

## ORIGINAL RESEARCH

# Comparison of Mechanical Strength of Palatal Denture Base using Four Mesh Designs on Shallow Palatal Vault Configuration: An *in vitro* Study

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## ABSTRACT

**Statement of problem:** Single maxillary complete denture fracture along the midline due to crack initiation and propagation from stressed areas in shallow palatal vault configuration. Therefore, it is important to use mesh in single denture fabrication.

**Aims and objectives:** To investigate the mechanical fracture strength of acrylic resin denture base materials using four different mesh designs on shallow palatal vault configuration.

**Materials and methods:** One type of heat-cured resin denture base materials was used to fabricate specimens. Shallow palatal vault shape stainless steel mold was used to aid in duplicating and standardizing the samples. A total of 100 samples were fabricated with high-impact acrylic resin denture base material using shallow palatal vault configuration and square mesh of dimension 50 × 40 mm was used and samples were divided into 5 groups of 20 samples, and each group contained different mesh designs. These samples were stored in water at room temperature for 4 weeks and will be subjected to fracture test using universal testing machine.

**Results:** Samples with different four mesh designs, among them there was no significant difference, but fracture strength value of 4 × 4 mm mesh design was slightly more than other groups.

**Conclusion:** The shallow palatal vault denture base is inherently weaker and less resistant to fracture. Thus, it is recommended to use stainless steel metal mesh in shallow palatal vault to increase fracture resistance. As there was no statistical difference among different mesh designs (i.e., different dimensions of each square in the mesh), any dimension of each square in the mesh can be used without making much statistical difference.

**Keywords:** Denture base, Fracture strength, Heat cure acrylic resins, Metal mesh, Palatal vault.

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**Conflict of interest:** None

## INTRODUCTION

The material most commonly employed in the construction of dentures is polymethylmethacrylate (PMMA) resin. Despite its popularity in satisfying esthetic demands, it is not very ideal in fulfilling the mechanical requirements of prosthesis. This is reflected in unresolved problem of denture fracture and accompanying costs to effect repair.<sup>1</sup>

During function, the denture base is subjected to various stresses like compressive, tensile and shear stress leading to denture fracture. In order to withstand these stresses, the denture base should possess good mechanical properties. One of the important properties is fracture strength. It is the stress at which a brittle material fractures. A number of predisposing factors have been recognized for the incidence of denture fractures. These include unsatisfactory occlusion, poor fit of the prosthesis, deep frenal notches, sharp changes in the contour of denture bases, and single complete denture.<sup>2</sup>

However, denture base resins in single complete dentures have been frequently found to fracture under excess masticatory forces. So a single complete denture opposing natural dentition should be reinforced to that extent that it should withstand the huge occlusal forces acting on it. Metal can be added in form of wires, bars, mesh, or plates. Metal strengthener had a beneficial effect on the fracture resistance of the PMMA. All forms of metal reinforcement significantly increased the impact strength, fracture strength, and tensile strength.<sup>3</sup>

In the prosthodontic literature, palatal shapes have been classified according to their cross-arch forms. Generally, palatal vault of various configurations can be classified into three groups as suggested by Johnson and Mathews, viz., shallow, medium, deep.

Saraf et al<sup>4</sup> found that maximum fracture of maxillary denture was seen in shallow palatal vault configuration.

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In case of maxillary denture, palatal vault shape may influence the fracture strength of heat-polymerized acrylic resin denture base.

Several studies have focused on attempts to improve the mechanical properties of PMMA. Numerous techniques for reinforcement of PMMA with inclusion of other materials have been described like inclusion of metals, mesh, hydroxyapatite, and rubber fillers in heat-cured MMA increased the fracture toughness when compared with commercial denture base material.<sup>5</sup>

So in this study, stainless steel metal mesh is used which is popular and cost-effective to increase fracture strength of PMMA.

**OBJECTIVES**

To evaluate the mechanical strength in fracture test of shallow palatal vault heat cure denture bases without incorporating mesh.

- To evaluate the mechanical strength in fracture test of shallow palatal vault heat cure denture bases incorporating mesh of four different dimensions.
- To compare the mechanical strength in fracture test of shallow palatal vault heat cure denture bases with and without incorporating mesh.

- To compare the mechanical strength in fracture test of shallow palatal vault heat cure denture bases incorporating mesh of four different dimensions.

