Research Article

Analysis of masticatory function among normal individuals versus denture wearers using a two-color chewing gum

Nauma Hafeez, Dhanraj Ganapathy*, R. M. Visalakshi

ABSTRACT

Aim: This study aims to analyze the masticatory function among normal individuals versus denture wearers using a two-color chewing gum. **Introduction:** The reintroduction of form and function is of utmost importance when it comes to the replacement of missing teeth. Ill-fitting denture has been known to cause number of problems related to patient comfort, chewing efficiency (functionality), and bone resorption in the long run. Hence, it becomes important to analyze chewing efficiency at the time of denture insertion and in the following years of its use to recognize any underlying cause. One method of testing functionality is by the chewing efficiency test, using a two-color chewing gum, and assessing its homogeneity in terms of color at the end of mastication. **Materials and Methods:** A two-color chewing gum was used to assess the chewing efficiency. Time taken for complete homogeneity of the chewing gum was recorded along with the number of chewing cycles required to achieve this homogeneity. **Results:** The average time taken by individuals without prosthesis was found to be 41 s. The average time taken by individuals with prosthesis was found to be 1 min and 50 s. **Conclusion:** This study shows that there is a significant difference in masticatory function between individuals without prosthesis and those with prosthesis. Hence, with further research and standardization of this test, the chewing efficiency can be assessed for patient with temporomandibular joint disorder and orthodontic and prosthodontic diagnosis in a clinical setting.

KEY WORDS: Denture wearers, chewing gum, efficiency, function

INTRODUCTION

Tooth loss is the shedding of permanent teeth seen usually in the older adult life or as people enter senescence. Although tooth loss is inevitable and a sign of aging, recent years have shown early loss of teeth becoming common, especially among the lower socioeconomic group.[1] One study found 19% of adult population to be completely edentulous[2] which is a significantly high percentage of people.

Various studies show the effects that tooth loss has on the life of a person.[3-5] Extensive tooth loss also affects the functionality of the oral cavity causing difficulties ranging from speech and mastication. Tooth loss is known to cause decreased self-confidence[6] and quality of life;[7] these effects are based on the distribution/site and extent of the tooth loss that has occurred. Overall teeth and oral health are important factors in maintaining a positive general health.[8,9]

Prosthetics are an important field in dentistry. It greatly improves both the form and function of the partially or completely edentulous oral cavity. Over the years, the popularity of prosthodontic field has greatly improved following the rise in tooth loss. Dentures and other oral prostheses are found to improve the eating-related quality of life[10] which plays an important part in the geriatric population[11] and serves to replace the function of teeth. In addition, various studies show majority of denture wearers reported good esthetics and comfort.[12,13]

Overall prosthetic replacement of missing teeth is the conventional method of its management and is found to significantly improve the patient satisfaction.[14]

However, there are some drawbacks to using prosthesis long term or prosthesis that is ill fitting. Management

Access this article online

Website: jprsolutions.info | ISSN: 0975-7619

Department of Prosthodontics, Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, Tamil Nadu, India

***Corresponding author:** Dr. Dhanraj Ganapathy, Department of Prosthodontics, Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences, 162, Poonamallee High Road, Chennai - 600 077, Tamil Nadu, India. Phone: +91-9841504523. E-mail: dhanrajmganapathy@yahoo.co.in

Received on: 19-11-2018; Revised on: 27-12-2018; Accepted on: 21-01-2019

of geriatric patient's is of utmost importance when planning for a prosthetic replacement[15] to achieve good overall prognosis, especially in completely edentulous patients proves challenging.[16,17] Patient satisfaction is initially contributed by esthetics. However, long-term use shifts the patients attention to the functionality of the prosthesis, often patients report with failed prosthesis and resorbed ridges, mobile abutment[18] teeth which make subsequent placement of prosthesis difficult to achieve. Therefore, the functionality is of utmost importance when it comes to the replacement of missing teeth. One method of testing functionality is by the chewing efficiency test;[19] however, this test has many modifications and is not standardized. One method of analyzing the chewing efficiency is using a two-color chewing gum and assessing its homogeneity in terms of color at the end of mastication.[20,21] This study aims at analyzing the chewing efficiencies between normal individuals versus denture wearers.

