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BITING FORCE EVALUATION IN COMPLETELY EDENTULOUS PATIENTS WITH A THERMOPLASTIC DENTURE VERSUS CONVENTIONAL HEAT CURED RESIN DENTURE RELINED WITH SOFT LINER

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ABSTRACT

Objective: The aim of this study was to evaluate biting force in completely edentulous patients with a thermoplastic denture versus conventional heat cured resin denture relined with soft liner. **Subjects and Methods:** twenty eight completely edentulous patients were randomly chosen. Each patient received two dentures. Group A (patients received a conventional heat cured resin denture relined with Soft liner). Group B (patients received a thermoplastic (nylon) denture). Each patient was allowed to wear each denture for six months with two weeks as a rest period between the two dentures. For each denture, the biting force was measured after one month and after six months of denture placement. **Results:** The patients recorded higher biting force with conventional heat cured acrylic denture relined with soft liner (group A) than thermoplastic denture (group B) after one month and six months. **Conclusion:** After six months of denture use, patients with a conventional acrylic denture relined with soft liner had a higher biting force than patients with a thermoplastic denture. As a result, it might be regarded a treatment plan alternative based on the nature and quality of the ridge to address the issue of decreasing biting force in elderly individuals.

KEYWORDS: Acrylic dentures, bite force, denture base materials, thermoplastic denture base.

INTRODUCTION

Modern dentistry offers many options for the restoration of completely edentulous mouth, like complete dentures and implant retained over denture. With the development of acrylic polymers in dentistry several decades ago, complete dentures became highly popular. Due to issues such as the relatively expensive cost of dental implants, many patients opt for full dentures [(1)].

Denture wearers had a lower biting force and masticatory efficiency when compared to natural dentition participants, according to studies[(2,3)]. People's muscles alter function as they age, primarily due to atrophy and tooth loss[(4)]. considering the constant increase in elderly people all over the world, it has become essential to evaluate bite force and muscle changes associated with age[(5,6)].

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Bite force is an essential factor to consider when studying oral function [7]. Diet choice is also influenced by maximum bite force (MBF), which plays a crucial role in the preservation of masticatory function [8].

Some edentulous individuals are uncomfortable with the hard acrylic bases of traditional dentures due to thin and relatively non-resilient mucosa or severe alveolar resorption. As a result, the patient will have inefficient masticatory performance and an uneven distribution of occlusal pressures, producing pain. To avoid this, conventional heat cured acrylic resin with soft liner and thermoplastic denture may be used [9].

On the dentistry market, there are a variety of commercial thermoplastic denture bases. Acrylic resin-based and silicone-based materials are the two types, and their major properties differ depending on the chemical type. High biocompatibility, good dimensional stability, permanent softness, compliance, viscoelasticity, strong adhesion to the hard denture foundation, low water sorption and water solubility, and color stability are all criteria for the soft denture liner [10].

Because of its robustness, resilient liners work as shock absorbers and disperse functional load, making the prosthesis more pleasant for the patient to wear [11-13].

Thermoplastic dentures have become a key rival to PMMA dentures in recent years. Thermoplastic dentures are excellent alternatives to conventional and partial acrylic dentures. Thermoplastic dentures are resistant to breaking and provide excellent comfort for edentulous people. When compared to conventional dentures, these dentures are more thinner, stay firmly in place, and are more retentive, making them quite comfortable to wear. They are low in weight and do not cause allergic responses. More research has revealed that these thermoplastic dentures have lower solubility and sorption values than heat-cured PMMA dentures [14, 15].

SUBJECTS AND METHODS

Twenty eight completely edentulous patients were randomly chosen from the removable prosthodontics department clinic, Faculty of Dental Medicine, (Boys, Cairo), Al-Azhar University, All patients selected have no psychiatric disease or movement disorders which may affect biting force recording. Informed consent was obtained from all patients after an explanation of the methodology before enrolment in the study [16].

Each patient received two dentures. Group A: patients received conventional heat cured resin (Vertex Regular, vertex-Dental B.V., and The Netherlands) with soft liner (Acrostone soft liner made in Egypt). Group B: patients received thermoplastic denture (TCS^R unbreakable Thermoplastic Dental Resin, USA).

Each patient was allowed to wear each denture for six months with two weeks as a rest period between the two dentures. For each denture, the biting force was measured after one month and after six months of denture placement.