**MATERIALS**

- Heat cure acrylic resin – DPI Heat cure (Dental Products of India Ltd), Mumbai.
- Prefabricated stainless steel mesh material (mainly contains chromium 18% and nickel 18%) – COMDENT CORPORATION, Mumbai, Maharashtra.
- Petroleum jelly – Vaseline, Made in India, manufactured by Cool Cosmetics Pvt, Ltd.

**METHODS**

**Preparation of Specimen**

Single type of heat-cured resin denture base material (DPI Heat cure) was used to fabricate specimens in a steel split mold.

Shallow palatal vault shape stainless steel split mold was used and the dimension of steel split mold = 50 mm × 40 mm × 9 mm (Length × Breadth × Depth).

The stainless steel mold was fabricated at MIDC, Koyanavasahat, Karad, India, to aid in duplicating and standardizing the samples (Fig. 1).



Figs 1A to C: Steel split mold with clamp

Samples in each group (n = 20) for group I (control group – without incorporating mesh) were prepared individually in following manner.

A monomer polymer ratio of 1:3 by volume for all samples was used. A pipette was used to transfer the required volume of monomer to a clean, dry, porcelain mixing jar. A measured quantity of polymer was transferred to the mixing jar containing monomer. Thorough mixing was done with a clean stainless steel spatula. The jar was kept closed till the mix attained the dough stage. The resin dough was removed from the mixing jar and loaded in stainless steel split mold. Then stainless steel split mold was reassembled and bench pressed under 1500 psi until the edges of the steel split mold closely approximated one another (Figs 2A and B). The stainless steel split mold was clamped and kept overnight for bench curing.

A short curing cycle was employed to cure the specimens. The acrylizer was filled with water. The clamped steel split mold was submerged in water at room temperature ( $23 \pm 2^\circ\text{C}$ ). First, the temperature of the water was raised to  $74^\circ\text{C}$  for  $1\frac{1}{2}$  hour. Later the temperature of the water bath was maintained at boiling/ $100^\circ\text{C}$  for an additional 1 hour. On cooling, the specimens were removed from the mold. Excess acrylic resin was removed, finishing and polishing was done, and named as Group I (control group – without incorporating mesh) (Figs 2A and B).

Samples for groups II–V (n = 80) (with incorporating mesh) were prepared individually in following manner – four different dimensions of mesh were used. They were adapted on the mold by keeping under hydraulic bench press under 1500 psi pressure to get the shape of shallow palatal vault (Figs 2C and D), then similar procedure

used for fabrication of samples of group I was repeated to prepare samples which were incorporated with mesh of different dimensions and were named as groups II–V accordingly.

### Sample Size

A total of 100 samples were fabricated with high-impact acrylic resin denture base material using shallow palatal vault configuration.

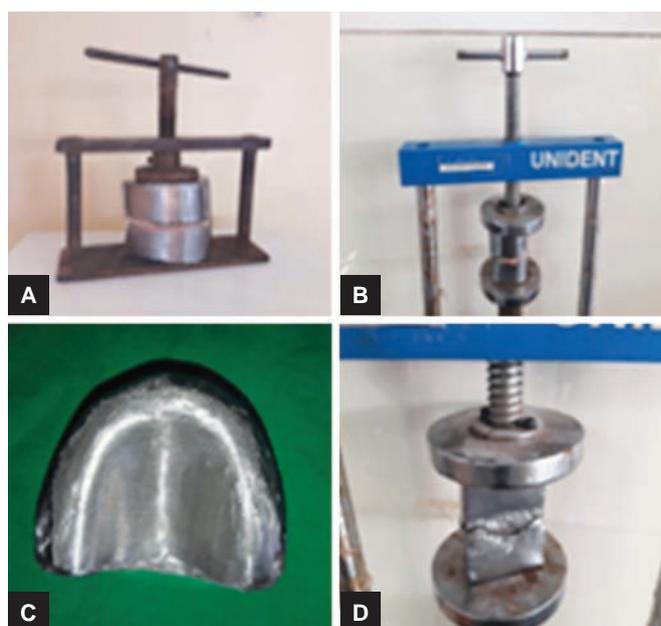
- These samples were divided into five groups of 20 samples.
- *Group I*: 20 shallow palatal vault fabricated with high-impact acrylic resin denture base material without using mesh (Fig. 3A).
- *Group II*: 20 shallow palatal vault fabricated with high-impact acrylic resin denture base material using mesh of dimension  $50 \times 40$  mm (Length  $\times$  Breadth) containing squares and each square had dimension  $1 \text{ mm} \times 1 \text{ mm}$  (Length  $\times$  Breadth) (Fig. 3B).
- *Group III*: 20 shallow palatal vault fabricated with high-impact acrylic resin denture base material using mesh of dimension  $50 \text{ mm} \times 40 \text{ mm}$  (Length  $\times$  Breadth) containing squares and each square had dimension  $2 \text{ mm} \times 2 \text{ mm}$  (Length  $\times$  Breadth) (Fig. 3C).
- *Group IV*: 20 shallow palatal vault fabricated with high-impact acrylic resin denture base material using mesh of dimension  $50 \text{ mm} \times 40 \text{ mm}$  (Length  $\times$  Breadth) containing squares and each square had dimension  $3 \text{ mm} \times 3 \text{ mm}$  (Length  $\times$  Breadth) (Fig. 4A).
- *Group V*: 20 shallow palatal vault fabricated with high-impact acrylic resin denture base material using mesh of dimension  $50 \text{ mm} \times 40 \text{ mm}$  (Length  $\times$  Breadth) containing squares and each square had dimension  $4 \text{ mm} \times 4 \text{ mm}$  (Length  $\times$  Breadth) (Fig. 4B).
- These samples were stored in distilled water at room temperature for 4 weeks. Later, samples were subjected to fracture test using Universal Testing Machine (UTM).

