

# Comparative Analysis of *Streptococcus Mutans* Adhesion to BioFlx, Zirconia, and Stainless Steel Crowns in Pediatric Dentistry: An In Vitro Study

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## Objective

- This study aims to evaluate the adhesion of *Streptococcus mutans* to the surfaces of BioFlx, zirconia, and stainless steel crowns under controlled laboratory conditions with the goal of reducing caries risk and enhancing long-term clinical success in pediatric patients.



BioFlx

Zirconia

SSC

## Methods

- Five samples of pediatric dental crowns per type (NuSmile BioFlx™, NuSmile zirconia, and 3M stainless steel crowns (SSC)), were sterilized and placed in the wells of a 24-well plate containing *S. mutans* cells in TYE + sucrose broth. The samples were incubated overnight at 37°C, then transferred to sterile plastic tubes containing phosphate-buffered saline (PBS) for bacterial detachment by sonication. The resulting bacterial suspensions were further diluted in PBS and each dilution was plated onto BHI agar plates for colony enumeration. Colony numbers obtained from each sample were compared.
- Statistical significance in bacterial levels was assessed using a nonparametric Kruskal-Wallis test on the log-transformed data. Post-hoc pairwise comparisons were assessed using DSCF multiple comparisons analysis to maintain a conservative 0.05 significance level. SAS EG v.8.3 (SAS Institute, Cary, NC) was used for all analyses.

## Results

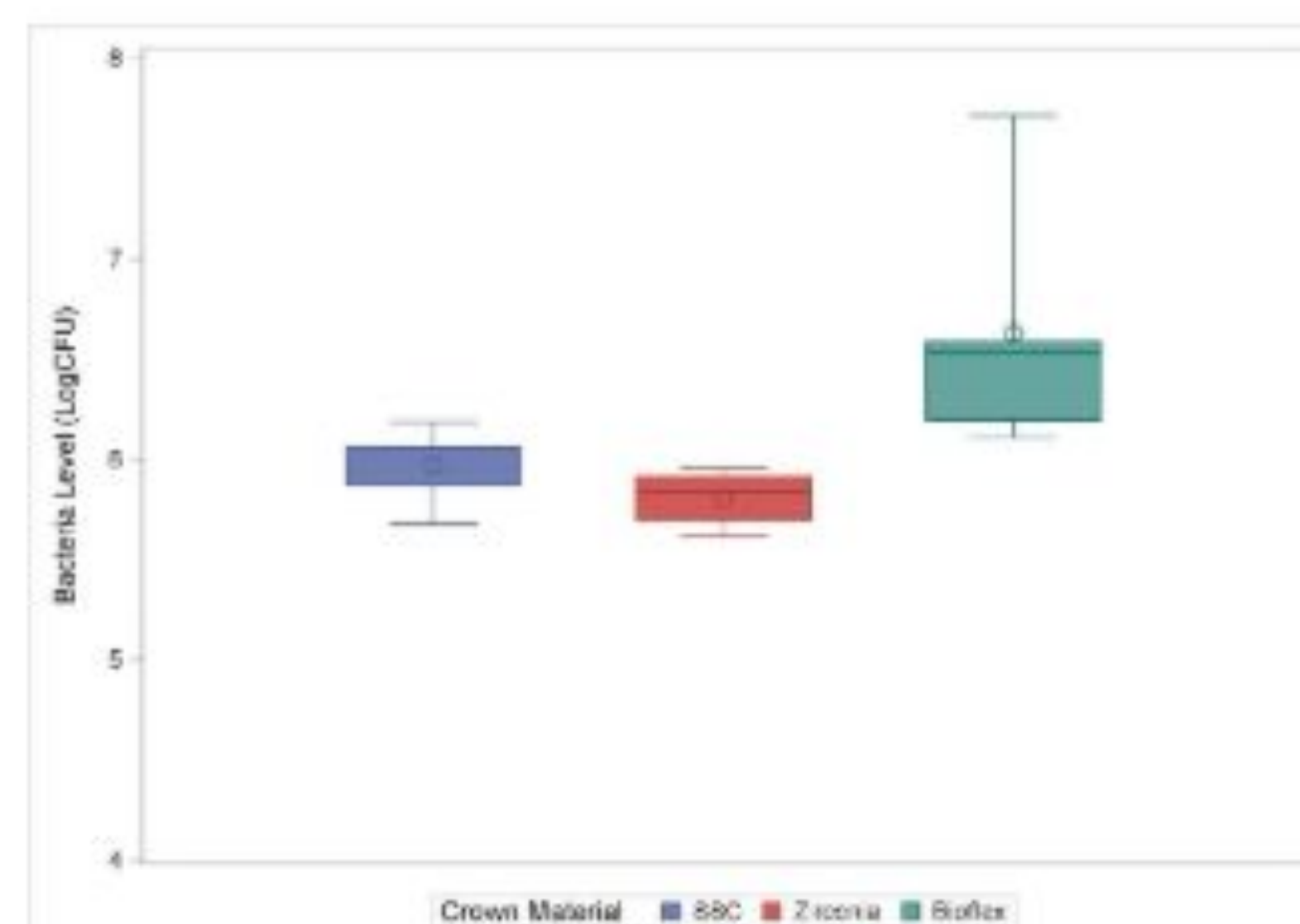
- BioFlx crowns had significantly higher bacterial levels than SSC (adj p=0.0430) and Zirconia crowns (adj p=0.0245). Bacterial levels recovered from Zirconia crowns and SSC were not significantly different (adj p=0.3633).

Table 1: Log-Transformed Bacteria Levels (LogCFUs) by Crown Type (Median, IQR)

Crown	Median	IQR
BioFlx	6.53	6.20, 6.59
SSC	6.06	5.87, 6.06
Zirconia	5.84	5.70, 5.91

\*CFUs- Colony Forming Units

Figure 1: Distribution of Bacterial Counts by Crown Material



\*Circle indicates mean bacterial level; horizontal line within shaded box indicates median; shaded box indicates interquartile range (IQR); error bars extend out to the minimum and maximum observed values.

## Discussion

- The findings demonstrated a clear difference among the three crown types, with BioFlx exhibiting the highest levels of *S. mutans* adhesion, followed by stainless steel and Zirconia crowns.
- These findings suggest that crown surface characteristics may influence plaque accumulation, which could impact caries risk in pediatric patients.
- While the study was conducted under controlled laboratory conditions, the findings provide a valuable insight into how crown material selection may influence plaque accumulation in the oral environment.

## Conclusion

- SSC and Zirconia crowns may be better options than BioFlx for pediatric patients, especially those with high caries risk and poor oral hygiene due to our finding of reduced adhesion of *S. mutans* to these materials. Although SSC and Zirconia crowns did not differ significantly from each other, both performed better than BioFlx.

## References

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