

Original Research

Assessment of the Effect of Complete Dentures on Respiratory Performance: A Spirometric Analysis

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ABSTRACT:

Background: Respiration is considered to be one of the most significant physiological processes. In order to prepare patients to recognise the type of prosthesis they need, a prosthodontist should focus on developing a complete understanding of the patient. As a result, the current study was carried out to evaluate the impact of complete dentures on pulmonary function. **Materials and Methods:** 100 patients who had a complete edentulous arch and a history of wearing complete dentures for at least five years were included in the study. Trained technicians carried out each and every spirometric operation. The spirometric test was carried out using a diagnostic spirometer. The following procedures were followed during testing: Stage 1 involves testing without a denture, Stage 2 involves testing with both dentures present, Stage 3 involves testing with a maxillary denture only, and Stage 4 involves testing with a mandibular denture only. The results of the spirometric test were recorded as forced vital capacity (FVC), peak expiratory flow (PEF), forced expiratory volume in one second (FEV1), and forced expiratory flow 25%–75% (FEF₂₅₋₇₅). SPSS software was used to analyse every outcome. **Results:** The spirometric value of FVC, PEF, FEV1, and FEF₂₅₋₇₅ in the absence of both maxillary and mandibular dentures was found to be 4.23, 6.21, 3.64, and 1.89, respectively. The spirometric value of FVC, PEF, FEV1, and FEF₂₅₋₇₅ in the presence of both maxillary and mandibular dentures was found to be 3.63, 4.95, 2.08, and 1.99, respectively. While analyzing statistically, it was seen that there was a significant decrease in the value of spirometric variables in the presence of dentures. **Conclusion:** According to the aforementioned findings, prolonged denture wearer edentulous patients are at risk of developing spirometric changes. Therefore, prompt advice on the various respiratory exercise regimes should be given to these patients.

Keywords: Complete denture, spirometry, Forced vital capacity

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INTRODUCTION

The proportion of elderly people in the population has increased throughout the course of the 20th century, particularly in developed countries. As might be expected, age is one of the most important factors in edentulousness. Although ageing itself does not cause tooth loss, the frequency of dental and general diseases and functional disabilities increase with advancing age, which may predispose older people to edentulousness.¹⁻³

Thus, the volume of the oral cavity may decrease and some crucial functions may be disturbed, such as speech production and chewing efficiency. Respiration is one of the most vital functions, and it can be

described as the exchange of gases between the living organism and the atmosphere to meet the metabolic demands of the body. The proportion of elderly people in the population has increased throughout the course of the 20th century, particularly in developed countries. As might be expected, age is one of the most important factors in edentulousness. Although ageing itself does not cause tooth loss, the frequency of dental and general diseases and functional disabilities increase with advancing age, which may predispose older people to edentulousness.⁴⁻⁹ Therefore, total edentulism is a widespread, intraoral condition among the aged population; complete dentures are still the most common treatment offered to the edentulous

patient worldwide.^{2,3} To ensure sufficient retention and stability, complete dentures must extend up to the soft palate in the maxilla and to retromolar tissues in the mandible.^{4,5,6} Thus, the volume of the oral cavity may decrease and some crucial functions may be disturbed, such as speech production and chewing efficiency.⁷⁻⁹ Respiration is one of the most vital functions, and it can be described as the exchange of gases between the living organism and the atmosphere to meet the metabolic demands of the body.¹⁰ In the course of oral respiration, oral tissues and existing dentures are the first contacting structures of the air passing through upper airways. It has been stated that edentulism produces a decrease in size and tone of the pharyngeal musculature.^{11,12} Hence, the current study was conducted to evaluate the effects of complete denture on respiratory performance.

