



Novel Challenges in Dental Practice and Research

November 2-4, 2022, Mae Fah Luang University, Chiang Rai, Thailand



Bond Strength Between Orthodontic Metallic Brackets Bonded to Different Tooth-colored Restorative Materials

(Dr. Rutapakon Insawak, Dr. Spun Lenglerdphol, Tamanan Ruangsiri, Thanatham Kengwitkam, Nichakam Jinaphen, Jinitta Ratimart and Orarak Choovanichwong) (College of Dental Medicine, Rangsit University, Rutapakon.i@rsu.ac.th)

Background

Due to the high demand of esthetic dentistry, use of tooth colored restoration has highly increased. In orthodontic treatment, the longevity and quality of bond between orthodontic bracket and tooth colored restoration are one of the most important factors of orthodontic treatment.

This study aimed to compare the shear bond strength of orthodontic metallic brackets bonded to different tooth-colored restorative materials and the surface roughness of the restorations.

Materials and Methods

50 specimens (N=50) were divided into 5 groups, including resin composite (RC), Porcelain (PL), Lithium disilicate glass (LD), Zirconia (Zr), and Hybrid ceramic (HC), 10 in each group (n=10). Specimens were bonded to orthodontic metallic bracket using Transbond XT. Shear bond strength,

adhesive remnant index and surface roughness value data were collected and analyzed by One-way ANOVA and Turkey test ($p < 0.05$), Chi square, and paired T-test ($p < 0.05$) respectively.

Results

The highest shear bond strength was PL group (6.24 MPa) and the lowest was RC group (3.33 MPa). RC and PL had significant difference shear bond strength (Table 1). According to Mode of ARI scores, most groups showed score 3, except RC group which

showed score 1 (Figure 1). Surface roughness value of HC group before and after polishing was the only group that was not significantly different. ($p < 0.05$)

Material	Composite	Porcelain	Emax	Enamic	Zirconia
Mean (MPa)	3.23	6.24	4.42	3.77	6.10
Standard deviation	1.84	2.72	3	1.58	2.35
SD/Mean x 100	56.93	43.57	67.83	41.80	38.57

Table 1 Shear bond strength of each material

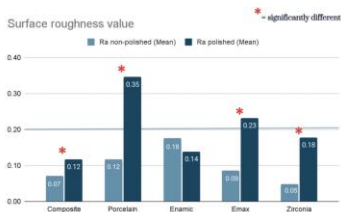


Figure 1 Surface roughness value of each material

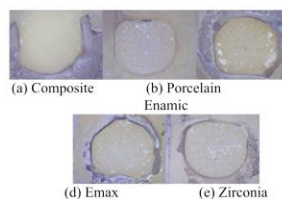


Figure 2 Mode of Adhesive Remnant Index scores

	0	1	2	3	Total
Composite	2 (20%)	7 (70%)	1 (10%)	0 (0%)	10 (100%)
Porcelain	0 (0%)	1 (10%)	0 (0%)	9 (90%)	10 (100%)
Enamic	2 (20%)	2 (20%)	2 (20%)	4 (40%)	10 (100%)
Emax	0 (0%)	1 (10%)	1 (10%)	8 (80%)	10 (100%)
Zirconia	0 (0%)	1 (10%)	1 (10%)	8 (80%)	10 (100%)

Table 2 Adhesive Remnant Index scores of each material

Discussion and Conclusion

- Only PL and ZR showed the adequate shear bond strength for orthodontic bonding.
- Every group, except RC, had adhesive failure at adhesive-bracket interface. Which increased the possibility of damage to the material surface due to the need to wear out the remaining adhesive is high.
- HC was the only group that did not have significant different roughness values comparing before and after polishing.

References

- Wongsamut, W., Satrawaha, S., & Wayakanon, K. (2017). Surface modification for bonding between amalgam and orthodontic brackets. *J Orthod Sci*, 6(4), 129-135. doi:10.4103/jos.JOS_25_17
- Alzainal,A.H.,Majud,A.S.,Al-Ani,A.M.,&Mageet,A.O.(2020).OrthodonticBonding: Review of the Literature. *Int J Dent*, 2020, 8874909. doi:10.1155/2020/8874909

Acknowledgements

This research would not have been possible without the exceptional support of the research institute, Rangsit University for research scholarship and our advisors, Dr. Rutapakon Insawak and Dr. Spun Lenglerdphol who provided a valuable research guideline and method with expert opinions to us. The enthusiasm, knowledge and exacting attention to details have been an inspiration and kept our work on track from the first encounter of this paper.