



## MEASUREMENT OF THE AVERAGE WEIGHT OF CONVENTIONAL COMPLETE DENTURES PROCESSED WITH ACRYLIC RESIN BASE MATERIAL AND THE ASSOCIATED CLINICAL SIGNIFICANCE

### Dental Science

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### ABSTRACT

**Objective:** To determine the average weight of conventional complete dentures processed with acrylic resin base material and the associated clinical significance

**Materials and methodology:** Weight of a total of 200 complete dentures; 100 ideal dentures fabricated by pre clinical students and 100 mucosal borne complete dentures fabricated for patients; was measured in a calibrated glass jar. The weights of maxillary and mandibular complete dentures were compared and association between age, gender and duration of edentulousness was seen.

**Results:** The average weight of maxillary and mandibular patient's dentures was found to be  $13.46 \pm 3.90$  gm and  $11.33 \pm 3.07$  gm respectively. The average weight of ideal maxillary and mandibular dentures was found to be  $17.7 \pm 3.21$  gm and  $15.11 \pm 3.44$  gm respectively.

**Conclusion:** The average weight of maxillary denture was more than that of mandibular denture in ideal as well patients' denture.

### KEYWORDS

Average weight, conventional complete denture, Acrylic resin base material

### INTRODUCTION

Acrylic resin is the most commonly used denture base material for mucosal borne removable complete denture.<sup>[1]</sup> Increased weight of maxillary complete denture can cause loss of retention due to gravity. However, the weight of complete denture is a significant factor for the retention and stability of mandibular complete denture,<sup>[2]</sup> though the concept has been challenged in the literature. Also, the average weight of mucosal borne removable complete denture is not available in the literature. Therefore, this study was conducted to estimate the average weight of the ideal denture and its variation with age, sex and period of edentulousness.

### MATERIALS AND METHOD

Weight of 200 dentures was measured in the Department of Prosthodontics and Crown & Bridge, Post Graduate Institute of Dental Sciences, Rohtak. Group I included 100 ideal denture fabricated by pre-clinical students (students having similar level of training under the supervision of single teacher). Same mould, equipment, material, and technique were followed to obtain the ideal denture as a part of their dental preclinical training program.

Group II included 100 mucosal borne removable complete denture delivered to edentulous patients. Group II were subdivided into subgroups based on sex (a), age (b) and period of edentulousness (c). Group IIa included 65 male patient and 35 female patients. Group IIb included subjects in the age groups ranging from 45-54 years, 55-64 years and above 65 years. Group IIc included patients with period of edentulousness less than 6 months, 6 months to 1 year and 1-5 years.

### Measurement of denture weight

Water displacement method was used to measure the weight of denture. A Calibrated glass jar was taken and filled with 1000 ml of water. (Figure 1)



Fig.1 The Calibrated glass jar filled with 1000 ml of water

The clean denture, whose weight was to be measured, was immersed into it. The rise in lower meniscus water level was recorded and charted. Then the denture weight was calculated from the volume of water displaced. (Figure 2). As in pure water 1 ml is equal to 1 gm, denture weight was calculated from volume of water displaced. The procedure was undertaken individually for maxillary and mandibular dentures.



Fig.2 Denture weight calculated from the volume of water displaced

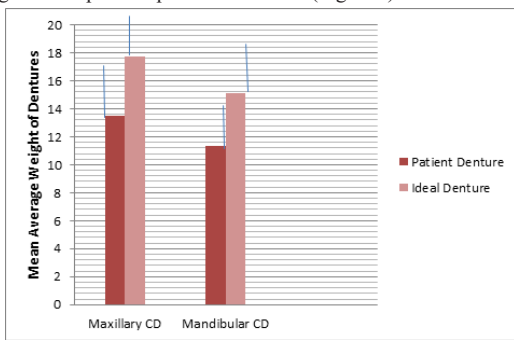
The average weight of the preclinical dentures and the dentures fabricated for patients was calculated individually. The average weight of the ideal dentures and the patient dentures was compared. The average weight of the denture was also correlated based on following parameters: age, sex and period of edentulousness.

### RESULTS

Weight of a total of 100 maxillary and mandibular complete dentures of patients was measured by measuring the volume of displaced water. For intergroup comparison parametric tests were applied. The average of weight of preclinical dentures and clinical dentures was calculated and compared using paired t-test. Pearson's correlation coefficient was used for determination of correlation amongst the parameters like gender, age, period of edentulousness and the denture weight.

