Keywords
Endodontically treated premolars, post-endodontic restoration, fracture outcomes, fiber post, clinical outcomes

Authors
Dr. Prashant A Karni[1*]
Professor, Specialisation: Prosthodontics and Crown & bridge, Implantology Department of Prosthodontics and Crown & bridge, KLE VK institute of Dental Sciences, Kaher, Belagavi ,590010 ,India , Email Id: prashantkarni@yahoo.co.in
Orcid Id: 0000-0003-0195-5290

Dr. Shreya Malhotra[2]
Dental Practitioner, Specialisation: BDS, Department of Dentistry,Manav Rachna Dental College, Manav Rachna International Institute of Research and Studies, Faridabad,Haryana, 121010, India, Email Id: shreyamalhotra369@gmail.com
Orcid Id: 0009-0002-9027-1009

Dr. Ena maakhni[3]
Senior Resident, Specialisation: General Dentistry, Department of Dentistry, AIIMS Gorakhpur, 273008, Gorakhpur, India, Email ID: emaakhni@gmail.com , Orcid Id: 0009000296053889

Deesha Kumari[4],
Reader, Specialisation: MDS,Department of Public Health Dentistry, NITTE (Deemed to be University), AB Shetty Memorial Institute of Dental Sciences (ABSMIDS) ,Mangalore, 575018 India, Email Id: drdeesha.k@gmail.com , Orcid Id: 0000-0002-9814-1105.

Vijayakumar.M[5]
Reader, Specialisation: Pediatric and Preventive Dentist, Department of Pediatric and Preventive Dentistry, Tagore Dental College and Hospital, Rathinamangalam, Chennai, 600127, Tamil Nadu, India, Email Id: drvijaypedo6@gmail.com, Orcid Id: 0000-0002-9345-9261

Dr. Sumaiya Fatima[6]
Dentist, Specialisation:Dental Surgery, Bachelor of Dental Surgery ,Kamineni Institute of Medical Sciences, Narketpalle ,Hyderabad,50057, India , Email Id: sumaiya6162@yahoo.com Orcid Id::0009-0000-6401-5381

Dr. Gowtham. N[7]
Assistant Professor, Specialisation: Pharmacology, Department of Pharmacology, Sree Balaji Medical College and Hospital, Bharath Institute of Higher Education and Research, Chromepet, Chennai ,Tamil Nadu,600044, India, Email Id: gowthamn11@hotmail.com , Orcid Id: 0009-0000-2359-3409

Received: 03.01.2026
Accepted: 02.02.2026

DOI: 10.1922/EJPRD_2865Karni30

Comparative Analysis of Post-Endodontic Restoration Designs on Fracture Resistance in Endodontically Treated Premolars

ABSTRACT
Endodontically treated premolars exhibit increased susceptibility to fracture due to structural compromise and altered biomechanical behavior. Selection of an appropriate post-endodontic restoration design is therefore critical for enhancing fracture outcomes and long-term clinical success. Though, comparative clinical evidence evaluating fracture outcomes across different restoration designs in premolars remains limited. This retrospective observational cohort study analyzed clinical and radiographic records of endodontically treated premolars restored with different post-endodontic restoration designs. Teeth were categorized into direct composite restorations without posts, fiber post–supported composite core restorations, cast metal post-and-core restorations, and full-coverage or endocrown restorations. Fracture incidence, mean time to fracture, and fracture occurrence were evaluated. Statistical analysis included descriptive statistics, independent samples t-test, correlation analysis, and binary logistic regression to assess associations and predictors of fracture outcomes. A total of 120 endodontically treated premolars were included. Fiber post–supported composite restorations demonstrated the longest mean fracture-free duration and the lowest fracture risk. Direct composite restorations without posts showed the shortest fracture-free longevity, while cast metal post-and-core restorations were associated with increased fracture risk. A significant difference in mean time to fracture was observed between post-retained and non-post-retained restorations. Correlation and regression analyses confirmed restoration design as a significant predictor of fracture occurrence. Post-endodontic restoration design significantly influences fracture outcomes in endodontically treated premolars. Fiber post–supported composite restorations provide superior fracture outcomes and clinical longevity. Restoration strategies incorporating biomechanical reinforcement should be prioritized to minimize fracture risk and improve long-term prognosis.

Keywords:

INTRODUCTION
Endodontic therapy is an important part of modern restorative dentistry as it allows saving pulpal and periapical pathology-affected teeth. Even with the high success rates of the modern endodontic treatments, endodontically treated teeth prove to have a higher susceptibility to structural failure in comparison with vital teeth.[1] This increased susceptibility to fracture is chiefly explained by loss of large volumes of tooth structure due to caries, access cavity preparation and restorative procedures and altered post-endodontic biomechanical properties of dentin.[2,3] Long term success of endodontic treatment is closely linked to the quality and design of the endodontic restoration. Restoration design establishes the distribution of stress in the tooth-restoration complex and is vital in eliminating the risk of fractures and increasing the clinical longevity.[4]

ejprd.org - Published by Dennis Barber Journals.

