

Letter to the Editor

Dear Editor,

We appreciated the article published in your journal, *Operative Dentistry*, titled “Ferrule design does not affect the biomechanical behavior of anterior teeth under mechanical fatigue: an in vitro evaluation.”¹ It was a quality study and threw light upon the factors that are necessary to consider for clinical application, while performing similar studies on ferrule. However, we would appreciate it if the authors could attend to the following concerns regarding the study.

1. There are differences in the properties of bovine and human teeth, and since this study evaluated biomechanical properties, the results may not be clinically relevant. Bovine enamel has been found to have significantly less microhardness value and higher wear as compared with human enamel.² There are also significant differences in the bond strength and shear bond strength of bovine and human teeth.³⁻⁴
2. The title of the study is suggestive of a conclusion rather than an insight to the study.
3. The conclusions of the cross reference quoted in the study have shown contrasting results, but the present study mentioned otherwise, stating “Ma and others reported a statistical difference between no-ferrule, 0.5-mm ferrule, and 1-mm ferrule designs, with an effect size that varied from 154,925 load fatigue cycles (mean difference between no-ferrule and 0.5-mm ferrule groups) to 262,659 cycles (mean difference between no-ferrule and 1-mm ferrule groups)”; however, in the original article by Ma and others, it was concluded that teeth with a 1.0-mm ferrule showed a significantly higher fatigue cycle count than the no-ferrule group ($p=0.008$) but were not statistically different from the 0.5-mm ferrule group ($p=0.032$).⁵
4. The masticatory forces acting on the anterior teeth ranges from 382N to 108N, respectively, for males and females.⁶ However, in the present study the dynamic load testing applied a load of up to 550N, which may not be clinically relevant.

Dr Anwetakshmi Ray
Post-graduate student

Department of Conservative Dentistry & Endodontics Manipal College of Dental Sciences, Mangalore
Affiliated to Manipal Academy of Higher Education, Manipal
anwetakshmiray@gmail.com

Dr M Kundabala, BDS, MDS

Department of Conservative Dentistry & Endodontics Manipal College of Dental Sciences, Mangalore
Affiliated to Manipal Academy of Higher Education, Manipal
Kunda.kamath@manipal.edu

Dr Neeta Shetty, BDS, MDS

Department of Conservative Dentistry & Endodontics Manipal College of Dental Sciences, Mangalore
Affiliated to Manipal Academy of Higher Education, Manipal
Neeta.shetty@manipal.edu

References

1. Figueiredo FE, Santos RC, Silva AS, Valdívila AD, Oliveira-Neto LA, Griza S, Soares CJ, & Faria-e-Silva AL (2019) Ferrule design does not affect the biomechanical behavior of anterior teeth under mechanical fatigue: an in vitro evaluation *Operative Dentistry*, **44**(3) 273-280.
2. Rios D, Honório HM, Magalhães AC, Delbem ACB, Machado MAAM, Silva SMBD, & Buzalaf MAR (2006) Effect of salivary stimulation on erosion of human and bovine enamel subjected or not to subsequent abrasion: an in situ/ex vivo study *Caries Research* **40**(3) 218.
3. Fowler CS, Swartz ML, Moore BK, & Rhodes BF (1992) Influence of selected variables on adhesion testing *Dental Materials* **8**(4) 265-269.
4. Kaplan AE, Ubios AM, & Beigelis AA (1996) Suitability of different substrates for reliable bond strength tests. *Acta Odontologica Latinoamericana: AOL* **9**(1) 3-12.
5. Ma PS, Nicholls JI, Junge T, & Phillips KM (2009) Load fatigue of teeth with different ferrule lengths, restored with fiber posts, composite resin cores, and all-ceramic crowns *The Journal of Prosthetic Dentistry* **102**(4) 229-234.
6. Helkimo E, Carlsson GE, & Helkimo M (1977) Bite force and state of dentition *Acta Odontologica Scandinavica* **35**(6) 297-303.

Authors' Response

We appreciate your interest in our manuscript. Please find below the response to your queries.

1. Both wear and hardness are barely related to the biomechanical behavior of restorations. In fact, the biomechanical behavior of restored teeth is closely related to mechanical properties such as elastic modulus or the Poisson coefficient. Otherwise, several studies have reported the similarity between the mechanical properties of bovine and human teeth:
1. Novais VR, Soares PB, Guimarães CM, Schliebe LR, Braga SS, & Soares CJ (2016) Effect of gamma

radiation and endodontic treatment on mechanical properties of human and bovine root dentin *Brazilian Dental Journal* **27**(6) 670-674.

2. Cochrane S, Burrow MF, & Parashos P (2019) Effect on the mechanical properties of human and bovine dentine of intracanal medicaments and irrigants *Australian Dental Journal* **64**(1) 35-42.
 3. Moda MD, Fagundes TC, Bresciani E, Briso ALF, & Dos Santos PH (2019) Comparison of in vitro erosion protocols in bovine teeth to simulate natural erosion lesion: analysis of mechanical properties and surface gloss *Journal of Applied Oral Science* **27** e20180107.
- Moreover, it has been demonstrated that bovine teeth are feasible substitutes for human teeth in either dentin or enamel bond testing. See: Reis AF, Giannini M, Kavaguchi A, Soares CJ, & Line SR (2004) Comparison of microtensile bond strength to enamel and dentin of human, bovine, and porcine teeth *Journal of Adhesive Dentistry* **6**(2) 117-121.
2. The title of the article is a personal choice of the authors. We chose this title since it quickly informs the readers about the content and conclusion of the study.
 3. The author of the letter misunderstood the results of the quoted study. The "Results" section of study from Ma et al (2009) reported the following: "The Mann-Whitney U test with Bonferroni correction ($\alpha=0.017$) was used for pairwise comparison and indicated that the no-ferrule group was significantly different from the 0.5-mm ferrule group ($p=0.008$) and 1.0-mm ferrule

group ($p=0.008$), and there was no significant difference between the 0.5-mm and 1.0-mm groups ($p=0.032$)." Therefore, the absence of a statistical difference was between the specimens presenting a ferrule of 0.5 and those with 1.0 mm.

4. The author misunderstood the meaning of "accelerated fatigue testing protocol," which is presented in the second paragraph of the "Discussion" section. As discussed, a stepwise fatigue approach is used to accelerate the failure, since the specimens could not present failure if loaded below its endurance limit.

Best regards,

André L. Faria-e-Silva

Letter to the Editor

Dear Editor,

First of all we thank the members of the editorial team for forwarding our letter to authors for clarification and also considering our letter for publication. We appreciate the authors for their prompt reply and clarifying all the doubts with proper explanation.

With warm regards,

Dr Anwetakshmi Ray, Dr M Kundabala, and Dr Neeta Shetty