

Clinical Outcomes of Primary Anterior Esthetic Crowns in Pediatric Dentistry: Prospective Cohort Study

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Introduction

Early childhood caries (ECC) is a significant dental issue affecting children aged 71 months or younger, characterized by decayed, missing, or filled tooth surfaces in primary teeth. Risk factors for ECC include microbiological agents (notably *Streptococcus mutans* and *Streptococcus sobrinus*), dietary habits (high sugar intake), and environmental influences such as limited access to dental care and socioeconomic status.

ECC primarily targets the smooth surfaces of primary maxillary incisors and can lead to broader health issues, including malnutrition and low self-esteem. It affects children's quality of life and can impose emotional and financial stress on parents.

Treatment options for ECC include full coronal restorations, particularly when caries are extensive or hygiene is poor. Options for restoration include:

- Resin Strip Crowns (RC):** Aesthetic and generally well-received by parents, though they are technique-sensitive and require a good bonding surface.



- Pre-Veneered Stainless Steel Crowns (PVSSC):** Known for excellent retention, but can experience issues with resin facing loss and color stability.



They do require less chair time than RCs.

- Zirconia Crowns (ZC):** Offer strength and aesthetics, with high parental satisfaction. However, they require more extensive tooth reduction and a skilled technique due to their inability to be adjusted after placement.



The study aims to evaluate the longevity, success, and parental satisfaction of these restoration types specifically for primary maxillary teeth treated under general anesthesia. This prospective cohort study seeks to fill existing gaps in the literature regarding the best materials for restoring primary anterior maxillary teeth.

Methods

This study, approved by the Virginia Commonwealth University IRB, focused on pediatric dental patients aged 36-72 months who received anterior maxillary crowns under general anesthesia. Data were collected at multiple intervals (6, 12, and 18 months) until tooth exfoliation or extraction.

Inclusion Criteria:

- Ages 36-72 months
- ASA I or II status
- Treated under general anesthesia

- Maxillary anterior teeth

- At least one decalcified or carious tooth

- Healthy pulp or reversible pulpitis

- Need for anterior esthetic full coverage restoration

Exclusion Criteria:

- History of trauma to maxillary anterior teeth

- Resorbed roots or near exfoliation

- Evidence of pathology

Data Collection and Analysis: During surgery, guardians consented and completed the Early Childhood Oral Health Impact Scale (ECOHIS) questionnaire, assessing the child's oral health-related quality of life. Restoration materials included strip crowns, pre-veneered stainless steel crowns, or zirconia crowns, chosen based on the dentist's comfort and patient needs.

Follow-up visits every six months included repeated ECOHIS assessments and dental evaluations by providers to check crown integrity. A parental satisfaction questionnaire was also administered, addressing factors like size, shape, color, and overall satisfaction. Data were collected using REDCap software.

Results

Table 1: : Summary of Patients and Crowns

	Mean	SD
Age	4.3	1.3
	n	%
Gender		
Male	21	51%
Female	20	49%
Teeth Treated		
C	11	10%
D	25	22%
E	20	17%
F	23	20%
G	25	22%
H	11	10%
Crown Type		
Zirconia	24	21%
Resin Crown	61	53%
Pre-veneered SSC	30	26%
Number of Teeth Treated		
1	7	17%
2	12	29%
3	7	17%
4	13	32%
5	1	2%
6	1	2%

Figure 1: Crown Outcomes at 6-Month Follow-up (n=101 crowns)