Premolars have an intermediate status between anterior teeth and posterior teeth and remain loaded with complicated patterns of occlusion.[5] Subsequent to endodontic therapy, huge loss of coronal and marginal ridge morphology is found to occur in such teeth, particularly in situations where there is a large amount of occluso-proximal caries. This kind of structural compromise greatly undermines the tooth and puts it at a risk of experiencing bad patterns of fracture.[6,7] Clinical and experimental researches have revealed that when tooth structure is removed during access cavity preparation, the distribution of stress in dentin changes and fracture outcomes remain minimized.[8] Moreover, decreased toughness of dentin of the root has been linked to the dehydration of dentin and the disturbance of collagen cross-linking after endodontic treatment.[9] These biomechanical changes remain the reason of increased fracture rates of endodontically treated premolars under functional loading conditions.[10]
Several choices of post-endodontic restorative treatment methods have been promoted to enhance fracture and clinical survival of endodontically treated teeth. They remain direct composite restorations, fiber post-supported composite cores, cast metal post-and-core and endocrown restorations.[11] Biomarkical behavior and clinical implications of each restorative approach remain different. The elastic modulus of fiber post system is more acceptable since it is nearer to dentin elastic modulus and as a result it allows good distribution of stress and avoids high concentration of stress at the root structure.[12] On the other hand, cast metal post-and-core restorations have been found to produce stress localization in the post-dentin interface, where it is mechanically hard, which causes catastrophic root fractures to be more probable.[13] Much more conservative restorations, such as endocrown restorations, based on adhesive bonding and intracoronal retention, have now been developed.[14] Although a substantial body of laboratory research has been conducted to compare the results of fracture of these restoration designs, the reported results have been found to be highly varied since of the variation in the materials, loading protocol and study methods used.[15] Moreover, in vitro conditions might not be suitable to represent the complicated biomechanical and biological scenario of the oral cavity.
Although laboratory research can give useful information on mechanical performance, clinical performance depends on a variety of patient-related and functional parameters which cannot be completely recreated in the laboratory.[16] The retrospective clinical studies permit assessing the performance of restorations in real-life situations, including functional loading, aging, and biological variability.[17] Existing clinical findings on a comparison of the post-endodontic restoration design designs remain scarce especially when it comes to the premolars.[18] There remain numerous existing studies, but most of them pay major attention to the anterior teeth or molars, and the information about premolars, with their specific anatomical and biomechanical features, is also lacking. What is more, combined clinical measurements of fracture incidence, fracture-free life and predictive risk measures remain sparse in one cohort.

Objectives of the study

1. To evaluate and compare the fracture-free longevity of endodontically treated premolars restored using different post-endodontic restoration designs.
2. To assess the association between post-endodontic restoration design and fracture occurrence in endodontically treated premolars under routine clinical conditions.

MATERIALS AND METHODS

2.1 Study Design and Setting

It was observational cohort research that was developed on a retrospective basis and was carried out in a tertiary care dental teaching hospital. Clinical records and radiographic information of patients who had received endodontic treatment then definitive post-endodontic restoration of premolars were archived. The study assessed the results of fractures through regular clinical practices with no treatment intervention.

2.2 Study Duration and Record Retrieval

Clinical records of which there was at least twelve months follow-up recorded after placement of definitive post-endodontic restorations were included. This provided sufficient time of observation in order to evaluate the outcomes of the fractures and restoration performance. The screening of records was done to ensure that clinical notes, radiographs, and follow-up documents on fracture events were complete.

2.3 Sample Selection Criteria

The sample of the study included predetermined criteria eligibility of endodontically treated premolars. The teeth were viewed as separate units of the study. The sample size was limited to patients whose clinical and radiographic records were complete and had follow-up records. The teeth with uncertain diagnostic results or fractures that had not been properly documented were excluded to ensure the information was true.

2.3.1 Inclusion Criteria

Patient records that were aged eighteen and above were included. Maxillary or mandibular premolars were selected only after undergoing a successful root canal treatment and finally, post-endodontic restoration was carried out. To have teeth with intact roots during the restoration placement, teeth were required. The clinical and radiographic assessment had to be documented within a minimum of twelve months after follow-up.

2.3.2 Exclusion Criteria

Cases of teeth whose cracks were already present or there were vertical root fractures and where the structure had already been lost before endodontic treatment were excluded. The histories of dental trauma, parafunctional habits, or tooth usage as a prosthetic abutment were excluded. Incomplete treatment records, provisional restorations and fracture documentation that could not be established were absent.

2.4 Grouping Based on Post-Endodontic Restoration Design

Post-endodontic restoration design was recorded and divided into groupings based on the eligibility of the teeth. These were direct composite restorations with no posts, fiber-post core restorations, full-cast restorations, and endocrown restorations. Assigning groups was strictly conducted on the basis of clinical records and investigator influence was eliminated.

