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Original Research

Assessment of effect of Complete Dentures on Respiratory Performance: A spirometric analysis

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ABSTRACT:
Background: Although the prevalence of complete tooth loss has declined over the last decade, edentulism remains a major disease worldwide, especially among older adults. Loss of vertical dimension of occlusion which causes reduction of the lower face height and rotation of the mandible are some of the conditions which may lead to obstructive sleep apnea. **Aim of the study:** To assess effect of Complete Dentures on Respiratory Performance: A spirometric analysis. **Materials and methods:** The present study was conducted in the Department Prosthodontics of the dental institution. The ethical clearance for the study was approved from the ethical committee of the hospital. For the study, 10 edentulous patients visiting the Department of Prosthodontics for complete denture prosthesis, were selected as subjects for this study. Following criteria of selection of the subjects were strictly adhered to: age group ranging between 40–70 years; healthy subjects from both genders with no systemic involvement especially respiratory diseases; residual alveolar ridge should be well formed/average; cooperative nature. A written informed consent was obtained from the participants after explaining them the protocol of the study. **Results:** Number of male patients was 6 and number of female patients was 4. The age of patients ranged between 40-70 years with mean age as 55.26 years. It was observed that all the spirometric values of the edenullus increased after receiving complete dentures. The results on comparing were found to be statistically non-signnificant. **Conclusion**: Within the limitations of the present study, it can be concluded that respiratory performance of edentulous patients improves with providing complete denture of appropriate vertical dimensions.
Keywords: Complete denture, respiratory, spirometry.

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Introduction:

Edentulism is a debilitating and irreversible condition and is described as the "final marker of disease burden for oral health".[1] Although the prevalence of complete tooth loss has declined over the last decade, edentulism remains a major disease worldwide, especially among older adults.[2] However, there are intra- and intercountry variations in the prevalence of complete edentulism,[3] and direct comparison between national samples is difficult because of the impact of various factors like education, economic circumstances, lifestyle, oral health knowledge and beliefs, and attitudes to dental care.[4]

Loss of vertical dimension of occlusion which causes reduction of the lower face height and rotation of the mandible are some of the conditions which may lead to obstructive sleep apnea. In edentulous patients while recording lung function tests without dentures produces

mild but significant decrease in inspiratory airflow rates,[5] this may be suggestive of same threat to the patency of upper airway. Obstructive sleep apnea is a common disorder, especially in elderly people older than 50 years. About 61% of this group is estimated to meet the minimum criteria for obstructive sleep apnea.[6] Hence, the present study was conducted to assess the effect of Complete Dentures on Respiratory Performance.

Materials and methods:

The present study was conducted in the Department Prosthodontics of the dental institution. The ethical clearance for the study was approved from the ethical committee of the hospital. For the study, 10 edentulous patients visiting the Department of Prosthodontics for complete denture prosthesis, were selected as subjects for this study. Following criteria of selection of the subjects were strictly adhered to: age group ranging between 40–70 years; healthy subjects from both genders with no systemic involvement especially respiratory diseases; residual alveolar ridge should be well formed/average; cooperative nature. A written informed consent was obtained from the participants after explaining them the protocol of the study.

Spirometric Technique and Analysis

Spirometry (Pulmonary Function Test) is a simple method of studying pulmonary ventilation by recording movements of air into and out of the lungs. Spirometry was done with spirometer with prior informed consent of patient. After three acceptable spirograms were recorded, reproducibility criteria were applied. The two largest FVC values within 0.2 Lt of each other and the two largest FEV1 values within 0.2 Lt of each other were taken. When both of these criteria were met, the session was concluded.

The Test Was Performed —

- for edentulous subjects (Without denture),
- for same subjects with complete denture having acceptable vertical dimension of occlusion

The statistical analysis of the data was done using SPSS version 11.0 for windows. Chi-square and Student's t-test were used for checking the significance of the data. A p-value of 0.05 and lesser was defined to be statistically significant.