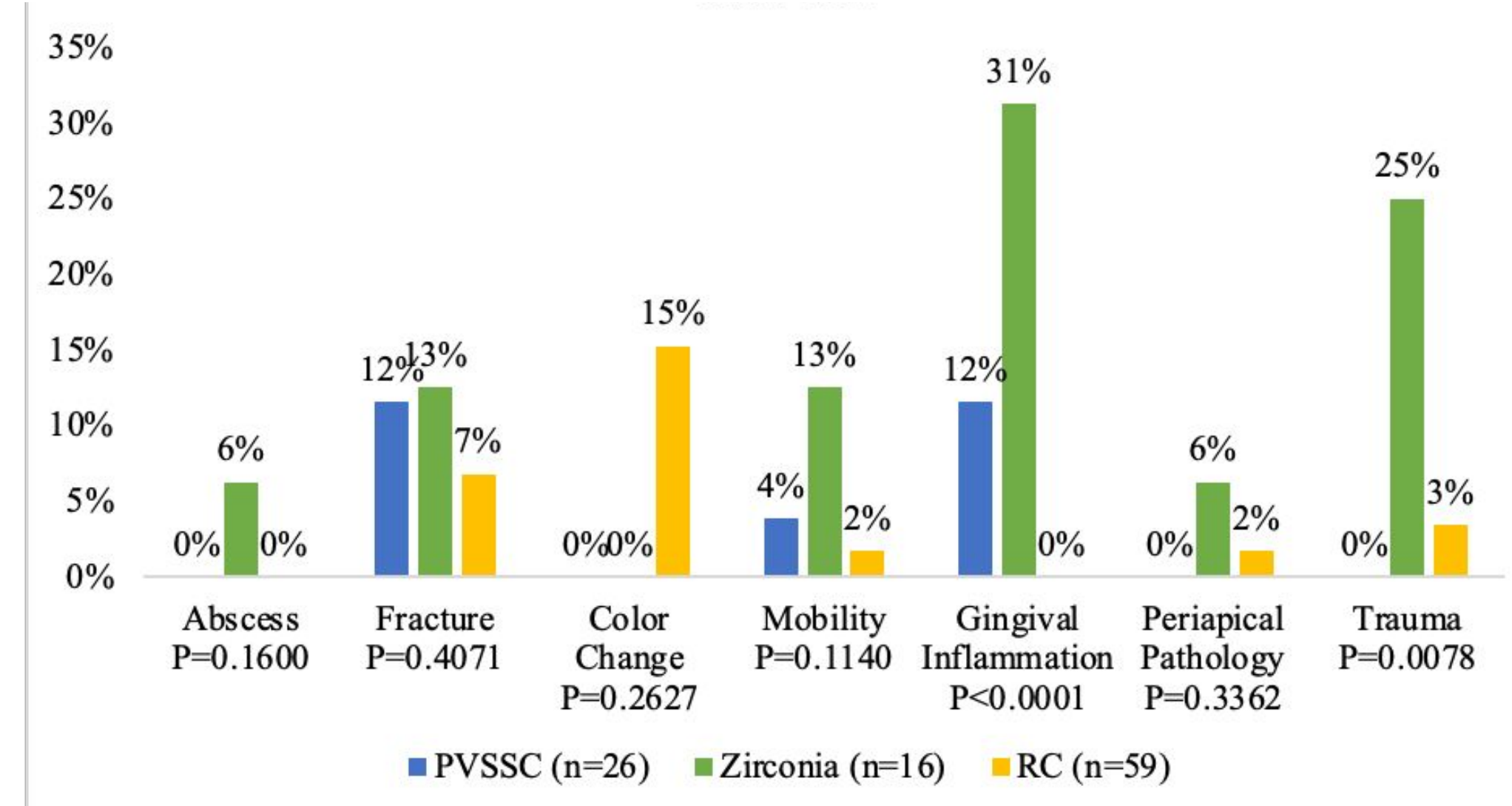


Figure 2: Crown Outcomes at 12-Month Follow-up (n=65 crowns)