The average weight of maxillary and mandibular patient's dentures was found to be  $13.46 \pm 3.90$  gm and  $11.33 \pm 3.07$  gm respectively. When these values were compared statistically p-value came out to be 0.00 which shows statistically significant value. Hence, the patients' maxillary complete dentures were heavier than mandibular dentures. The average weight of ideal maxillary and mandibular dentures was found to be  $17.7 \pm 3.21$  gm and  $15.11 \pm 3.44$  gm respectively. These values show that in ideal dentures also, the maxillary denture was heavier and both maxillary & mandibular dentures were heavy in

weight as compared to patients' dentures. (Figure 3)



**Fig. 3. Graphical representation of mean weight of ideal and patient's denture**

The average weight of male maxillary denture and female maxillary denture was 14.46±3.97 and 11.45±3.21 respectively, with p value of 0.000. This showed male maxillary denture was heavier than female maxillary denture. The male mandibular denture and female mandibular denture didn't show any statistically significant difference. In Group II b it was seen that average weight of maxillary denture among the age group 45-55 years was 13.03±4.17 gm while the subjects in age group 55-65 years and geriatric patients above 65 years showed mean value of 13.41±3.70 and 14.29±3.85 respectively. As the p value calculated was 0.000, it clearly showed that with increase in age weight of the denture also increased, while no significant difference was seen in the weight of mandibular denture. While in group IIc, variation in the weight of maxillary and mandibular denture according to the duration of edentulousness was not significant.(Table 1)

**Table 1. Comparison of weight of maxillary and mandibular complete dentures based on age groups, gender and duration of edentulousness of patients**

Parameters	n	Maxillary		Mandibular		
		Mean±S.D.	p-value	Mean±S.D.	p-value	
Gender	Male	65	14.46±3.97	0.000	11.86±3.32	0.006
	Female	35	11.45±3.21		10.34±2.27	
Age groups	45-55 years	36	13.03±4.17	0.000	10.94±3.13	0.217
	55-65 years	43	13.41±3.70		11.55±3.15	
	Above 65 years	21	14.29±3.85		11.52±2.87	
Duration of edentulousness	6 Months	15	13.21±4.26	0.785	11.43±3.11	0.927
	6 months-1 year	19	13.11±4.09		10.95±2.25	
	1-5 years	66	13.67±3.82		11.44±3.31	

**DISCUSSION**

It has been recognized for more than 150 years, that the weight of the denture contributes to both the retention and stability of mandibular complete dentures.<sup>[2]</sup> However, weight of maxillary complete denture can cause loss of retention due to gravity. Grunewald<sup>[3]</sup> recommended that the complete denture should have the same weight as the missing tissue and the weight of both the resorbed alveolar ridge and the missing teeth would amount to 40 to 50 g. Some criticism arose from the fact, that the increased weight of the denture puts a constant pressure on the residual alveolar ridges producing regressive changes on the mucosa, bone and musculature.<sup>[4]</sup>

Though denture surface area has been extensively studied and has been calculated precisely but the denture weight is an important aspect of the complete denture design which has been neglected in the literature. Denture stability<sup>[5,6]</sup> and patient's satisfaction<sup>[7,8,9,10]</sup> have always been the epitome of various clinical studies with dentures but the concern of weight has still not been well scrutinized and till now there are no recommended values for denture weight As, acrylic resin is the most commonly used denture base material for mucosal borne removable complete denture.<sup>[1]</sup> Thus, the present study determined the average weight of conventional complete dentures processed with acrylic resin base material.

The results showed that the patients' maxillary complete dentures (13.46 ±3.90 gm) were heavier than mandibular dentures (11.33±3.07 gm). This could be attributed to the fact that denture bearing area of

maxilla is more and hence it resulted in a heavy maxillary denture that may further compound the poor denture-bearing ability of the tissues and lead to decreased retention and resistance.<sup>[4]</sup> It was also seen that with increase in age, weight of the maxillary denture increased significantly. This can be due to extreme resorption of the maxillary and mandibular denture bearing area with advancing age. As resorption progresses, supporting tissues decreases and result in large restorative space between the maxillary and mandibular residual ridge.<sup>[11]</sup> Long lip length adds to this problem. This may result in a heavy denture that increases the leverage forces and overtaxing of the remaining supporting structures. However, the sample size and lack of comparison with other denture base materials contributed to the limitation of the study.

**CONCLUSION**

From the above study it could be concluded that average weight of maxillary denture was more than that of mandibular denture in ideal as well patient's denture. However literature is in support of minimizing the weight of maxillary denture to decrease the leverage and improving the cantilever mechanics of suspension and overtaxing of the remaining supporting structures.

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