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Original Research

Assessment of the effect of Complete Dentures on Respiratory performance

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ABSTRACT:
Background: To assess the effects of complete dentures on respiratory performance. **Materials & methods:** A total of 40 subjects were enrolled. The patients were having denture for around 5 years. All the spirometric tests were performed. Testing was carried out in the following steps: Stage 1: testing in the absence of denture, Stage 2: testing in the presence of both dentures, Stage 3: testing in the presence of maxillary denture only, and Stage 4: testing in the presence of mandibular dentures only. The result was analysed using SPSS software. **Results:** A total of 40 subjects were enrolled. The mean age of patients was 58.5 years. The spirometric value of FVC, PEF, FEV1, and FEF $_{25–75}$ in the absence of both maxillary and mandibular dentures (Stage 1) was found to be 3.05, 5.79, 2.38, and 2.76, respectively. The spirometric value of FVC, PEF, FEV1, and FEF $_{25–75}$ in Stage 2 was found to be 2.99, 5.62, 2.32, and 2.72, respectively. **Conclusion:** There was a significant decrease in the value of spirometric variables in the presence of dentures.
Keywords: complete dentures, 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] 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] Thus, the volume of the oral cavity may decrease and some crucial functions may be disturbed, such as speech production and chewing efficiency. [5]

Among the vital functions, respiration can be claimed to be one of the most important. [6] It can be considered to be an exchange of air or gases between a living being and the outside atmosphere in order to fulfill the metabolic requirements of the body. In the course of this respiring process, the oral tissues and the prosthetic dentures are basically the first structures that come in contact with the air moving up the airways. [7,8]

Pulmonary function tests are highly valuable tools for physiologic evaluation of the respiratory system, diagnosis of some pathologies, and clinical case management. [9] PFTs include a large number of tests, ranging from simple non-invasive oximetry to sophisticated invasive blood gas analysis. Invasive tests display some implemental difficulties in physiologic studies, even though they provide precise results. [10,11] Although reference values, results, and interpretation may vary individually, spirometry is widely used throughout general medicine to assess the mechanical or bellows properties of the respiratory system by measurement of the dynamic or respired lung volumes and capacities. [10,12]Thus, spirometric test has been generally used for evaluating the respiratory disorders including chronic obstructive

lung disease, pneumonia, and asthma. Compared with other pulmonary function tests, the spirometric test has some important advantages, including being non-invasive and ease of use. [12,13] Hence, this study was conducted to assess the effects of complete dentures on respiratory performance.

MATERIALS & METHODS

A total of 40 subjects were enrolled. The patients were having denture for around 5 years. All the spirometric tests were performed. Forced vital capacity (FVC) value, peak expiratory flow (PEF) value, forced expiratory volume in 1 s (FEV1) value, and FEF $_{25–75}$ value were recorded with the spirometric test. A diagnostic spirometer was employed for performing the spirometric test. Testing was carried out in the following steps: Stage 1: testing in the absence of denture, Stage 2: testing in the presence of both dentures, Stage 3: testing in the presence of maxillary denture only, and Stage 4: testing in the presence of mandibular dentures only. The result was analysed using SPSS software.

RESULTS

A total of 40 subjects were enrolled. The mean age of patients was 58.5 years. The spirometric value of FVC, PEF, FEV1, and FEF $_{25–75}$ in the absence of both maxillary and mandibular dentures (Stage 1) was found to be 3.05, 5.79, 2.38, and 2.76, respectively. The spirometric value of FVC, PEF, FEV1, and FEF $_{25–75}$ in the presence of both maxillary and mandibular dentures (Stage 2) was found to be 2.99, 5.62, 2.32, and 2.72, respectively. The spirometric value of FVC, PEF, FEV1, and FEF $_{25–75}$ in the presence of maxillary denture only (Stage 3) was found to be 2.86, 5.45, 2.27, and 2.58, respectively. The spirometric value of FVC, PEF, FEV1, and FEF $_{25–75}$ in the presence of mandibular denture only (Stage 4) was found to be 2.94, 5.38, 2.28, and 2.65, respectively.