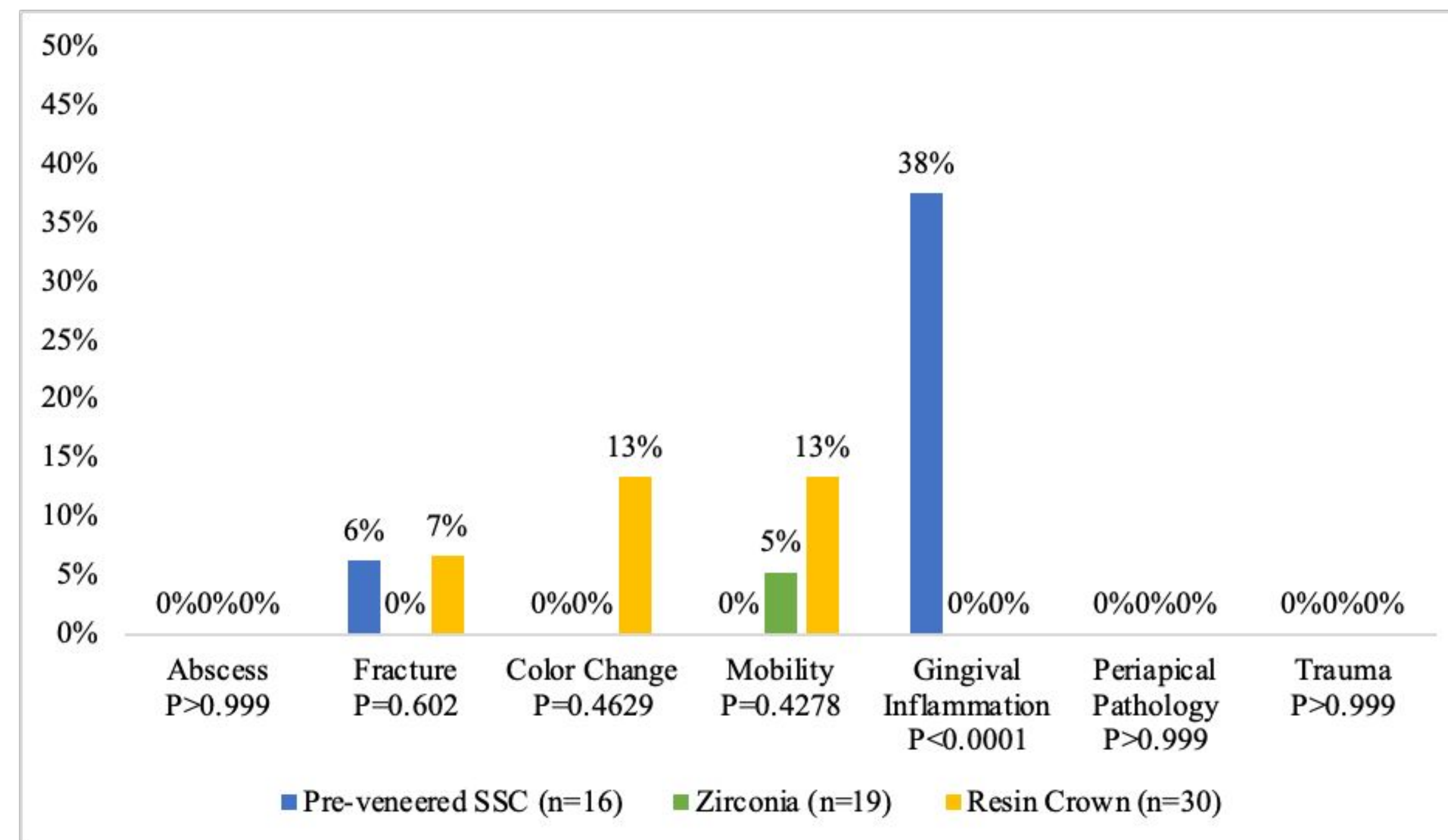


Figure 3: Crown Outcomes at 18-Month Follow-up (n=20 crowns)