2.5 Data Collection Procedure

The process of data extraction was done using a standardized data collection form. Variables that were recorded were age of the patients, sex, tooth position, restoration design, coronal coverage, and follow-up period, fracture, and fracture pattern, and the time to fracture. Prudent data extraction was done in such a way that consistency and accuracy of data recorded is guaranteed.

2.6 Outcome Measures

The main measures of restoration performance were clinical fracture outcomes. The results were evaluated on the basis of the clinical findings in the documents with radiographic evidence. The fracture time was captured and compared by using descriptive and comparative statistics. Outcome events were only taken into account as confirmed fractures treated clinically.

2.6.1 Primary Outcome: Fracture Incidence

Incidences of fractures were determined as coronal or root fracture after definitive post endodontic restoration. The clinical documentation and radiographic confirmation of fracture events were performed. Teeth that have not been reported to have a fracture in the follow-up period were considered non-fractured.

2.7 Statistical Analysis

Statistical software was used to analyse the data. The parameters used to summarize continuous variable were an average and standard deviation and the parameters used to summarize categorical variables were frequency and percentage. Mean time to fracture was calculated only for teeth that experienced fracture during the follow-up period. Independent samples t-test was used to compare the mean time to fracture of post-retained and non-post-retained restorations. Correlation analysis was used to evaluate the relationship between the restoration design and the fracture occurrence. Correlation analysis was done by numerically coding restoration design according to the increasing biomechanical reinforcement. Binary logistic regression was used to test the relationship between restoration design and fracture occurrence. The set statistical significance was $p < 0.05$. The mean time of fracture was estimated in relation to the teeth that fractured within the follow-up period only.

RESULTS

3.1 Demographic and Clinical Characteristics of the Sample

The demographic and clinical characteristics of the sample used in the study remain summarized in table 1. The average age of the clients was 42.6 +- 9.8 years. The male patients were 56.7 percent (n=68) and the female patients were 43.3 percent (n=52). A majority of the teeth included (60.0% n = 72) were the maxillary premolars and 40.0% (n = 48) were the mandibular premolars. The average time of following was 24.3 +- 8.5 months. In 55.0 percent (n = 66), there was coronal coverage and in 45.0 percent (n = 54), there was none. A total of 26.7% (n = 32) of teeth were fractured and 73.3% (n = 88) were not fractured.

Table 1. Demographic and Clinical Characteristics of the Study Sample (n = 120)

Variable	Category / Value	Frequency (n)	Percentage (%)
Age (years)	Mean ± SD	42.6 ± 9.8	100.0
Sex	Male	68	56.7
	Female	52	43.3
Tooth location	Maxillary premolars	72	60.0
	Mandibular premolars	48	40.0
Follow-up duration (months)	Mean ± SD	24.3 ± 8.5	100.0
Coronal coverage	Present	66	55.0
	Absent	54	45.0
Fracture status	Fractured	32	26.7
	Non-fractured	88	73.3

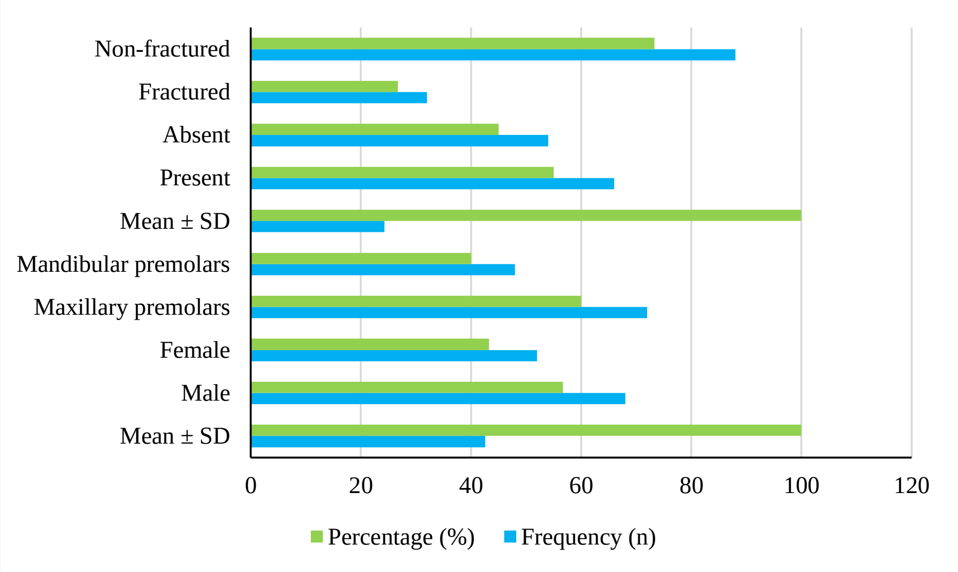

Figure 1. Distribution of Demographic and Clinical Characteristics of the Study Sample

Figure 1 shows the distribution of the demographic and clinical variables of the study population by the frequencies and percentages. The representation of male patients was a bit higher than that of female ones. There was greater inclusion of maxillary premolars as compared to mandibular premolars. The coronal coverage was found in more teeth than the uncovered ones. The sample was mainly non-fractured teeth with a reduced percentage having fractures at follow-up. The values of mean and standard deviation remain provided to recapitulate the continuous variables which would give a general picture of the sample characteristics being studied in the research.