Material and methods

The purpose of the current study was to examine the impact of full dentures on pulmonary function. 100 patients who had a complete edentulous arch and a history of wearing complete dentures for at least five years were included in the study. Additionally, only individuals who were totally delighted with their dentures were admitted. The current study excluded participants with asthma and those who had a history of any other respiratory ailment. Prior to the spirometric test, patients were under strict instructions not to engage in any physical activity for at least 3 to 4 hours. All of the patients' complete demographic, clinical, and personal information was documented. The weight, height, and body mass index of each patient were also recorded on a proforma. Trained technicians carried out each and every spirometric operation. The spirometric test was carried out using a diagnostic spirometer. The results of the spirometric test were recorded as forced vital capacity (FVC), peak expiratory flow (PEF), forced expiratory volume in one second (FEV1), and FEF25-75. The SPSS software version 16.0 was used to analyse each outcome, and the degree of significance was determined using the Chi-square test and Student's t-test.

Results

Table 1: Comparison of spirometric values

Comparison	P value
Stage 1-FVC	
Stage 2-FVC	0.001*
Stage 3-FVC	0.00*
Stage 4-FVC	0.01*
Stage 1-PEF	
Stage 2-PEF	0.13
Stage 3-PEF	0.0001*
Stage 4-PEF	0.43

[*: Significant, FVC: Forced vital capacity, PEF: Peak expiratory flow]

In the present study, assessment of 100 patients with the presence of complete edentulous arch and who had a history of complete denture usage for at least 5 years was done. The mean age recorded among the patients of the present study was 61.8 years. Majority of the patients of the present study (70%) were male, whereas the remaining were female.

Table 2: gender-wise distribution of subjects

Gender	Number of subjects	Percentage
Males	70	70%
Females	30	30%
Total	100	100%

The spirometric value of FVC, PEF, FEV1, and FEF₂₅₋₇₅ in the absence of both maxillary and mandibular dentures was found to be 4.23, 6.21, 3.64, and 1.89, respectively. The spirometric value of FVC, PEF, FEV1, and FEF₂₅₋₇₅ in the presence of both maxillary and mandibular dentures was found to be 3.63, 4.95, 2.08, and 1.99, respectively. While analyzing statistically, it was seen that there was a significant decrease in the value of spirometric variables in the presence of dentures.

Discussion

According to the findings from this study, spirometric values for pulmonary function testing were affected by wearing complete dentures. Indeed, previous studies^{13,14} showed that there is a strict relationship between orofacial conditions and the upper airway. However, until the end of the 20th century, clinical findings were not used for the evaluation of respiratory functions in different dental conditions such as partial or total edentulism. The most significant clinical evidence about the relationship between oral conditions and respiratory functions emerged in the late 1990s. Bucca et al.¹⁵ reported that Apnoea-Hypopnea Index (AHI) scores almost doubled during sleep WOD in a 44-year-old COPD and OSA patient who began to wear complete dentures because of total tooth loss after extractions. Cephalometric analysis of the patient revealed significant narrowing in the anteroposterior oropharyngeal distance from 1.5 to 0.6 cm. After these striking findings, they extended their study to six edentulous male OSA patients, and authors observed that removal of complete dentures significantly decreased retropharyngeal space and that sleeping WOD was associated with a decrease in mean and lowest arterial blood saturation while increasing AHI scores.

Bulent P et al¹⁶ determined the influences of complete dentures on spirometric parameters in edentulous subjects. A total of 46 complete denture wearers were included. Respiratory functions of the subjects were evaluated by spirometric tests that were performed in four different oral conditions: without dentures (WOD), with dentures, lower denture only and upper denture only. Forced vital capacity (FVC), peak

expiratory flow, forced expiratory volume in 1 s and forced expiratory flow between 25% and 75% were evaluated. The data were analyzed with Friedman, Wilcoxon and paired-samples t tests ($\alpha = 0.05$). Significant differences were found between spirometric parameters in different oral conditions ($p < 0.05$). In all spirometric parameters, the most important significant differences were found between conditions WOD, FVC and with lower dentures (FVC), and WOD (forced expiratory volume in 1 s) and with upper dentures (forced expiratory volume in 1 s) ($p < 0.001$). It was observed that complete dentures may unfavourably affect spirometric values of edentulous subjects.

Conclusion

According to the aforementioned findings, prolonged denture wearer edentulous patients are at risk of developing spirometric changes. Therefore, prompt advice on the various respiratory exercise regimes should be given to these patients.

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