

## CHAPTER IV

### RESULTS

The first consideration to be presented was related to the shear bond strength test, showing the comparison of the different bonding systems. The means, their standard deviations and ranges of shear bond strengths of System 1+, Transbond, Sequence and Enlight were summarized in Table 1. The amount of shear bond strength at the point of bond or bracket failure was recorded in newtons (N) which was recommended by Fox et al.(1994).

Table 1 Means, standard deviations and ranges of shear bond strengths of System 1+, Transbond, Sequence and Enlight

Adhesives	Number	Shear bond strength (N)		
		X	SD	Min.-Max.
System 1+	30	99.85	21.51	61.97 - 138.06
Transbond	30	112.85	21.41	70.94 - 161.38
Sequence	30	96.19	20.66	68.94 - 132.10
Enlight	30	94.98	20.65	54.11 - 132.92

Visible light cured composite resin, Transbond, was found to have the highest mean shear bond strength value of 112.85 N (SD= 21.41 N). Chemically cured composite resin of System 1+ and Dual cured composite resin of Sequence were found to have the mean shear bond strength value of 99.85 N (SD= 21.51 N) and 96.19 N (SD= 20.66 N) respectively. Dual cured composite resin, Enlight, had the lowest mean shear bond strength value of 94.98 N (SD= 20.65 N).

Oneway analysis of variance (ANOVA) and Duncan's multiple comparison test were employed in the statistical analysis of shear bond strength by SPSS for Windows Release 6.0 (Table 2, 3).

Table 2 Analysis of variance of mean bond strengths of four kinds of adhesives

Source of variation	SS	df	MS	F
Between groups	6036.2817	3	2012.0939	4.5369 **
Within groups	51445.3954	116	443.4948	
Total	51445.3954	119	443.4948	

\*\* p < 0.01

Table 3 Statistical comparison of mean bond strengths using Duncan's multiple range test

Adhesives	Enlight	Sequence	System1+	Transbond
$\bar{X}$	94.98	96.19	99.85	112.85
Enlight	-			
Sequence	1.21	-		
System1+	4.87	2.66	-	
Transbond	17.87*	16.66*	13.00*	-

\* p<0.05

From analysis of variance, there was a significant difference in shear bond strength among four adhesives and Duncan's multiple range test indicated that Transbond, visible light cured composite resin, had significantly greater bond strength than the other adhesives (p<0.05). There were no significant different of shear bond strengths among chemically (System 1+) and dual (Sequence and Enlight) cured composite resins.

The second consideration was related to the fracture site. Fracture sites were divided into bracket-composite interface, enamel-composite interface and within composite and were determined in terms of adhesive and cohesive failure (Table 4).

Table 4 Means, standard deviations and ranges of the percentage of failure modes

Adhesive	Percent adhesive failure				Percent cohesive failure	
	Bracket base		Enamel surface		X ± SD	Min.-Max.
	X ± SD	Min.-Max.	X ± SD	Min.-Max.		
System 1+	40 ± 27	3 - 86	40 ± 33	0 - 92	20 ± 15	1 - 54
Transbond	50 ± 27	2 - 95	42 ± 30	4 - 98	8 ± 7	0 - 25
Sequence	16 ± 14	0 - 67	81 ± 16	29 - 100	3 ± 5	0 - 20
Enlight	12 ± 9	0 - 29	83 ± 12	48 - 100	5 ± 6	0 - 25

Microscopic observation of the mode of failure showed that adhesive failure were more prominent mode than cohesive failure in all adhesives. The chemically (System 1+) and the visible light (Transbond) cured composite resins underwent bond failure at both bracket-composite and enamel-composite interface, whereas the dual cured composite resins, Sequence and Enlight, predominantly underwent bond failure at enamel-composite interface. However, the chemically cured composite resin showed the highest cohesive failure (20 ± 15%).