3.2 Distribution of Post-Endodontic Restoration Designs

The designs of post-endodontic restorations used in the study remain given in Table 2. The highest percentage was 38.3 (n = 46), which was constituted by fiber post-supported composite core restorations. The sample size of direct composite restorations without posts was 23.3% (n = 28). The prevalence of cast metal post-and-core restorations was 21.7% (n = 26) versus 16.7% (n = 20) of the full-coverage or endocrowns restorations. The total number of endodontically treated premolars analyzed was 120, which demonstrated the diversity of the types of approaches used in the everyday clinical practice.

Table 2. Distribution of Post-Endodontic Restoration Designs

Restoration Design	Frequency (n)	Percentage (%)
Direct composite (no post)	28	23.3
Fiber post + composite core	46	38.3
Cast metal post and core	26	21.7
Full-coverage / endocrown	20	16.7
Total	120	100.0

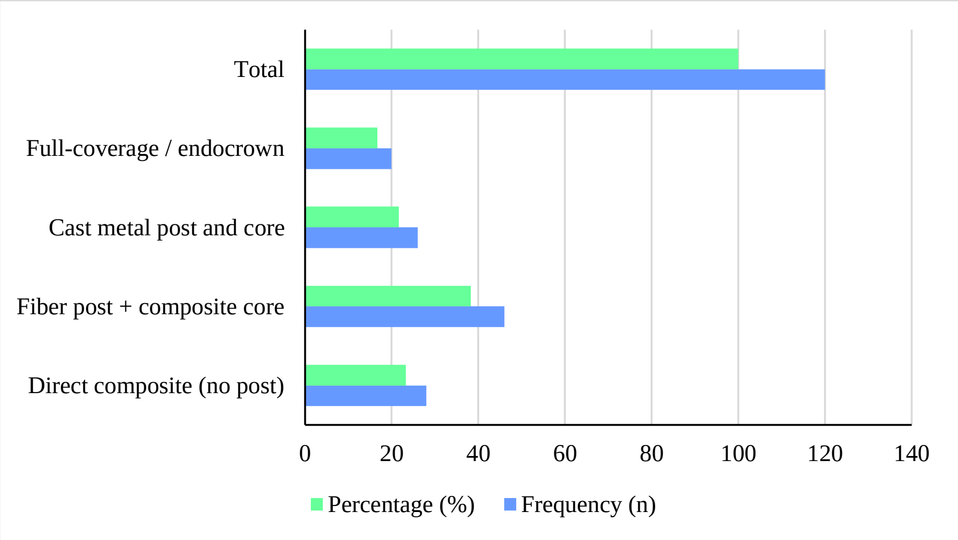

Figure 2. Distribution of Post-Endodontic Restoration Designs in the Study Sample

Figure 2 illustrates the frequency and percentage of the post-endodontic restoration design among the premolars that were included. The best proportion of cases was exhibited by fiber post-supported composite core restorations, which remain the most commonly used ones in clinical practice. The moderately represented were direct composite restorations without posts and post and core restorations cast in cast metals. The lowest percentage in the sample was the full-coverage or endocrown restorations. The entire bar stands to denote the total population of study and it makes sure that all the eligible teeth have been included. This graphical illustration indicates the difference in the restorative options taken on endodontically treated premolars in the study group.

3.3 Mean Time to Fracture Across Restoration Groups

Table 3 summarizes the mean time to fracture among fractured teeth only according to post-endodontic restoration design. Direct composite restorations without posts demonstrated the shortest mean time to fracture (14.2 ± 6.1 months) among 11 fractured teeth. Fiber post–supported composite core restorations showed the longest fracture-free duration, with a mean time to fracture of 28.5 ± 7.4 months in 6 fractured cases. Cast metal post-and-core restorations exhibited a mean fracture time of 17.6 ± 5.9 months across 10 fractured teeth. Full-coverage or endocrown restorations demonstrated an intermediate mean time to fracture of 22.4 ± 6.8 months in 5 cases. Overall, the mean time to fracture for all 32 fractured teeth was 19.8 ± 7.6 months, indicating variation in fracture-free longevity among restoration designs.