### Testing Procedure

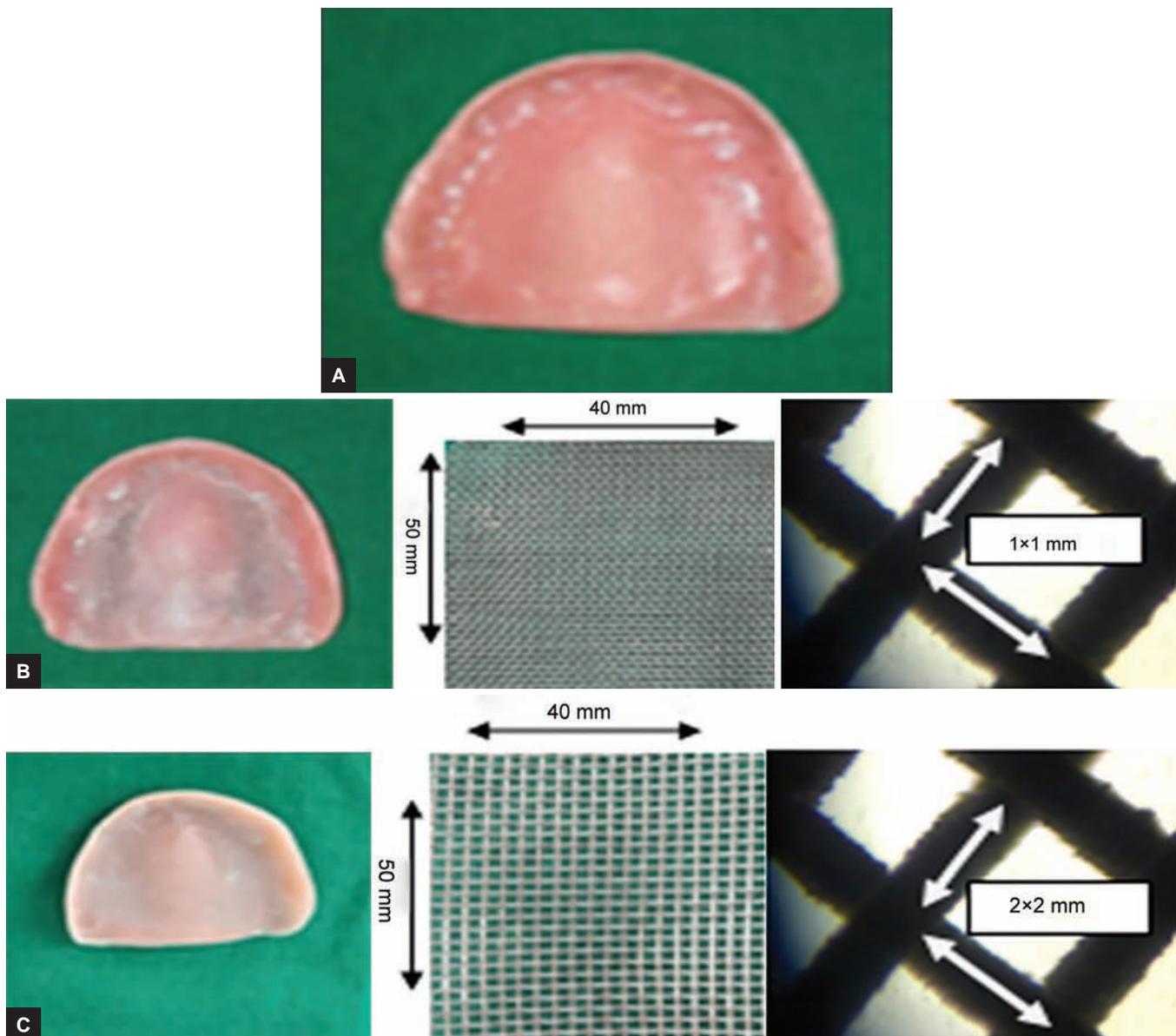
Samples were dried completely before placing them on the UTM. The samples were kept with the tissue side, i.e., the unpolished surface on the platform of the UTM (Fig. 5). The fracture tests were carried out on UTM at a cross-head speed of  $5 \text{ mm/minute}$ . Force was applied via a specially profiled metal ring placed on the most prominent part of the palate. The readings were collected as data. The data were statistically analyzed.