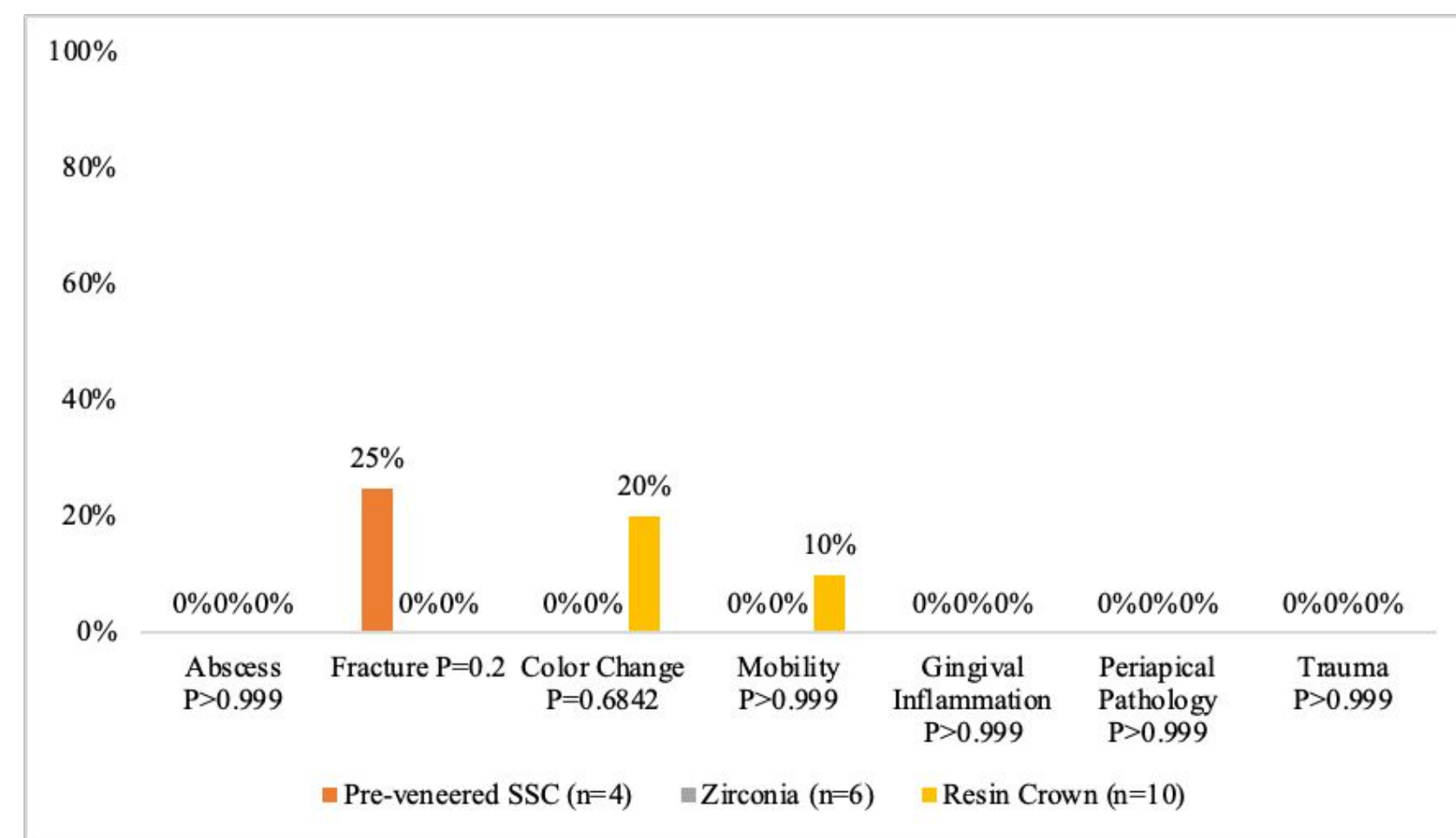


Figure 4: Parental Satisfaction at 12-month Follow-up (n=12)