Table 3. Mean and Standard Deviation of Time to Fracture Among Fractured Teeth by Restoration Design

Restoration Design	Number of Fractured Teeth (n)	Mean Time to Fracture (months)	Standard Deviation
Direct composite (no post)	11	14.2	6.1
Fiber post + composite core	6	28.5	7.4
Cast metal post and core	10	17.6	5.9
Full-coverage / endocrown	5	22.4	6.8
Overall	32	19.8	7.6

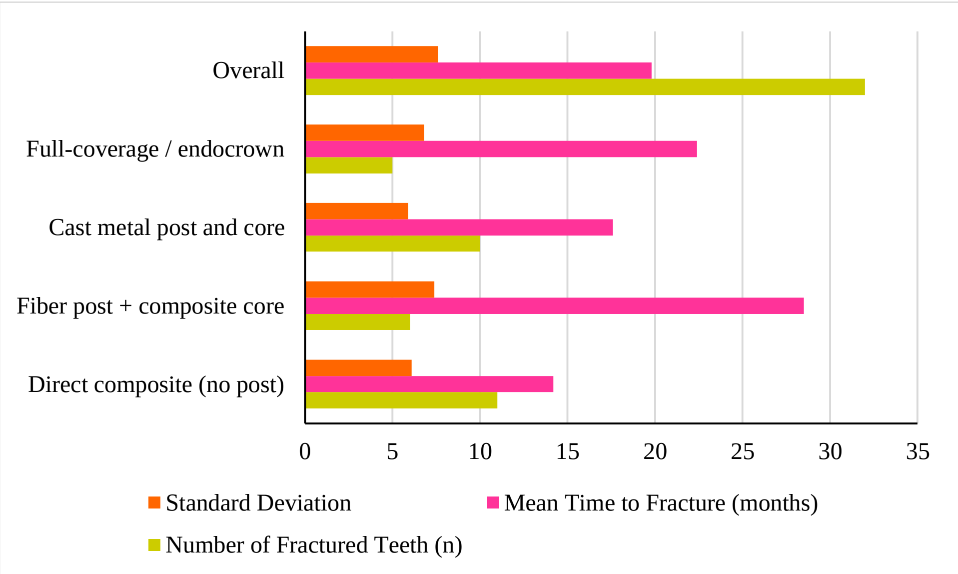

Figure 3. Comparison of Restoration Designs Based on Mean Time to Fracture and Distribution of Teeth

The comparison of the post endodontic restoration designs relative to the number of treated teeth, the mean time to fracture and the standard deviation is shown in Figure 3. The study of fiber type, which is post-supported composite core restorations showed the longest mean measurement of time to fracture which implies long fracture-free performance. Less mean fracture times were seen in direct composite restorations with no posts and cast metal post-and-core restorations. The intermediate values were found in full-coverage or endocrown restorations. The total column shows the aggregate data of all the restoration designs. This graphical analysis has shown variations in the patterns of fracture-free lifespan and distribution in restorative methods applied on endodontically treated premolars.

3.4 Comparison of Mean Time to Fracture

Table 4 presents the comparison of mean time to fracture between post-retained and non-post-retained restorations among fractured teeth. Post-retained restorations, including fiber post–supported and cast metal post-and-core restorations, demonstrated a longer mean time to fracture of 22.1 ± 7.2 months across 16 fractured teeth. In contrast, non-post-retained restorations, comprising direct composite and endocrown restorations, showed a shorter mean fracture time of 15.9 ± 6.3 months in 16 fractured cases. The independent samples t-test revealed a statistically significant difference between the two restoration categories (t = 2.41, p = 0.022). These findings indicate that incorporation of post-retained restorative designs was associated with prolonged fracture-free longevity compared with restorations placed without posts.

Table 4. Independent Samples t-Test Comparing Mean Time to Fracture Between Restoration Categories (Fractured Teeth Only)

Restoration Category	Number of Fractured Teeth (n)	Mean Time to Fracture (months)	Standard Deviation	t-value	p-value
Post-retained restorations (fiber post + cast metal post)	16	22.1	7.2	2.41	0.022
Non-post-retained restorations (direct composite + endocrown)	16	15.9	6.3	2.41	0.022