### RESULTS

Table 1 gives descriptive statistics for fracture strength of all the five groups with force of minimum  $840.16 \text{ N}$



**Figs 2A to D:** Packing and mesh adaptation

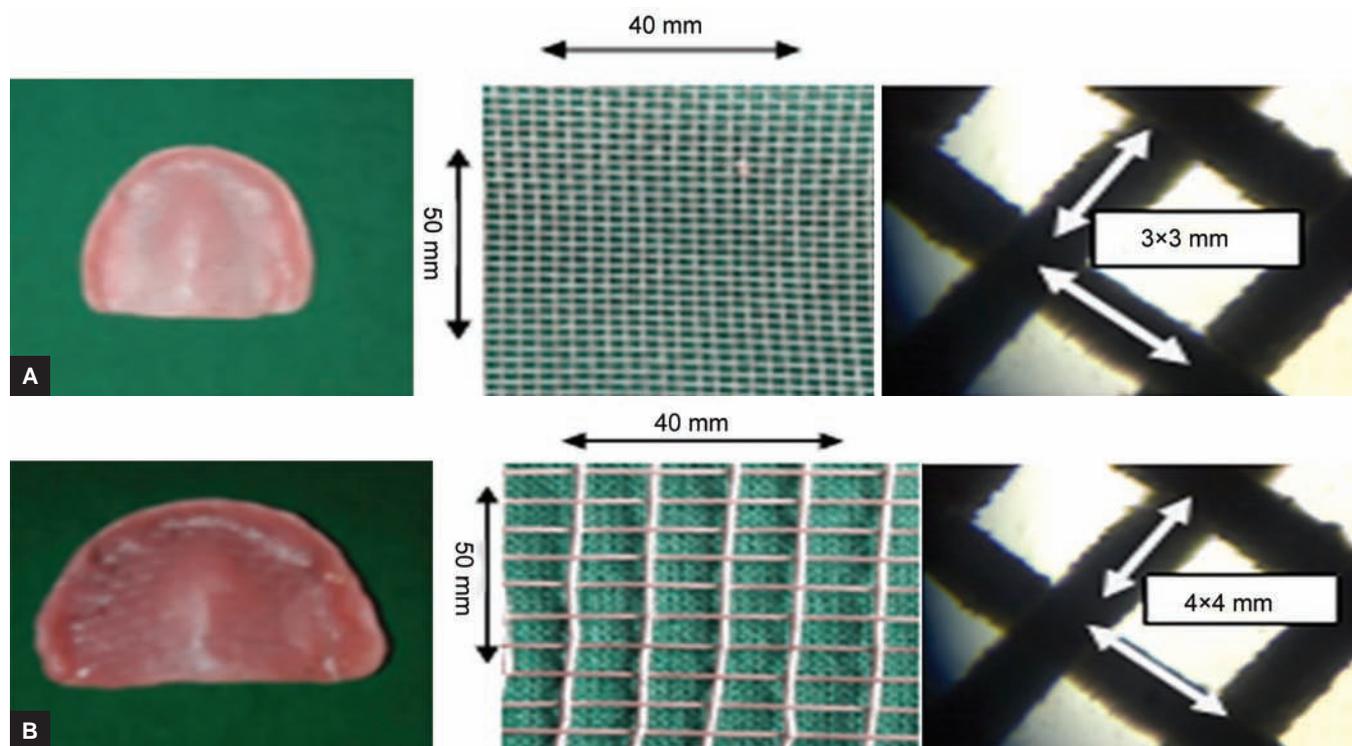


Figs 3A to C: Fabricated samples

and maximum of 1120.48 N. The mean force required to fracture shallow palatal vault heat cure denture base with or without mesh was 1043.1485 N with standard deviation of 70.11566 N.

