

NEW FIBER-REINFORCED COMPOSITES WITH UEDMA-BASED RESIN MATRIX FOR DENTAL USE

OBJECTIVES: There are currently some concerns on *bis*-phenol-A-glycidyl methacrylate (*bis*-GMA) as a component in dental biomaterials. This study aims at investigating Vicker's hardness, flexural properties and water sorption of experimental fiber-reinforced composites(FRC) with a newly developed urethane dimethacrylate(UEDMA)-based resin matrix.

METHODS: Three experimental light-curable E-glass fiber reinforced groups(Exper1, Exper2, Exper3; n=18) with different UEDMA contents in the resin matrix were prepared. The control group had a *bis*-GMA-based resin matrix(n=18). After preparation and light curing, the specimens were stored in dry condition for 24h or in deionized water at 37C for 1 and 3months. Water sorption, Vicker's hardness together with flexural modulus and strength in 3-point bending(n=6) were investigated at each storage point. To evaluate the fracture type, scanning electron microscopy(SEM) images were taken. Kruskal-Wallis one-way ANOVA and Mann-Whitney U test were carried out to analyse the results with $\alpha=0.05$.

RESULTS: Maximum weight increase trend after water storage was Control(0.001g) < Exper1(0.004g) < Exper2(0.006g) < Exper3(0.007g). The hardness value for the four groups was Control > Exper1 > Exper2 = Exper3(p=0.001). The storage time had no significant effect on the hardness. The trend for the flexural strength(Table1), according to composition, was Control > Exper1 >Exper2 = Exper3(p<0.001); according to storage time, it was dry storage > 1month = 3month(p=0.001). The trend for the flexural modulus, according to composition, was Control = Exper1 = Exper2 > Exper3(p<0.001); according to storage time, it was dry storage > 1month = 3month(p=0.006). SEM image showed good adhesion between the fiber and surrounding matrix.

CONCLUSIONS: The novel UEDMA-based resin matrix showed comparable properties to the traditional *bis*-GMA-based matrix, however, further investigations are on-going.

Table1Mean \pm SD(MPa) of flexural strength

Group	Storage		
	0month(dry)	1month	3months
Control	429 \pm 67	446 \pm 95	461 \pm 78
Exper1	499 \pm 78	441 \pm 34	387 \pm 94
Exper2	485 \pm 107	285 \pm 34	328 \pm 25
Exper3	370 \pm 53	191 \pm 14	182 \pm 14