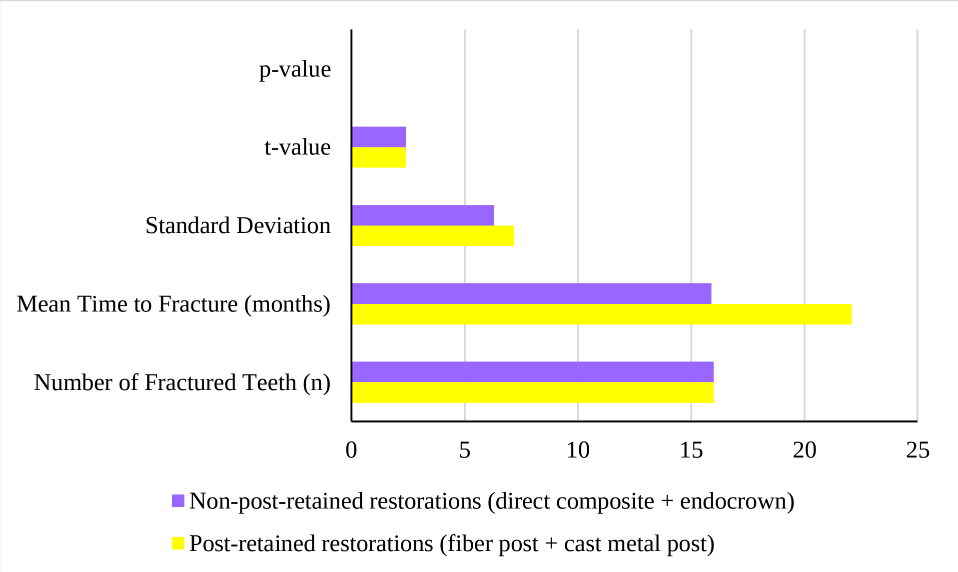

Figure 4. Comparative Statistical Profile of Post-Retained and Non-Post-Retained Restorations

A comparative analysis of the post-retained and non-post-retained restorations is provided in Figure 4 in terms of the major statistical parameters. The post-retained restorations had more number of treated teeth and mean time to fracture than the non-post-retained restorations. Variations in the standard deviation depict variations in the duration of fracture-free in the two populations. The t-value demonstrates the statistically significant difference in the mean fracture time, and the p-value demonstrates that the given comparison is significant. In general, the figure shows the high fracture free performance of post-retained restoration design.

3.5 Association Between Restoration Design and Fracture Occurrence

The correlation matrix in Table 5 shows a correlation between the design of the restoration and the fracture. The correlation between restoration design and fracture occurrence had a moderate negative correlation with a correlation coefficient of 0.41. This result suggests that restoration designs with a higher biomechanical reinforcement were linked with a reduced risk of fracture. All the diagonal values of 1.00 indicate perfect self-correlation of each variable, which proves the legitimacy of the matrix structure. The correlation that was observed was statistically significant (p = 0.001), indicating that there was a significant association of restoration configuration and fracture outcome in endodontically treated premolars. These findings endorse the role of restoration design in the fracture risk in clinical scenarios.

Table 5. Correlation Matrix Showing the Association Between Restoration Design and Fracture Occurrence

Variable	Restoration Design	Fracture Occurrence
Restoration Design	1.00	−0.41
Fracture Occurrence	−0.41	1.00

p = 0.001 for the correlation between restoration design and fracture occurrence

3.6 Predictive Influence of Restoration Design on Fracture Occurrence

The findings of the binary logistic regression analysis that assessed the effect of post-endodontic restoration design on the fracture occurrence remain in Table 6. The direct composite restorations without posts showed a much higher tendency to fracture, chance ratio 3.12 and 95% confidence interval, 1.18-8.25 (p = 0.021). There was also a high risk of fracture in cast metal post-and-core restorations (OR = 2.84; 95% CI: 1.06-7.59; p = 0.037). Full-coverage or endocrown restorations were less and statistically not significant associated with the presence of fractures (OR = 1.62; p = 0.361). Fiber post-supported composite restorations served as the reference category and demonstrated the lowest fracture risk.

Table 6. Binary Logistic Regression Analysis for Fracture Occurrence

Restoration Design	Odds Ratio (OR)	Lower 95% CI	Upper 95% CI	p-value
Direct composite (no post)	3.12	1.18	8.25	0.021
Cast metal post and core	2.84	1.06	7.59	0.037
Full-coverage / endocrown	1.62	0.58	4.54	0.361
Fiber post + composite core	1.00	1.00	1.00	1.000

Model fit statistics: −2 Log Likelihood = 112.60; Cox & Snell R^2 = 0.18; Nagelkerke R^2 = 0.26; overall model p-value = 0.001.

DISCUSSION

The study rated the role of post-endodontic restoration design on the effects of fracture of endodontically restored premolars. The major conclusions show that restoration design was critical in the fracture-free survival and fracture risk. The sample demographic and clinical features represented an adequate representation of both sex, location of tooth, and duration of follow-up which offers a balanced clinical background in interpretation (Table 1). The restorations that were used the most frequently (Table 2) and were the most effective with respect to fracture-free performance were fiber post-supported composite restorations. Table 3 summarizes the mean time to fracture among fractured teeth only according to post-endodontic restoration design. Direct composite restorations without posts demonstrated the shortest mean time to fracture among 11 fractured teeth. The cumulative result of the findings is an emphasis on restoration design as an effective clinical determinant of fractures. The difference in the meantime to fracture of the restoration groups is an indication of disparity in biomechanical behavior and stress distribution. Fiber post-supported composite restorations had the longest period of fracture-free, then full-coverage or endocrown restorations and direct composite restorations with no posts had the lowest period of fracture-free (Table 3). Historical difference between post retained and non-post incorporated restorations is also statistically significant which again supports the protective effect of post incorporation (Table 4). Analysis of correlation showed that restoration design and fracture occurrence had moderate negative relationship, which implied that the higher the biomechanical reinforcement, the lower the risk to develop a fracture (Table 5). Also, logistic regression analysis proved that restoration design was one of the important predictors of fracture occurrence, and direct composite and cast metal post-and-core restorations showed greater fracture risk than fiber post-supported restorations (Table 6). Such results indicate that restoration design has an effect on the timing and likelihood of fracture.