Table 2 and Graph 1 describe statistics [mean  $\pm$  standard deviation (SD)] for fracture strength among five groups. Control group with force of minimum 840.16 N and maximum of 1054.72 N, the mean force required to fracture shallow palatal vault heat cure denture base without mesh was 938.55 N with standard deviation of 75.80 N. Shallow palatal vault heat cure denture base with mesh containing each square of dimension 1  $\times$  1 mm requires force minimum of 1024.88 N and maximum of 1099.50 N, the mean force required to fracture shallow palatal vault heat cure denture base with mesh containing each square of dimension 1  $\times$  1 mm was 1066.66 N with standard deviation of 31.43 N shallow palatal vault heat

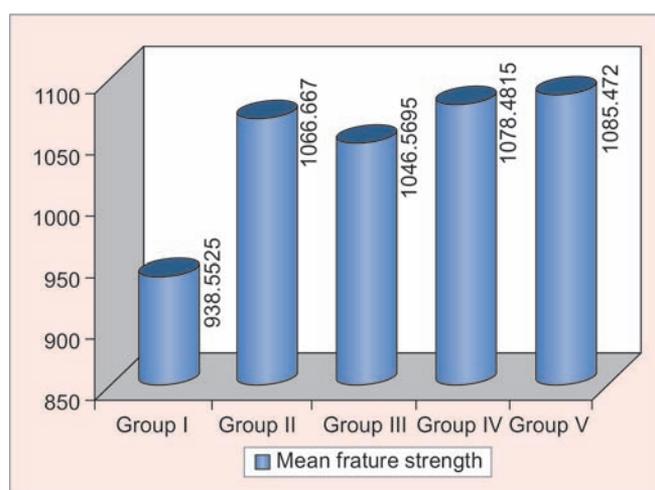
cure denture base with mesh containing each square of dimension 2  $\times$  2 mm requires force minimum of 1019.16 N and maximum of 1082.09 N, the mean force required to fracture shallow palatal vault heat cure denture base with mesh containing each square of dimension 2  $\times$  2 mm was 1046.56 N with standard deviation of 27.73 N. Shallow palatal vault heat cure denture base with mesh of dimension containing each square of 3  $\times$  3 mm requires force minimum of 1014.93 N and maximum of 1114.43 N, the mean force required to fracture shallow palatal vault heat cure denture base with mesh containing each square of dimension 3  $\times$  3 mm was 1078.4815 N with standard deviation of 35.65 N. Shallow palatal vault heat cure denture base with mesh of dimension containing each square of 4  $\times$  4 mm requires force minimum of 1020.10 N and maximum of 1120.48 N, the mean force required to fracture shallow palatal vault heat cure denture base



Figs 4A and B: Fabricated samples



Fig. 5: Sample on UTM



Graph 1: Mean fracture strength among five groups

Table 1: Descriptive statistics (mean ± SD) for fracture strength among study

Descriptive statistics					
	n	Minimum	Maximum	Mean	Standard deviation
Fracture strength	100	840.16	1,120.48	1,043.1485	70.11566

with mesh containing each square of dimension 4 × 4 mm was 1085.47 N with standard deviation of 39.12 N.

Table 3 shows the mean fracture strength among five groups was compared by analysis of variance (ANOVA) which found to be statistically significant ( $p < 0.001$ ) with  $F 35.284$ . This means there was difference in mean strength among all five groups.

Table 4 shows the mean difference for fracture strength among group I ( $938.5525 \pm 75.80340$ ) and groups II–V ( $1066.6670 \pm 31.43508$ ) was  $-128.11450$  with standard error (SE)  $14.35664$  which was statistically significant  $p < 0.001$ , confidence interval (CI)  $(-168.0384; -88.1906)$ . The mean difference for fracture strength among groups II–V was statistically insignificant  $p > 0.005$ . It denoted there was a significant ( $p < 0.05$ ) difference in the fracture strength of denture bases in the fracture strength of shallow palatal vault heat cure denture bases with mesh and without mesh and no statistical difference among different mesh designs (i.e., different dimensions of each square in the mesh) but there was slight difference in the fracture strength values of shallow palatal vault heat cure