Results:

Table 1 shows demographic data. A total of 10 patients were included in the study. Number of male patients was 6 and number of female patients was 4. The age of patients ranged between 40-70 years with mean age as 55.26 years. **(Fig 1)**

Table 2 shows mean spirometric values of ednetulous patients and after providing them complete dentures. It was observed that all the spirometric values of the edenullus increased after receiving complete dentures. The results on comparing were found to be statistically non-signnificant. **(Fig 2)**

Table 1: Demographic data

Total number of patients	10
Number of male patients	6
Number of female patients	4
Age range (years)	40-70
Mean age (years)	55.26

Fig 1: Demogrpahic data

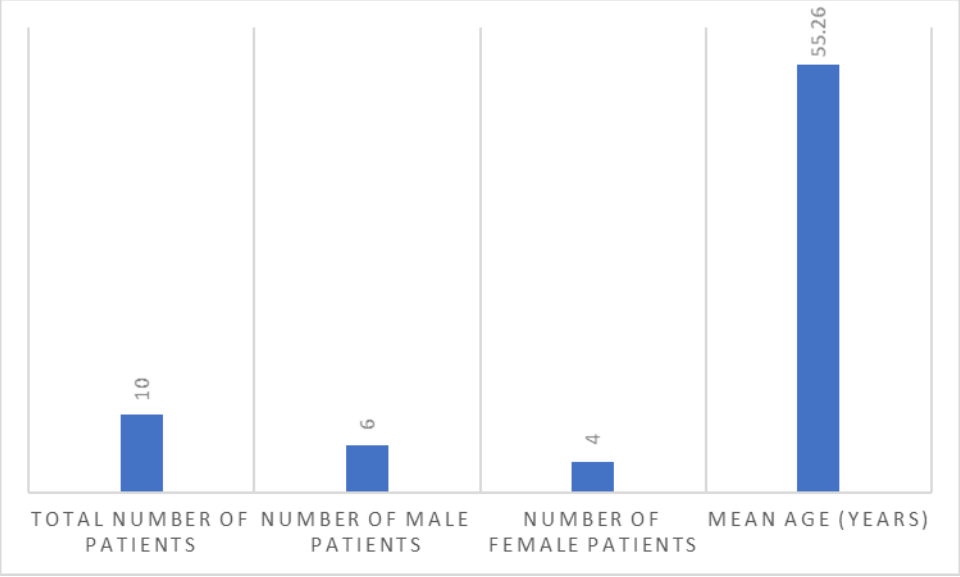
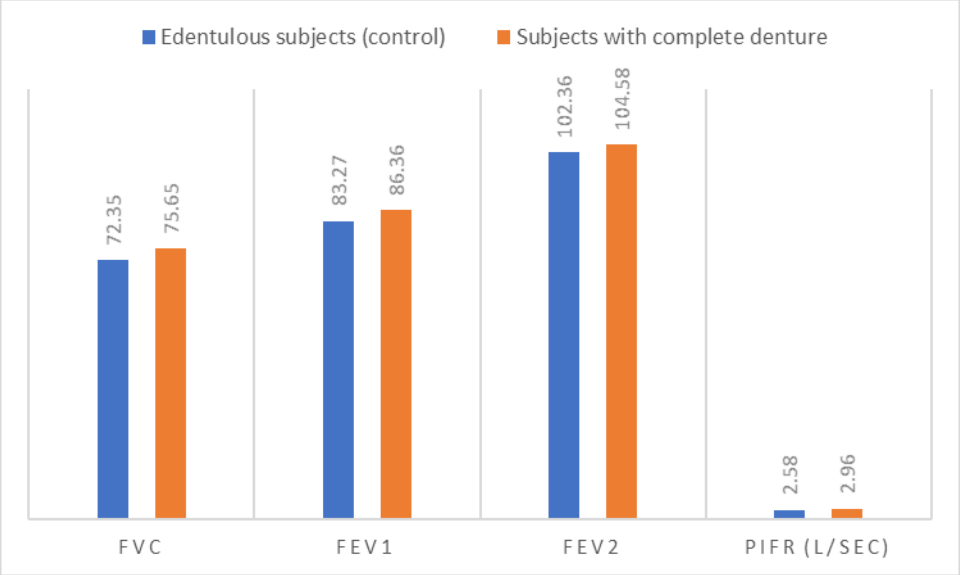