Table: Spirometry values

Spirometric values	Mean values
Stage 1	
FVC	3.05
PEF	5.79
FEV1	2.38
FEF $_{25-75}$	2.76
Stage 2	
FVC	2.99
PEF	5.62
FEV1	2.32
FEF $_{25-75}$	2.72
Stage 3	
FVC	2.86
PEF	5.45
FEV1	2.27
FEF $_{25-75}$	2.58
Stage 4	
FVC	2.94
PEF	5.38
FEV1	2.28
FEF $_{25-75}$	2.65

FVC: Forced vital capacity, PEF: Peak expiratory flow, FEV1: Forced expiratory volume in 1 s, FEF $_{25-75}$: Forced expiratory flow 25%-75%

DISCUSSION

Development of a correct occlusal vertical dimension (OVD) is the most important factor in the fabrication of a new set of complete denture, which is in optimum harmony with the temporomandibular joint (TMJ) and masticatory apparatus of the patient. [14] However, prolonged use of old dentures may inadvertently result in jaw shifting due to frictional abrasion of the denture teeth and also resorption of the residual alveolar ridge. Both these situations lead to a reduction in OVD. A reduced OVD can lead to poor esthetics and morphologic variations in the patients, such as over or underactivity of the muscles of mastication, variations in the masticatory forces, problems of TMJ, reduction in facial height, downward and forward rotations of the mandible, as well as appearance of pseudo-prognathism. All these can invariably influence the function, comfort, speech, and even the appearance of the patient. [15,16] In our study, a total of 40 subjects were enrolled. The mean age of patients was 58.5 years. The spirometric value of FVC, PEF, FEV1, and FEF $_{25–75}$ in the absence of both maxillary and mandibular dentures (Stage 1) was found to be 3.05, 5.79, 2.38, and 2.76, respectively. The spirometric value of FVC, PEF, FEV1, and FEF $_{25–75}$ in the presence of both maxillary and mandibular dentures

(Stage 2) was found to be 2.99, 5.62, 2.32, and 2.72, respectively.

A study by Indrakumar HS et al, 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% (FEF_{25-75}) were evaluated. 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. [17] In our study, the spirometric value of FVC, PEF, FEV1, and $FEF_{25–75}$ in the presence of maxillary denture only (Stage 3) was found to be 2.86, 5.45, 2.27, and 2.58, respectively. The spirometric value of FVC, PEF, FEV1, and $FEF_{25–75}$ in the presence of mandibular denture only (Stage 4) was found to be 2.94, 5.38, 2.28, and 2.65, respectively.

Piskin et al. evaluated the effects of complete dentures on spirometric variables in patients without teeth. This study incorporated 46 edentulous patients wearing complete dentures. Respiratory functions of the patients were assessed by spirometric tests which were carried out in four separate oral conditions, namely without dentures, with dentures, lower denture only, and upper denture only. They concluded that undesirable changes may appear in the spirometric parameters as a result of complete dentures. [18]

Another study by Shah Bukhari JA et al, fifty patients with the presence of complete edentulous arch and who had a history of complete denture usage for at least 5 years were enrolled. Forced vital capacity (FVC) value, peak expiratory flow (PEF) value, forced expiratory volume in 1 s (FEV1) value, and forced expiratory flow 25%–75% ($FEF_{25–75}$) value were recorded with the spirometric test. The spirometric value of FVC, PEF, FEV1, and $FEF_{25–75}$ in the absence of both maxillary and mandibular dentures (Stage 1) was found to be 3.18, 5.83, 2.44, and 2.80, respectively. While analyzing statistically, it was seen that there was a significant decrease in the value of spirometric variables in the presence of dentures. [19]

CONCLUSION

There was a significant decrease in the value of spirometric variables in the presence of dentures.

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