**Table 2:** Descriptive statistics (mean  $\pm$  SD) for fracture strength among five groups

Descriptive statistics					
Groups	n	Minimum	Maximum	Mean	Standard deviation
I (control without mesh)	20	840.16	1,054.72	938.5525	75.80340
II (with mesh 1 $\times$ 1)	20	1,024.88	1,099.50	1,066.6670	31.43508
III (with mesh 2 $\times$ 2)	20	1,019.16	1,082.09	1,046.5695	27.73605
IV (with mesh 3 $\times$ 3)	20	1,014.93	1,114.43	1,078.4815	35.65255
V (with mesh 4 $\times$ 4)	20	1,020.10	1,120.48	1,085.4720	39.12728

**Table 3:** Comparing mean fracture strength among five groups by one-way ANOVA

Analysis of variance					
Fracture strength					
	Sum of squares	Df	Mean square	f-value	Significance
Between groups	290,896.917	4	72,724.229	35.284	<0.001
Within groups	195,807.497	95	2,061.132		
Total	486,704.414	99			

Df: Degree of freedom

**Table 4:** Group-wise comparison of mean fracture strength among five groups (one to one ) by Tukey's *post hoc* test

Multiple comparisons						
Dependent variable: fracture strength						
Tukey honest significant difference						
(I) group	(J) group	Mean difference (I - J)	Standard error	Significance	95% CI	
					Lower bound	Upper bound
Group I (control without mesh)	Group II (with mesh 1*1)	-128.114*	14.356	<0.001	-168.03	-88.1906
Group I (control without mesh)	Group III (with mesh 2*2)	-108.017*	14.356	<0.001	-147.94	-68.0931
Group I (control without mesh)	Group IV (with mesh 3*3)	-139.929*	14.356	<0.001	-179.85	-100.005
Group I (control without mesh)	Group V (with mesh 4*4)	-146.919*	14.356	<0.001	-186.84	-106.995
Group II (with mesh 1*1)	Group III (with mesh 2*2)	20.0975	14.356	0.629	-19.826	60.0214
Group II (with mesh 1*1)	Group IV (with mesh 3*3)	-11.8145	14.356	0.923	-51.738	28.1094
Group II (with mesh 1*1)	Group V (with mesh 4*4)	-18.8050	14.356	0.686	-58.728	21.1189
Group III (with mesh 2*2)	Group IV (with mesh 3*3)	-31.9120	14.356	0.180	-71.835	8.0119
Group III (with mesh 2*2)	Group V (with mesh 4*4)	-38.9025	14.356	0.060	-78.826	1.0214
Group IV (with mesh 3*3)	Group V (with mesh 4*4)	-6.9905	14.356	0.988	-46.914	32.9334

\*The mean difference is significant at the 0.05 level

denture base with mesh and it was seen that fracture strength value of shallow palatal vault heat cure denture base containing mesh of dimension 4  $\times$  4 mm was more as compared with other groups.

The mean fracture strength among five groups was compared by ANOVA which found to be statistically significant ( $p < 0.001$ ) with F 35.284. This means there was difference in mean strength among all five groups.

The mean difference for fracture strength among group I (938.5525  $\pm$  75.80340) and groups II-V (1066.6670  $\pm$  31.43508) was -128.11450 with SE 14.35664, which was statistically significant  $p < 0.001$  (CI -168.0384; -88.1906). The mean difference for fracture strength among groups II-V was statistically insignificant,  $p > 0.005$

\*Statistically significant

### Significant Figures

Suggestive significance,  $p < 0.05$ ; Moderately significant,  $p = 0.05$ ; Highly significant,  $p = 0.01$

### Statistical Software

The statistical software namely Statistical Package for the Social Sciences 20.2 and Systat 8.0 were used for the analysis of the data and Microsoft Word and Excel have been used to generate graphs, tables, etc.