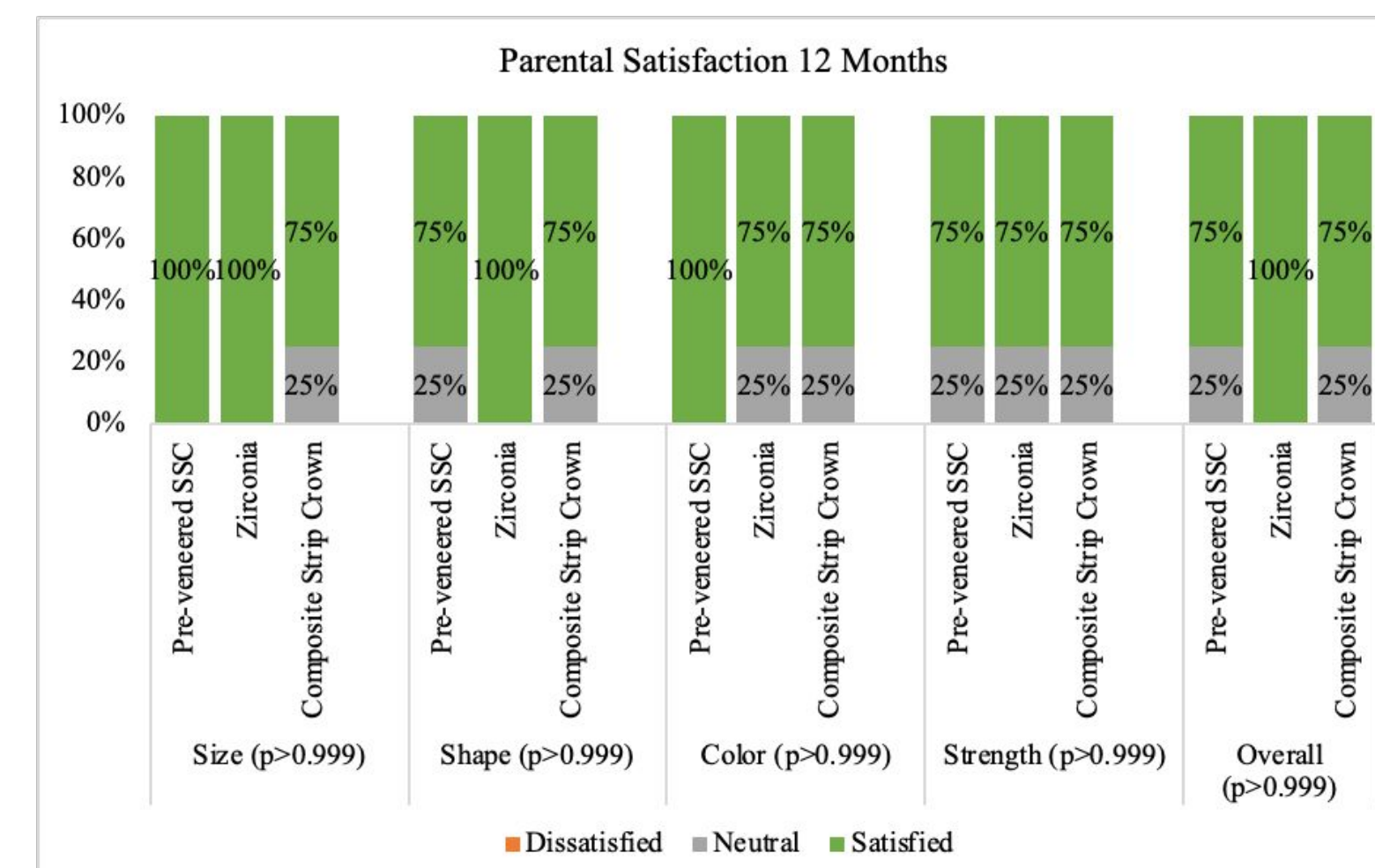


Figure 5: Parental Satisfaction at 18-month Follow-up (n=16)