The results of the current research remain in agreement with the recent clinical and experimental evidence. The findings of these studies support the superior fracture survival of post-endodontic reinforced restorations, which is arguably the main role of the design of the restoration in the present analysis.[19] In vitro studies revealed superiority in the fracture survival of post-endodontic reinforced restorations, and this finding is pertinent to supporting the high-risk of fracture in fiber post restorations.[20] The biomechanical reinforcement of the design of the restoration is important in determining fracture resistance in endodontically treated prem Biomechanically, fiber posts have elastic moduli that remain closer to dentin, which enables the more evenly distributed stress and less stress concentration in the rootcore interface.[21] This is probably the reason why the fracture-free period was so long and the risk of fracture was reduced in fiber post-supported restorations. Conversely, although cast metal post-and-core systems remain structurally retentive, they can be more stress concentrated meanwhile of their higher rigidity, which is why the risk of fracture is higher.[22] Direct restorations that remain made using composite resin and no posts do not have internal reinforcement, and remain therefore more prone to fracture during functional loading. Clinically, as these findings would indicate, designs of restorations that involve biomechanical reinforcement ought to be given a first priority especially in pre molars that remain exposed to complex forces of occlusiveness.[23] The findings allow considering a conservative but reinforcement-based restorative strategy that can balance between structural preservation and mechanical stability.

There remain a number of limitations that should be admitted. The retrospective design is based on nature on the accuracy and completeness of clinical records. There could not be complete standardization in variability of operator technique, occlusal schemes and restorative materials. The magnitude of occlusal loads and para-functional habits were not measured. Also, the results of the fractures were obtained using clinical fracture events instead of the controlled mechanical testing. In spite of these limitations, the clinical environment in the real world improves the external validity and give valuable information on the routine restorative outcomes. The findings of the study reveal that the fiber post-supported composite restoration seems to have better fracture-free survival and lower fracture in endodontically treated premolars. Post-retained designs should also be considered by clinicians in the event of coronal tooth structure being compromised. Endocrown restorations or full-coverage restorations can be considered an option in a few cases. Postless direct composite restorations remain only to be used carefully especially in teeth that remain exposed to high functional loads. The choice of restoration design must put more emphasis on biomechanical compatibility to achieve better clinical outcomes in the long term.

CONCLUSION

The study offers valuable information in terms of the fracture outcome of endodontically-treated premolars in relation to the design of post-endodontic restoration. The results indicate that restoration design is a crucial factor that influences fracture-free life span and risk of fractures in the case of standard clinical practice. Fiber post-supported composite restorations were the best of the appraised restorative strategies since of longer fracture-free time and low possibility of fracture. These results demonstrate the biomechanical superiority of fiber posts with regard to obtaining desirable stress distribution patterns and strengthening structurally defective premolars. Conversely, un-posted direct composite restorations were found to have the shortest fracture-free survival, which implies that they remain weak to functional stresses in the absence of internal reinforcement. Endocrown or full-coverage restorations also displayed mediocre performances, and, thus, they can be used as substitutes in specific clinical cases when the structural quality of the cornea and the level of adhesive bonding remain favorable. Integration of biomechanical compatible restorative modalities seems to be necessary in reducing risk of fracture and increasing functional life span. Although the retrospective characteristic of the research has its own limitations, the application of real-life clinical evidence enhances the transferability of the research to practical practice. Prospective and long-term clinical studies should be conducted in the future to confirm these findings and also corrective choices that need to be made on endodontically treated premolars to be made.