Table 2: Mean spirometric values of ednetulous patients and after providing them complete dentures

	Edentulous subjects (control)	Subjects with complete denture	p-value
FVC	72.35	75.65	0.09
FEv1	83.27	86.36	0.54
FEV2	102.36	104.58	0.65
PIFR (L/sec)	2.58	2.96	0.25

Fig 2: Spirometric values in subjects and controls



Discussion:

In the present study, a total of 10 edentulous patients were included. We observed that the spirometric capacities increased with providing complete denture to the edentulous patients. Piskin B et al determined influences of complete dentures on spirometric parameters in edentulous subjects. A total of 46 complete denture wearers were included in this study. 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. Significant differences were found between spirometric parameters in different oral conditions. 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). It was observed that complete dentures may unfavourably affect spirometric values of edentulous subjects. However, current findings need to be confirmed with advanced respiratory function tests. Indrakumar HS et al assessed the impact of complete dentures on the functioning of the respiratory system. A spirometric assessment of the effect of complete dentures on respiratory performance was done. A total of 100 subjects were included, and diagnostic spirometer was used for carrying out the spiro-metric test at different stages of each subject. The spirometric test was carried out at four different stages: In the absence of both the denture (AODs), with both the dentures (maxillary and mandibular) inserted in the patient's mouth (BDs), with only maxillary denture inserted in the oral cavity (UDs), and finally, by inserting only the mandibular dentures in the oral cavity (LDs). Forced vital capacity (FVC), peak expiratory flow (PEF), forced expiratory volume in 1 second (FEV1), and forced expiratory flow between 25 and 75% (FEF25-75) were evaluated. All the results were compiled and assessed using Statistical Package for the Social Sciences (SPSS) software. Of the total 100 subjects included in the study, 42 were males and 58 were females. The mean FVC values of AOD, BD, LD, and UD group were 3.10, 3.02, 2.90, and 2.93 respectively. The mean PEF values of AOD, BD, LD, and UD group were 5.79, 5.60, 5.40, and 5.48 respectively; 2.39, 2.35, 2.33, and 2.32 were the mean FEV1 values observed in AOD, BD, LD, and UD group respectively. Statistically significant results were obtained while comparing AOD-FVC and BD-FVC and

other oral conditions. They concluded that spirometric values of respiratory functional , tests in edentulous patients might be unfavorably affected by wearing complete dentures. [7,8]

Gupta P et al undertook the study to ascertain the role of complete denture and complete denture with slight increase in vertical dimension using custom made occlussal jig, on retropharyngeal space, posterior airway space, pharyngeal depth, and spirometric readings in comparison with those in edentulous group. Significant changes were observed in both intervention groups and thus, paving the way for doing further research for the consideration of using complete denture with modifications as an oral appliance in edentulous obstructive sleep apnea patient. Erovigni F et al assessed through a cephalometric analysis, if the removal of denture induces, and where, modifications that can favour the pharynx collapse. A total of 27 subjects with complete or partial loss of teeth and with heavy loss of the vertical dimension, were examined. The patients were submitted to radiographs of the cranium in supine position, to simulate as much as possible the night condition, with the denture in intercuspal position (ICP), and in relaxed position both with denture (D-RP) and without it (edentule-relaxed position, E-RP). The radiographs were analysed through specific measures for OSA evaluating the parameters that could be modified by the denture. The pharyngeal airway space (PAS) decreases, at the level of uvula, from ICP (6.7 mm) to RP (5.3 mm). The distance between the base and the tip of the tongue significatively decreased both from ICP vs E-RP, both from D-RP to E-RP. It was concluded that the cephalometric analysis it seems that wearing denture induces modifications in the position of the tongue, of the jaw and of the pharyngeal airway space that can favour the reduction of apnea episodes. [9, 10]

Conclusion:

Within the limitations of the present study, it can be concluded that respiratory performance of edentulous patients improves with providing complete denture of appropriate vertical dimensions.

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