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ASSOCIATION BETWEEN ORAL HYGIENE PRACTICES AND RESTORATION LONGEVITY IN CHILDREN: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: The longevity of dental restorations in paediatric patients is influenced by various factors, among which oral hygiene practices play a pivotal role. Understanding the relationship between hygiene behaviours and restoration durability can aid in improving clinical outcomes and parental education.

Aim: To assess the association between oral hygiene practices and the clinical status of existing restorations in children aged 6–12 years.

Methods: A cross-sectional study was conducted among 250 children attending a Paediatric/ Operative department. Data were collected using a structured questionnaire to evaluate oral hygiene practices, including brushing frequency, technique, fluoride use, and parental supervision. Clinical examination was performed to assess the integrity of restorations (GIC and composite), presence of secondary caries, marginal adaptation, and wear. Statistical analysis was done using chi-square and logistic regression tests to identify significant associations.

Results: Children who brushed twice daily under parental supervision had a restoration failure rate of 12.5%, significantly lower than the 36.8% observed in children who brushed once daily without supervision ($p = 0.004$). The use of fluoridated toothpaste was associated with a 21.3% failure rate, compared to 38.6% in non-fluoride users ($p = 0.011$). Composite restorations had a higher failure rate (32.9%) compared to GIC restorations (18.4%) in children with poor oral hygiene ($p = 0.03$). Overall, proper hygiene practices showed a strong correlation with increased restoration longevity.

Conclusion: Oral hygiene practices have a significant impact on the longevity of restorations in children. Parental involvement and consistent use of fluoridated toothpaste are key factors in

enhancing the durability of restorations. These findings highlight the need for reinforcing oral hygiene education as part of paediatric dental care.

Keywords: Oral hygiene, restoration longevity, dental caries, composite, glass ionomer cement.

INTRODUCTION

Dental caries is one of the most prevalent chronic diseases in children worldwide, with significant public health implications. It not only affects a child's ability to eat and speak but also has a profound impact on their overall health, school performance, and quality of life. To combat caries, restorative procedures are commonly performed, utilizing materials such as composite resins and glass ionomer cements (GIC). However, restoration failure remains a critical challenge in paediatric dentistry, necessitating repeated treatments and increased healthcare costs.[1] Among the many variables affecting the longevity of dental restorations, oral hygiene practices stand out as a modifiable behavioural factor. Toothbrushing frequency, brushing technique, the use of fluoridated toothpaste, and parental supervision collectively determine the oral environment's health. Poor oral hygiene fosters plaque accumulation increases the risk of recurrent caries, and ultimately compromises the lifespan of restorations.[2]

Paediatric patients differ from adults in terms of cooperation, cognitive understanding, and manual dexterity, which further underscores the role of caregivers. The effectiveness of home oral care is often contingent upon parental awareness and supervision. Studies have shown that children supervised by their parents during toothbrushing exhibit significantly better oral health outcomes.[3] Furthermore, the choice of restorative material also plays a vital role. GIC, for instance, offers the advantage of fluoride release, which can inhibit demineralisation and promote remineralisation, thereby improving restoration survival in caries-prone children. In contrast, while composite resins provide superior aesthetics and physical properties, they are more technique-sensitive and susceptible to moisture contamination and secondary caries in the absence of optimal hygiene.[4] Understanding the interaction between these variables and restoration outcomes is crucial for clinicians, particularly when planning long-term treatment strategies in children.[5] Despite the abundance of literature on caries prevention and restorative techniques, few studies have rigorously evaluated the direct association between oral hygiene behaviours and the clinical performance of restorations in the paediatric population.[6-8]

This study aims to fill that gap by analysing the association between oral hygiene practices and the clinical status of existing restorations in children aged 6 to 12 years. The outcomes of this research will not only contribute to evidence-based clinical decision-making but also help in designing targeted educational programs for parents and children to foster long-term oral health.

MATERIALS AND METHODS

This cross-sectional study was conducted in the Department of Paediatric and Operative Dentistry. A total of 250 children aged 6–12 years who had at least one dental restoration were included through convenience sampling. Informed consent was obtained from parents or guardians. A structured questionnaire was administered to the children and their parents to gather information on (a) Frequency and technique of toothbrushing (b) Use of fluoridated toothpaste (c) Parental supervision during brushing (d) Dietary habits and sugary food intake. Each child underwent a clinical evaluation to assess (a) Type and integrity of restoration (GIC or composite) (b) Presence of secondary caries (c) Marginal adaptation and (d) Surface wear or fracture.

Data were analyzed using SPSS software. Chi-square and logistic regression analyses were used to determine associations between hygiene practices and restoration failure. A p-value < 0.05 was considered statistically significant.