Bite force recordings

At the time of new prosthesis insertion and after six months of denture wear, measurements were taken with the patient in an upright position. An occlusal force meter with a hydraulic pressure device and a disposable polyvinyl cover was used to measure bite force bilaterally at the first molar area (17 mm in width and 5.4 mm in height). The measuring range was 0–1000 N with an accuracy of ± 1 N (Figure 1) (GM10, Nagano Keiki, Tokyo, Japan). The instrument was placed such that all bite forces were directed to the center.

The patients were instructed to bite as powerfully as possible three times per side at maximum intercuspation, with a rest time of 2 min in between. The greatest occlusal force was measured in Newtons (N). The patient's Biting force was determined to be the greatest of the three records.

The difference in biting force between two groups after one month and six months was determined, and statistical analysis was carried out using SPSS 20. (IBM, Armonk, NY, USA).

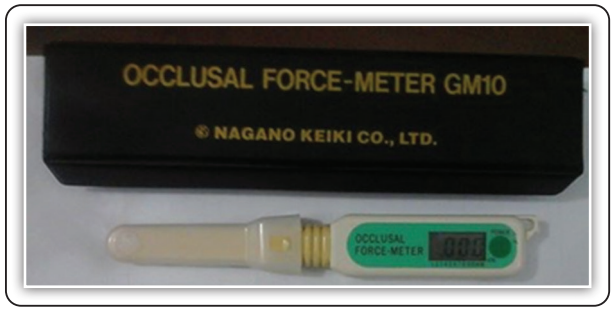

FIG (1) Occlusal force meter

RESULTS

Biting force with different denture base materials in completely edentulous patients was evaluated.

TABLE (1) Mean and standard deviation (SD) values for biting force in different groups.

Side	Time	Biting force (Mean±SD)		p-value
		Acrylic with soft liner Group (A)	Thermoplastic Group (B)	
Right	**After 1 month**	48.10±3.69	44.27±2.47	**0.014***
	After 6 months	50.98±1.51	47.32±3.77	**0.011***
Left	**After 1 month**	55.12±3.77	51.02±1.51	**0.005***
	After 6 months	58.32±2.34	54.90±3.69	**0.024***

**; significant ($p \leq 0.05$) ns; non-significant ($p>0.05$)*

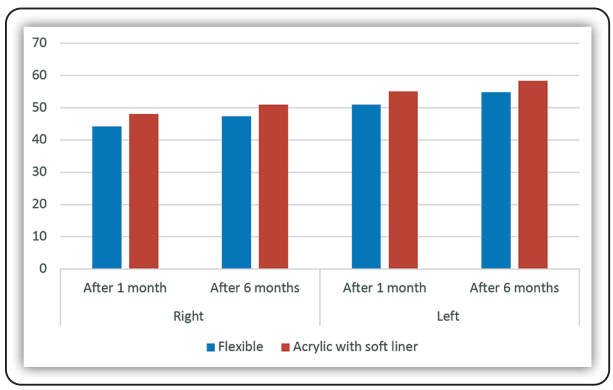

FIG (2) Average biting force in different group

DISCUSSION

Bite force is an essential factor to consider when studying oral function. [7] Diet choice is also influenced by maximum bite force (MBF), which plays a crucial role in the preservation of masticatory function [8].

Some edentulous individuals are uncomfortable with the hard acrylic bases of traditional dentures due to thin and relatively non-resilient mucosa or severe alveolar resorption [9]. As a result, the patient will have inefficient masticatory performance and an uneven distribution of occlusal pressures, producing pain and suffering. Traditional heat-cured acrylic resin with Soft liner and Thermoplastic denture were utilized to avoid this.

MBF is a critical metric for assessing masticatory function [17, 18]. Bite force varies by location in the oral cavity, but it is largest in the first molar region, where about 80% of total bite force is dispersed [19,20] and it is easier and faster to measure. The reliability of many recordings is higher than that of a single recording [21].

Thermoplastic dentures were reported to be more pleasant and comfortable by a statistically significant proportion of patients than traditional dentures. These findings matched those of a research done by Dhiman [22]. These results can be traced to the basic nature of denture base materials once again. Marcelo Coelho Goiato et al. recommended the same in their investigation [23].

In our study, the biting force of conventional dentures relined with soft liner was higher than thermoplastic dentures type with a significance difference which come in agreement with study of Mohamed et al [3].

CONCLUSION

Within the limitations of this study the following conclusion may be drawn: Biting force of acrylic denture with soft liner is higher than flexible denture with significance difference.

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