁶.⁷. MBF is primarily related to mastication and is determined in aged individuals by the diminution of muscle mass expressed as a minimisation in the number and size of muscle fibers mid the regular process of aging⁷.⁸. Apart from persuasion of the masticatory action, MBF is also influenced by the nature of the food, which has a significant role in maintaining the function of musculoskeletal system⁴.⁶. Prosthetic rehabilitation of individuals with missing teeth aids in providing efficient masticatory ability, phonetic and esthetic functions and thereby improving the quality of life of the edentulous patients¹⁰. Individuals with missing tooth can be rehabilitated by different types of prostheses, which includes, a removable prosthesis, or a fixed prosthesis.
Table 1. Comparison of MBF between gender and sides

<table>
<thead>
<tr>
<th>Gender</th>
<th>Right side</th>
<th>Left side</th>
<th>Chi-square</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>Mean ± Std. Deviation</td>
<td>409.6 ± 3.12</td>
<td>238.5 ± 8.54</td>
<td>399.2 ± 4.32</td>
</tr>
<tr>
<td>Females</td>
<td>Mean ± Std. Deviation</td>
<td>226.8 ± 5.82</td>
<td>226.8 ± 5.82</td>
<td>226.8 ± 5.82</td>
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RESULTS

This study included fifteen male and fifteen female edentulous subjects, the mean age of the patients was 59.6 ± 2.3 years for males and 58.2 ± 7.2 years for females. The results of the kappa values were 0.88 ± 0.01 and 0.89 ± 0.07 for both intra and inter-examiner reliability which indicate almost perfect agreement. We observed in our study that the mean MBF in complete denture wearers was 404.9 ± 8.23 N among males, 229.5 ± 2.32 for females and 321.5 ± 6.31 N for the total group. The difference between the MBF among males and females was statistically significant. No significant difference in MBF was observed between right and left side.

DISCUSSION

MBF is a helpful marker of the functional condition of the masticatory apparatus and the stacking of the dentition. The evaluation of individual bite force level has been broadly utilized in dental practice, principally to comprehend the mechanics of mastication for assessment of the therapeutic impacts of prosthetic devices and to reference values for research regarding the biomechanics of prosthetic devices.

Multiple components have been proposed to influence bite force measurements, these variables are either individual-related factors, for example, age, gender, periodontal support of the dentition, dental status of an individual, disorders related to temporomandibular joint, the type and nature of the device used to analyze the bite force, interocclusal spacing location of measuring device over the teeth, and head position of the individual during measurement. It has been also observed that the bite force differs among different populations. People from urban area were observed to have lower bite force than individuals who were having archaic life style.

The MBF was assessed in our study with a force transducer occlusal force meter (GM10, Nagano Keiki, Tokyo, Japan). The bite force was displayed digitally in Newtons and the accuracy of this force transducer occlusal force meter has been previously confirmed.

We observed in our study that the mean maximum bite force in complete denture wearers was 404.9 N among males, 229.5 for women, and 321.5 N for the entire group. In accordance with this, Alajbeg et al. observed a MBF of 320 N, which is almost similar to the our study's mean MBF value of 321 N found in male and female complete denture patients. In contrast to this, higher values were noted by Okamoto and Asano, they found that the MBF in complete denture wearers, was 412.6 N on men and 252.3 N for women, and a total MBF of 332.3 N for the entire group. Michael et al. measured the bite strength using a gnathodynamometer and noted that the bite strength of denture wearers was 35lb which was 4.5 times lesser than that of individuals with natural dentition.

In the present study, males were noted has having a significantly higher MBF values than females, which is similar to previous studies. This may be due to the reason that men have a bigger tooth size than women, which relates to a greater periodontal ligament area and hence may deliver higher MBF values. It has been also stated the increased muscular body features among men resulting from the anatomic diversities between the genders and the type 2 muscle fibers with a larger diameter and a increased sectional area comprises the masseter muscles in men.

Studies in the literature have observed that subjects with new complete dentures experience difficulty in chewing immediately after denture insertion, in spite of the fact that function of the masticatory system enhances with time in these individuals. Considering these facts, individuals with a favourable outcome after wearing the complete denture for at least 3 months were incorporated in the present study.

CONCLUSION

The mean MBF in complete denture wearers was 404.9 ± 8.23 N among males, 229.5 ± 2.32 for females, and 321.5 ± 6.31 N for the total group. The difference between the MBF among males and females was statistically significant. No significant difference in MBF was observed between right and left side.

REFERENCES