RESULTS

Table 1 presents the comparative failure rates of restorations across various hygiene-related factors. Notably, children with twice-daily brushing and parental supervision showed significantly lower

failure rates. Similarly, the use of fluoride toothpaste and the use of GIC restorations in poor hygiene conditions were associated with better clinical outcomes.

Table 1: Association between oral hygiene variables and restoration failure rates.

Variable	***Category***	***Restoration Failure Rate (n/%)***	***p-value***
Brushing Frequency	*Once Daily*	*46/125 (36.8%)*	*0.004*
	Twice Daily	*16/125 (12.5%)*	
Fluoride Use	*Yes*	*30/141 (21.3%)*	*0.011*
	No	*42/109 (38.6%)*	
Parental Supervision	*Yes*	*20/130 (15.4%)*	*0.005*
	No	*42/120 (34.9%)*	
Restoration Type (Poor Hygiene)	*Composite*	*28/85 (32.9%)*	*0.03*
	GIC	*19/103 (18.4%)*	

Table 2 shows that children with good oral hygiene had higher rates of intact restorations, lower incidence of secondary caries, and fewer marginal defects compared to children with poor hygiene. These findings further emphasize the clinical importance of maintaining effective oral hygiene practices to preserve restoration integrity.

Table 2: Clinical condition of restorations in relation to oral hygiene status.

Oral Hygiene Indicator	**Restoration Integrity (n/%)**	**Secondary Caries Present (n/%)**	**Marginal Adaptation Compromised (n/%)**
Good Hygiene	104/122 (85.2%)	11/117 (9.4%)	6/111 (5.4%)
Poor Hygiene	79/129 (61.3%)	31/126 (24.6%)	18/127 (14.1%)

DISCUSSION

This study explored the influence of oral hygiene practices on the longevity of dental restorations in children aged 6 to 12 years. The results revealed a significant association between better hygiene behaviours and reduced restoration failure rates. Frequent toothbrushing, especially when performed twice daily, was linked to improved restoration outcomes. This aligns with the general consensus that mechanical plaque removal is essential in preventing secondary caries and preserving the structural integrity of restorations. Moreover, parental supervision enhanced the effectiveness of these hygiene practices, likely by ensuring correct technique and regularity.[9] The use of fluoridated toothpaste emerged as a crucial factor. Fluoride plays a well-established role in inhibiting cariogenic bacteria and promoting remineralisation of enamel. Children using fluoride toothpaste had significantly lower rates of restoration failure, which is consistent with previous studies that have demonstrated the protective effects of fluoride against caries recurrence.[10]

Another important observation was the material-dependent variation in restoration failure. GIC restorations, known for their fluoride-releasing property and chemical bonding to tooth structure, performed better than composites in children with poor oral hygiene.[11] This suggests that GIC may be a more appropriate choice in high-risk cases or when compliance with hygiene practices is doubtful. Despite the benefits of composites in aesthetics and wear resistance, their greater sensitivity to moisture and higher technique dependence may render them more vulnerable in less-than-ideal oral environments. These findings support the strategic selection of restorative materials based on individual risk assessments.

The findings of this study are in line with those of Santos et al. (2024)[12], who reported that parental supervision and twice-daily brushing significantly reduced the prevalence of restoration failure in Jordanian school children. Similarly, a study by Wong et al. (2022)[13] highlighted the higher longevity

of GIC restorations in populations with lower socio-economic status and limited access to professional dental care underscoring GIC's durability in suboptimal hygiene conditions. Furthermore, a longitudinal study by Alamri et al. (2022)[14] evaluating composite restorations in children found an increased failure rate in restorations placed in high caries-risk patients, reinforcing the need for preventive care and careful material selection. These comparative findings from international literature validate our observations and suggest that oral hygiene-related behaviour and fluoride exposure are universally relevant factors in determining restorative success.

The study also highlights the role of caregivers in fostering oral hygiene habits. Children in the 6–12 age group are transitioning toward independence, yet they still require guidance to adopt and maintain effective oral hygiene routines. Educational interventions targeting both children and parents can substantially improve outcomes.

CONCLUSION

Oral hygiene practices significantly influence the longevity of dental restorations in paediatric patients. Factors such as twice-daily brushing, parental supervision, and fluoride use were associated with lower failure rates. GIC restorations showed better outcomes in children with poor hygiene. These findings underscore the importance of incorporating oral hygiene education into dental treatment planning and follow-up care.

Conflict of Interest: None

Authors' Contribution

Concept & Design: Suffiyan Saleem, Sana Idrees
Acquisition, Analysis & Interpretation of Data: Usman Nazir, Sana Idrees, Zubair Nasir.
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