### DISCUSSION

Polymethylmethacrylate has been established as principal material in denture base construction due to its good overall processing as well as user-friendly properties. Nevertheless it is generally recognized that despite fulfilling esthetic requirements, the fracture strength of PMMA are not entirely satisfactory and this is reflected by the expenditure on a large number of denture repairs annually.<sup>6</sup>

The denture base is subjected to load during function as well as parafunction. Under the load, the maximum stress is on the palatal aspect of the denture base. Factors that contribute to the stress concentrations will enable the

initiation and propagation of the cracks thereby influencing the rate of failure.<sup>7</sup>

The morphology of edentulous maxilla greatly influences the manner of deformation of the denture base at the anterior palatal part, an area known to deform most in maxillary dentures.<sup>8</sup>

Denture base deformation is also considered to be a contributing factor in ridge resorption, with acrylic resin bases exhibiting a lateral deformation some 8.5 times greater than that of metal denture bases. Denture base deformation is affected by the anatomy of supporting tissues, with high-ridge bases exhibiting torsional deformation and compression (inward movement) occurring with flat ridges.<sup>9</sup>

The flexural strength of maxillary denture bases in different palatal vault shapes with varying thickness of denture base was studied by Morris. It was shown that the shape of the palatal vault and the base thickness significantly affect the fracture resistance of denture bases. The shallow palatal vault base is inherently weaker and less resistant to fracture than medium palatal vault and deep palatal vault, a study done by Saraf et al.<sup>4</sup>

The stresses to which a denture base is subjected are complex. So in our study, samples included were shallow palatal vault denture base with Stainless steel mesh in order to increase its fracture resistance.

Increase in the base thickness will increase the fracture resistance of the shallow palatal vault base, but greater thickness, namely 4 mm may not be clinically acceptable.<sup>10</sup>

In this research, 2 mm thickness of denture bases was tested because it is clinically acceptable. The samples were stored in water for 4 weeks. This long period of storage in water allowed any residual monomer to fully leach out.<sup>11</sup>

Each sample was then subjected to loading on a UTM. Force was applied via a specially profiled metal ring placed on the most prominent part of the palate at a cross head speed of 5 mm/minute to enable accurate assessment of the actual point of load at which fracture occurred. The testing conditions did not completely simulate the intraoral conditions as force was unidirectional and not multidirectional as seen in the oral cavity. The occlusal scheme was not taken into consideration, which may play a role in the amount of stress applied on the denture base. The readings were collected as data. The data were statistically analyzed.

Table 1 gives descriptive statistics for fracture strength of all the five groups with force of minimum 840.16 N and maximum of 1120.48 N. The mean force required to fracture shallow palatal vault heat cure denture base with or without mesh was 1043.1485 N with standard deviation of 70.11566 N.

Table 2 describes statistics (mean $\pm$ SD) for fracture strength among five groups. Control group with force

of minimum 840.16 N and maximum of 1054.72 N, the mean force required to fracture shallow palatal vault heat cure denture base without mesh was 938.55 N with standard deviation of 75.80 N. Shallow palatal vault Heat cure denture base with mesh containing each square of dimension 1  $\times$  1 mm requires force minimum of 1024.88 N and maximum of 1099.50 N, the mean force required to fracture shallow palatal vault heat cure denture base with mesh of dimension containing each square of 1  $\times$  1 mm was 1066.66 N with standard deviation of 31.43 N. Shallow palatal vault heat cure denture base with mesh containing each square of dimension 2  $\times$  2 mm requires force minimum of 1019.16 N and maximum of 1082.09 N, the mean force required to fracture shallow palatal vault heat cure denture base with mesh of dimension containing each square of 2  $\times$  2 mm was 1046.56 N with standard deviation of 27.73 N. Shallow palatal vault heat cure denture base with mesh of dimension containing each square of 3  $\times$  3 mm requires force minimum of 1014.93 N and maximum of 1114.43 N, the mean force required to fracture shallow palatal vault heat cure denture base with mesh containing each square of dimension 3  $\times$  3 mm was 1078.4815 N with standard deviation of 35.65 N. Shallow palatal vault heat cure denture base with mesh containing each square of dimension 4  $\times$  4 mm requires force minimum of 1020.10 N and maximum of 1120.48 N, the mean force required to fracture shallow palatal vault heat cure denture base with mesh of dimension containing each square of 4  $\times$  4 mm was 1085.47 N with standard deviation of 39.12 N. It denotes that fracture strength of shallow palatal vault heat cure denture base without mesh had lower as compared with shallow palatal vault heat cure denture base with mesh of different dimensions and it gives slight difference in the fracture strength values within the group of shallow palatal vault heat cure denture base with mesh containing each square of dimension 1  $\times$  1 mm, 2  $\times$  2 mm, 3  $\times$  3 mm, 4  $\times$  4 mm.

Table 3 shows that the mean fracture strength among five groups was compared by ANOVA which was found to be statistically significant ( $p < 0.001$ ) with  $F$  35.284. This means there was difference in mean strength among all five groups.