REFERENCES

1. Guo J, Wang Z, Li X, Sun C, Gao E, Li H. A comparison of the fracture resistances of endodontically treated mandibular premolars restored with endocrowns and glass fiber post-core retained conventional crowns. The journal of advanced prosthodontics. 2016 Dec 15;8(6):489.
2. Gautam AS, Paramasivam T, Sivarajan RK. Comparative evaluation of fracture resistance of root canal treated teeth restored with two post endodontic restorative materials: An in vitro analysis. Endodontology. 2024 Oct 1;36(4):406-11.
3. Doshi P, Kanaparthy A, Kanaparthy R, Parikh DS. A comparative analysis of fracture resistance and mode of failure of endodontically treated teeth restored using different fiber posts: an in vitro study. The journal of contemporary dental practice. 2018 Dec 1;20(10):1195-9.
4. Vartak MA, Hegde VR, Hegde SR, Fanibunda U. Fracture resistance and failure modes of endodontically-treated permanent teeth restored with Ribbond posts vs other post systems: a systematic review and meta-analysis of in vitro studies. Restorative Dentistry & Endodontics. 2025 Feb 17;50(1):e5.
5. El-Refaay AY, Hassan MR, Mohammed RM. Assessment of fracture resistance of endodontically treated premolars restored with endocrowns constructed of two different materials. Egy Dent J Research. 2020;4:533-42.
6. Hayati AT, Prisinda D, Nugroho AL. Survival and Success Rate of Restoration Post Endodontic Treatment. Clinical, Cosmetic and Investigational Dentistry. 2025 Dec 31:525-37.
7. Naik RR, Mynam N, Shruthi HR, PEDDIRAJU MOUNIKA DD, Srinivas V. Comparative Evaluation of the Fracture Resistance and Marginal Adaptation of Endodontically Treated Teeth Restored with Different Prosthodontic Techniques: A Clinical and In Vitro Study. International Journal of Environmental Sciences. 2025 Jun 22:65-9.
8. Mavidi JB, Varma KM, Sajjan GS, Satish RK, Dasari L, Ajjimera K. Comparative evaluation of fracture resistance of endodontically treated maxillary premolars restored with three different fibre-reinforced composites: An in vitro study. Endodontology. 2025 Apr 1;37(2):199-204.
9. Nasr M, Abd-Elhaliem NN. Effect of inlay, onlay, and endocrown restorations on the mode of failure and fracture resistance of endodontically treated maxillary premolar teeth. An in vitro study. Egyptian Dental Journal. 2024 Apr 1;70(2):2031-40.
10. Bajunaid SO, AlSadhan NO, AlBuqmi N, Alghamdi R. Influence of type of final restoration on the fracture resistance and fracture mode of endodontically treated premolars with occluso-mesial cavities. The Saudi Dental Journal. 2021 Sep 1;33(6):316-21.
11. Mrinalini M, Gupta A, Soi S, Abraham D, Bukhari SH, Bukhari S. Endodontic Access Cavity Design and Fracture Resistance: A Systematic Review and Meta-Analysis of Conventional vs. Newer Access Cavity. Cureus. 2024 Sep 6;16(9).
12. Fouad NN, Negm MM, Moukarab DA, Mahmoud EF. Fracture Resistance of Endodontically Treated Posterior Teeth Restored with Three Different

Coronal Restorations An in-vitro study. Egyptian Dental Journal. 2025 Apr 1;71(2):1767-75.
13. Naumann M, Schmitter M, Krastl G. Postendodontic restoration: endodontic post-and-core or no post at all. J Adhes Dent. 2018 Jan 1;20(1):19-24.
14. Thomas RM, Kelly A, Tagiyeva N, Kanagasingam S. Comparing endocrown restorations on permanent molars and premolars: a systematic review and meta-analysis. British dental journal. 2020 Nov 12:1-9.
15. Gallicchio V, Lodato V, De Santis R, Rengo S. Fracture Strength and failure modes of endodontically treated premolars restored with compact and hollow composite posts subjected to cyclic fatigue. Materials. 2022 Feb 1;15(3):1141.
16. Veeraganta S. *The influence of post material, post diameter and substance loss on the fracture resistance of endodontically treated premolars: A laboratory study* (Doctoral dissertation, Dissertation, Kiel, Christian-Albrechts-Universität zu Kiel, 2023).
17. Shah EH, Shetty P, Aggarwal S, Sawant S, Shinde R, Bhol R. Effect of fibre-reinforced composite as a post-obturation restorative material on fracture resistance of endodontically treated teeth: A systematic review. The Saudi dental journal. 2021 Nov 1;33(7):363-9.
18. Nalci Calik G, Alim Uysal BA. Comparison of post-endodontic restoration preferences among dental specialists and general dental practitioners: a cross-sectional web-based survey. BMC Oral Health. 2025 Dec;25(1):1801.
19. Rohym SM, Badra H, Nassar H. Comparative evaluation of marginal adaptation and fatigue resistance of endodontically treated premolars restored with direct and indirect coronal restorations: an in vitro study. BMC Oral Health. 2024 Jun 15;24(1):696.
20. Intaraprasong N, Banomyong D, Chotvorrarak K, Ngoenwiwatkul Y, Pittayachawan P. Influence of different post-endodontic restorations on the Survival Rate against Fracture of Endodontically Treated Anterior Teeth affected by cervical lesions with Pulpal involvement: a retrospective clinical study. European endodontic journal. 2024;9(1):44.
21. Che S, Awang RA, Adnan MB, Ma X, Gao X, Ismail NH. Restorative Strategies for Posterior Teeth Following Endodontic Treatment. Journal of Natural Science, Biology and Medicine. 2024 Jul;15(2):337.
22. Singh MV, Sarfaraz H, Mehta D, Gurunathan D. Comparative analysis of marginal fit and fracture resistance in CAD-CAM lithium disilicate and pre-processed composite endocrowns: An in vitro study. The Journal of Contemporary Dental Practice. 2024 Nov 26;25(8):732-9.
23. Hegde DV, Singh DN, Ansari DA. Comparative evaluation of the fracture resistance of endodontically treated teeth with different access designs. Int J Appl Dent Sci. 2021;7(3):258-64.