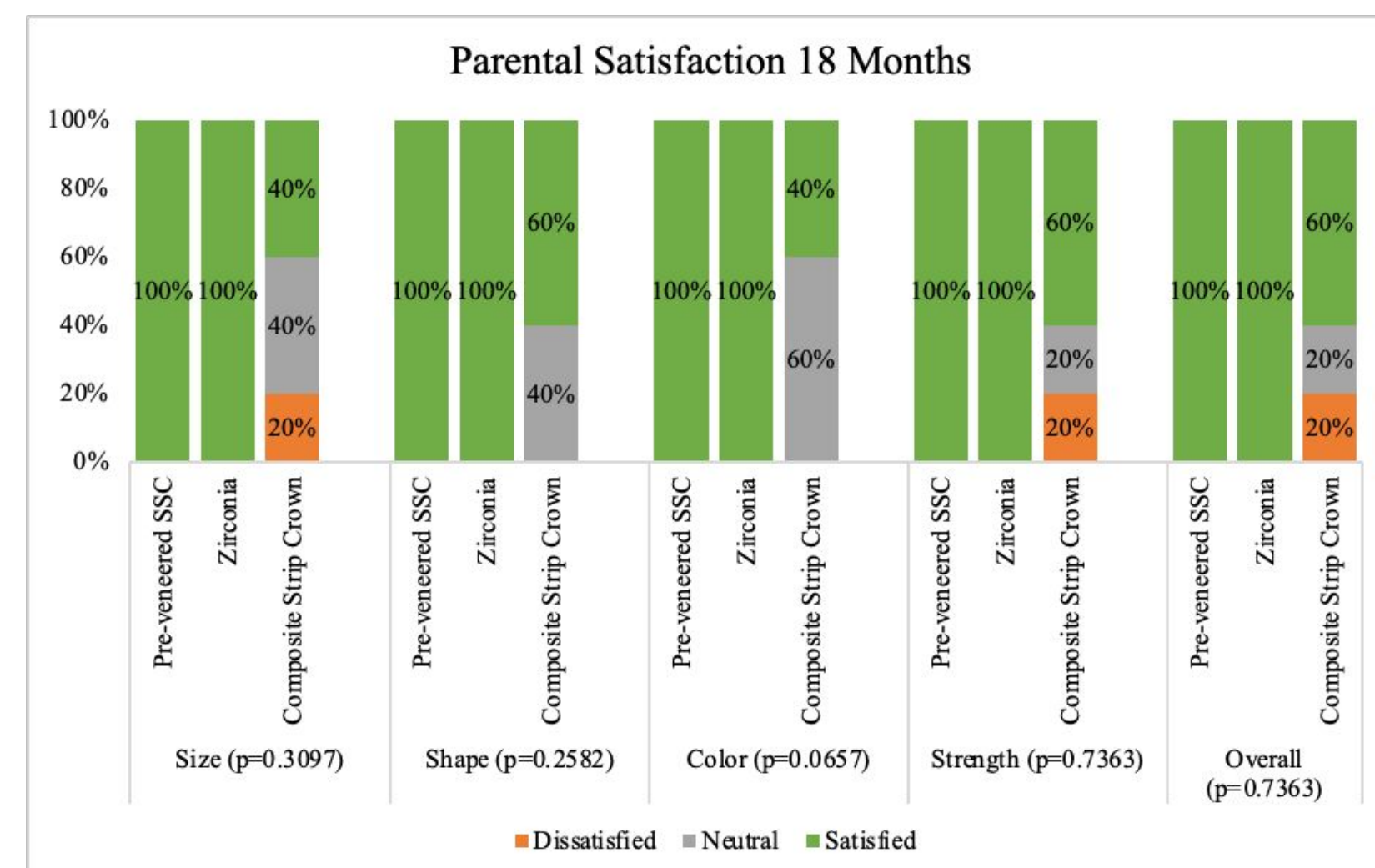


Table 2: Summary of Oral Health Related Quality of Life (ECOHIS) by Visit

	Child Impact Score	Family Impact Score	Total
Six Months (n=28)			
Pre-Op	10.5 (7.5-12)	3.5 (2-5)	12.5 (9.5-17.0)
6-Month Follow-up	7.5 (5.25-10.5)	2 (2-4.25)	10.25 (8-14)
p-value	0.0194	0.0550	0.0284
Twelve Months (n=23)			
Pre-Op	10.5 (7.5-12)	3.5 (2-5)	12.5 (9.5-17)
12-Month Follow-up	9 (4.5-12)	2 (2-5)	12.5 (6.5-17)
p-value	0.4654	0.1658	0.3491
Eighteen Months (n=13)			
Pre-Op	10.5 (4.5-12)	2 (2-5)	12.5 (6.5-20)
18-Month Follow-up	9 (6-10.5)	2 (2-3.5)	11 (8-14)
p-value	0.2773	0.1309	0.2441

*P-value from Wilcoxon signed-rank test

Discussion

The study assessed 41 subjects and 115 crowns. At 6-month follow-up nearly all crowns were intact. Zirconia crowns exhibited greater gingival inflammation than resin composite (RC) and pre-veneered stainless steel crowns (PVSSC). Resin strip crowns showed negative color changes compared to PVSSC and zirconia. While PVSSC and zirconia had higher rates of chips and fractures, these differences were not statistically significant. More trauma incidents were noted with zirconia crowns, but again without statistical significance. At the 12-month follow-up with 25 subjects and 67 crowns, 2 resin crowns naturally exfoliated. PVSSC had significantly greater gingival inflammation (38%) compared to zirconia and RC (0%). Other clinical outcomes remained statistically insignificant. The 18-month follow-up involved 10 subjects and 22 crowns, showing no significant differences across types, although RC showed increased color change and PVSSC had a higher fracture rate. All crowns exhibited 0% gingival inflammation. Parental satisfaction, assessed on a 5-point Likert scale starting at 12 months, indicated no dissatisfaction among parents initially, but 20% were dissatisfied with resin strip crowns at 18 months. Satisfaction was highest for zirconia and PVSSC. The Early Childhood Oral Health Impact Scale (ECOHIS) is a tool designed to assess the impact of oral health on the quality of life of young children and their families. It includes two main components: child impact scores, which reflect the child's oral health-related quality of life, and family impact scores, which capture the effect on family functioning and well-being. In this study, the ECOHIS revealed a significant reduction in child impact scores, indicating improved oral health and quality of life for the children. Additionally, there was a marginal reduction in family impact scores, although these changes were not statistically significant. The study underscores ongoing issues with early childhood caries (ECC) and its impacts on health-related quality of life.

Conclusion

Crown Integrity: Nearly all crowns remained intact at the 6-month mark.

Gingival Inflammation: Most significant concern noted particularly with zirconia crowns at the 6 month follow-up, but at 12 month follow-up PVSSC had a higher prevalence of gingival inflammation compared to RC and ZC.

Long-Term Outcomes: By 18 months, clinical outcomes across all crown types were similar, indicating initial differences in gingival health may not persist.

ECOHIS Results: Significant improvements in Child Impact Score and total score at the 6-month follow-up; subsequent follow-ups at 12 and 18 months showed non-significant improvements.

Parental Satisfaction: Consistently high across all restoration types, regardless of crown material.

Clinical Insights: Findings provide valuable guidance for clinicians in selecting restoration materials for primary anterior teeth, balancing clinical performance and parental expectations.

References/ Acknowledgements

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