Table 4 shows that the mean difference for fracture strength among group I (938.5525  $\pm$  75.80340) and groups II–V (1066.6670  $\pm$  31.43508) was -128.11450 with SE 14.35664 which was statistically significant  $p < 0.001$ , CI -168.0384; -88.1906. The mean difference for fracture strength among groups II–V was statistically insignificant,  $p > 0.005$ . It denoted that there was a significant ( $p < 0.05$ ) difference in the fracture strength of denture bases in the fracture strength of shallow palatal vault heat cure denture bases with mesh and without mesh and no statistical difference among different mesh designs

(i.e., different dimensions of each square in the mesh) but there was slight difference in the fracture strength values of shallow palatal vault heat cure denture base with mesh and it was seen that fracture strength value of shallow palatal vault heat cure denture base containing mesh of dimension  $4 \times 4$  mm was slightly more compared with other groups.

The stainless steel mesh used in study was of different designs (of four dimensions). Further, I have compared mechanical strength of palatal denture base by using these four mesh designs on shallow palatal vault configuration.

The present study showed that there was significant difference in the fracture strength of shallow palatal vault denture bases with mesh and without mesh similar to said by, Dahiya et al<sup>3</sup> and Varghese et al.<sup>12</sup>

Samples with different four mesh designs containing mesh of different dimensions of each square were  $1 \times 1$  mm,  $2 \times 2$  mm,  $3 \times 3$  mm,  $4 \times 4$  mm; among them, there was no significant difference, but its values show slight difference as group II ( $1 \times 1$  mm) – mean fracture strength 1066.6670 N, group III ( $2 \times 2$  mm) – mean fracture strength 1046.5695 N, group IV ( $4 \times 4$  mm) – 1085.4720 N, by these values. It is clear that using mesh design containing each square of dimension  $4 \times 4$  mm had slightly good strength as compared with other groups.

According to the subject of structural engineering, as the slenderness ratio increases, the compressive strength decreases. Hence, the strength is inversely proportional to the slenderness ratio ( $\lambda$ )<sup>13</sup>

$$\text{Slenderness ratio}(\lambda) = L_e/k$$

$L_e$  – Effective length of sample

$k$  – Radius of gyration of sample

To get values of  $L_e$  and  $k$ , Eulers formula is used.<sup>13</sup> Our study fulfills the assumptions of Eulers theory, such as loading should be given axially to sample, sample material should be elastic and homogenous so that we can use this formula.

Using this formula, the slenderness ratio values for groups II–V are 1.7460, 1.7450, 1.7440, and 1.7320 respectively. Hence, as the slenderness value for group V is less than the other groups, it proves the statement that the compressive strength of group V is slightly more than the other groups.

Very little or no literature available on the comparison of fracture strength of shallow palatal vault denture bases containing mesh, so our hypothesis was incorporating mesh in denture bases strengthens the denture base but using different mesh designs does not make such difference for increasing the strength of denture base but heat cure denture base with mesh containing each square of dimension  $4 \times 4$  mm had slightly good strength than other groups so we suggest that using mesh containing each square of dimension  $4 \times 4$  improves strength and esthetics.

Midline fractures appear to be the most common problem in maxillary complete dentures, and they can be prevented by reinforcement of the base material.<sup>14</sup>

Results indicate that there exists a significant ( $p < 0.05$ ) difference in the fracture strength of denture bases in the fracture strength of shallow palatal vault denture bases with mesh and without mesh.

As there was no statistical difference among different mesh designs (i.e., different dimensions of each square in the mesh), any dimension of each square in the mesh can be used but as there was slight difference in the value of strength of mesh design containing each square of dimension  $4 \times 4$  mm, mesh containing each square of dimension  $4 \times 4$  mm is preferred.

## LIMITATIONS OF THE STUDY

- The testing conditions did not completely simulate the intraoral conditions as force was unidirectional and not multidirectional as seen in the oral cavity.
- The occlusal scheme was not taken into consideration, which may play a role in the amount of stress applied on the denture base.
- We have not discussed about midline fracture of maxillary complete denture.

## CONCLUSION

The shallow palatal vault denture base is inherently weaker and less resistant to fracture hence, recommended to use stainless steel metal mesh in shallow palatal vault to increase fracture resistance.

As fracture strength value of mesh design containing each square of dimension  $4 \times 4$  mm was more as compared with other mesh designs, mesh containing each square of dimension  $4 \times 4$  mm is advised.

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