MATERIALS AND METHODS

A two-color chewing gum was used to assess the chewing efficiency. Time taken for complete homogeneity of the chewing gum was recorded along with the number of chewing cycles required to achieve this homogeneity. Eight volunteers in each of the following groups were taken: Individuals without prosthesis, individuals with partial prosthesis, and individuals with complete prosthesis.

The following inclusion and exclusion criteria were followed:

Inclusion Criteria

Individuals without prosthesis and individuals with prosthesis.

Exclusion Criteria

Orofacial pain, signs of severe temporomandibular disorders dysfunction, and neuromuscular disorders.

A stopwatch was used for precise time recording and the data were collected. The collected data were tabulated and statistically analyzed.

RESULTS

The average time taken by individuals without prosthesis was found to be 41 s. The average time taken by individuals with partial prosthesis was found to be 1 min and 50 s. The average time taken by individuals with complete prosthesis was found to be 2 min and 30 s. Chart 1 shows the average time taken by each of the groups.

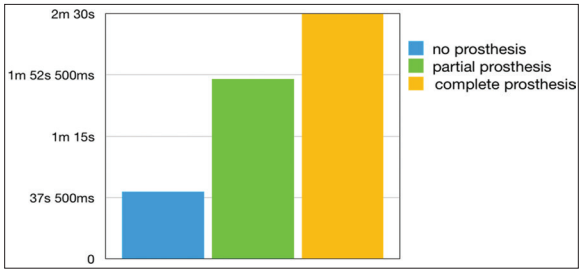

Chart 1: Average masticatory time taken by the participants

DISCUSSION

The above data suggest that the chewing efficiency is significantly decreased in denture wearers. This decrease in chewing efficiency is associated to the adaptability and comforts that denture wearers feel and various factors depending on the fit of denture and patient comfort. Patients with ill-fitting dentures have frequent removal or dislodgement of the denture, leading to compromise in its function. In patients with resorbed ridge, there is reduced capacity of the jaws to take up the force of mastication causing reduced chewing efficiency; an altered treatment plan is required which includes bone augmentation and procedures to increase bone strength. In patient with partial dentures, abutment support and periodontal health play an important role in determining chewing efficiency.

All the above reasons are factors that diminish the quality of functional prosthetics. An improvement in denture fit and support helps in increasing the chewing efficiency of the patient. Providing high-quality denture is based ultimately on its functionality, and therefore, chewing efficiency can be used as one way of assessing it.

The ultimate aim of prosthetics is reestablishment of function. To establish superior functioning dentures, the aim should be to increase the chewing efficiency of denture wearers and bring it as close as possible to the standard normal chewing time.

CONCLUSION

This study shows that there is a significant difference in masticatory function between individuals without prosthesis and those with prosthesis and, therefore, has a potential to serve as a method to assess the masticatory function. Hence, with further research and standardization of this test, the chewing efficiency can be assessed for patients with temporomandibular joint disorder, orthodontic and prosthodontic diagnosis, etc., in a clinical setting.

ACKNOWLEDGMENT

This research was supported by Saveetha Dental College and Hospitals that greatly assisted the research.

REFERENCES

1. Gaber A, Galarneau C, Feine JS, Emami E. Rural-urban disparity in oral health-related quality of life. Community Dent Oral Epidemiol 2018;46:132-42.
2. Dye B, Thornton-Evans G, Li X, Iafolla T. Dental caries and tooth loss in adults in the United States, 2011-2012. NCHS Data Brief 2015;197:197.
3. Allen PF, McMillan AS. A review of the functional and psychosocial outcomes of edentulousness treated with complete replacement dentures. J Can Dent Assoc 2003;69:662.
4. Scott BJ, Leung KC, McMillan AS, Davis DM, Fiske J. A transcultural perspective on the emotional effect of tooth loss in complete denture wearers. Int J Prosthodont 2001;14:461-5.
5. Friedman PK, Lamster IB. Tooth loss as a predictor of shortened longevity: Exploring the hypothesis. Periodontol 2000 2016;72:142-52.
6. Fiske J, Davis DM, Frances C, Gelbier S. The emotional effects of tooth loss in edentulous people. Br Dent J 1998;184:90-3.
7. Gerritsen AE, Allen PF, Witter DJ, Bronkhorst EM, Creugers NH. Tooth loss and oral health-related quality of life: A systematic review and meta-analysis. Health Qual Life Outcomes 2010;8:126.
8. Furuta M, Takeuchi K, Adachi M, Kinoshita T, Eshima N, Akifusa S, *et al.* Tooth loss, swallowing dysfunction and mortality in Japanese older adults receiving home care services. Geriatr Gerontol Int 2018;18:873-80.
9. Klotz AL, Tauber B, Schubert AL, Hassel AJ, Schröder J, Wahl HW, *et al.* Oral health-related quality of life as a predictor of subjective well-being among older adults-a decade-long longitudinal cohort study. Community Dent Oral Epidemiol 2018;46:631-8.
10. Kaushik K, Dhawan P, Tandan P, Jain M. Oral health-related quality of life among patients after complete denture rehabilitation: A 12-month follow-up study. Int J Appl Basic Med Res 2018;8:169-73.
11. Al-Sultani HF, Field JC, Thomason JM, Moynihan PJ. The impact of replacement conventional dentures on eating experience. JDR Clin Trans Res 2019;4:29-40.
12. Sharma A, Tabassum A. Evaluation of patient satisfaction for retention, masticatory efficacy, aesthetics and comfort for removable partial denture: A retrospective study. Int J Appl Dent Sci 2018;4:91-3.
13. Shala KS, Dula LJ, Pustina-Krasniqi T, Bicaj T, Ahmedi EF, Lila-Krasniqi Z, *et al.* Patient's satisfaction with removable partial dentures: A retrospective case series. Open Dent J 2016;10:656-63.
14. Karmacharya P, Saha S, Kumari M. Comparison of chewing ability, oral health-related quality of life, and nutritional status before and after the insertion of complete denture among edentulous patients in Lucknow. J Indian Assoc Public Health Dent 2017;15:145.
15. Berg E, Isidor F, Öwall B. Prosthodontics for the elderly patient–a Scandinavian approach. Protet Stomatol 2018; 68:255-66.
16. Cooper LF. Edentulism and the demise of dentures: Facts and fallacies. In: Mandibular Implant Prostheses. Cham: Springer; 2018. p. 3-10.
17. Patel J, Granger C, Morrow L. The effect of complete denture occlusion on function and patient quality of life: Systematic review. Eur J Prosthodont Restor Dent 2018;26:24-30.
18. Khalifa AK, Elmekawy N. Bite force and bone height changes around abutments retaining mandibular removable partial denture with wrought wire and polyamide clasps: Split mouth study. Dent J 2019;65:59.
19. Elsig F, Schimmel M, Duvernay E, Giannelli SV, Graf CE, Carlier S, *et al.* Tooth loss, chewing efficiency and cognitive impairment in geriatric patients. Gerodontology 2015;32:149-56.
20. Silva LC, Nogueira TE, Rios LF, Schimmel M, Leles CR. Reliability of a two-colour chewing gum test to assess masticatory performance in complete denture wearers. J Oral Rehabil 2018;45:301-7.
21. Kaya MS, Güçlü B, Schimmel M, Akyüz S. Two-colour chewing gum mixing ability test for evaluating masticatory performance in children with mixed dentition: Validity and reliability study. J Oral Rehabil 2017;44:827-34.

Source of support: Nil; Conflict of interest: None Declared