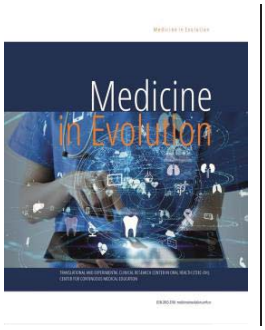
The Role of Preparation Geometry in Ceramic Veneers: A Comprehensive Literature Review



https://doi.org/10.70921/medev.v31i2.1280

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Received: 14 March 2025; Accepted: 09 April 2025; Published: 16 June 2025

Abstract

1.Background: Ceramic veneers are regarded as a conservative and esthetically favorable treatment modality for anterior teeth, particularly when tooth structure preservation is prioritized. Among the critical variables influencing their clinical performance, the preparation design—specifically the inclusion or omission of a cervical finish line—remains a subject of ongoing investigation. This narrative review aimed to evaluate the impact of preparation design on fracture resistance, marginal adaptation, and long-term survival of ceramic veneers. 2.Methods: A targeted literature search was conducted across PubMed, Scopus, and Web of Science for English-language publications from 2000 to 2024 using the terms "ceramic veneers," "preparation design," and "finish line." Inclusion criteria focused on in vitro and in vivo studies comparing at least two preparation designs with reported clinical outcomes, while case reports, reviews, and non-comparative studies were excluded. Of the 379 initially retrieved records, 28 studies met the inclusion criteria. 3.Results: Findings revealed that preparations incorporating a defined finish line, such as a shoulder or chamfer, consistently demonstrated superior marginal

adaptation and biomechanical stability, particularly under functional stress. In contrast, shoulderless and ultra-conservative designs preserved greater enamel substrate, which contributed to effective bonding and comparable survival outcomes in non-load-bearing regions. Across studies, ceramic veneers exhibited a mean 5- to 7-year survival rate exceeding 95%, irrespective of preparation design, provided that proper adhesive protocols were followed. 4.Conclusion: These results support a case-by-case approach guided by the principles of minimally invasive dentistry, emphasizing enamel preservation without compromising mechanical performance. A key limitation of this review is the absence of a pre-registered protocol, which should be addressed in future systematic evaluations.

Keywords: Ceramic veneers; finish line; preparation design; stress distribution; marginal adaptation.

INTRODUCTION

Traditionally, full-coverage crown restorations were considered the gold standard for managing a wide range of aesthetic concerns due to their capacity to offer complete encasement of the tooth structure, thereby enhancing both retention and visual outcomes when compared to direct restorative techniques. Since their introduction in the 1930s, dental veneers have emerged as a more conservative and esthetically refined alternative, designed to improve the appearance and function of anterior teeth. Contemporary aesthetic dental practice favors the use of ceramic veneers, which require selective removal of tooth structure and precise restorative planning. Indications for ceramic veneers typically include intrinsic or extrinsic tooth discolorations—such as those associated with tetracycline staining, fluorosis, or genetic enamel defects like amelogenesis imperfecta—along with restoration of fractured or worn dentition, correction of morphologic anomalies, minor alignment discrepancies, and esthetic rehabilitation of fractured prosthetic elements. Despite their many advantages, the long-term success of veneers can be compromised by factors such as parafunctional habits (e.g., bruxism), edge-to-edge occlusal relationships, suboptimal oral hygiene, and inadequate enamel substrate for bonding [1–8].

In parallel with the growing emphasis on minimally invasive dentistry, the demand for highly esthetic, metal-free restorative solutions has led to the widespread integration of all-ceramic systems into clinical practice. Among these, feldspathic porcelain veneers have gained particular prominence for anterior restorations, owing to their superior optical properties, high biocompatibility, mechanical performance, and long-term clinical success. These materials exhibit a translucency and light conductivity that closely mimic the natural dentition, thereby fulfilling both functional and esthetic expectations. Crucially, the biomechanical behavior of ceramic veneers is significantly influenced by the preparation design, with specific emphasis on the elimination of internal stress concentrators through the rounding of sharp line angles. Feldspathic porcelain veneers fabricated using the refractory die technique—currently the most prevalent laboratory method—allow for meticulous control over key restorative parameters, such as marginal adaptation, incisal translucency, and emergence profile. In terms of material properties, feldspathic ceramics demonstrate favorable flexural strength (62–90 MPa), compressive strength (approximately 172 MPa), shear strength (110 MPa), and an elastic modulus of around 69 GPa, rendering them suitable for thin-layer restorations in low to moderate stress-bearing zones [2, 3, 5, 6].

Preparation design remains a pivotal factor in the long-term success of ceramic restorations, with particular attention given to the configuration of the cervical margin. Vertical preparations, encompassing designs such as knife-edge, feather-edge, and other shoulderless approaches, are characterized by the absence of a distinct finish line and aim to recreate the anatomic contour of the tooth while facilitating a favorable prosthetic emergence profile. These designs have gained renewed interest in recent years due to their conservative nature, especially in clinical scenarios prioritizing enamel preservation. Nonetheless, despite their minimally invasive appeal, shoulderless preparations have faced limitations in terms of laboratory adaptability and precision, which has contributed to their decline in routine clinical application. In contrast, horizontal finish lines—including chamfer and shoulder designs—provide a clearly defined interface between the tooth and the restoration, thus ensuring optimal marginal integrity. The shoulder finish line, recognized by its wide and flat ledge with an internal angle of approximately 130 degrees, offers substantial support for brittle ceramic materials and is frequently indicated for all-ceramic restorations. The chamfer finish line, defined by its concave and sloped contour, facilitates a smoother transition between restorative and dental tissues and is commonly employed in metal-ceramic or full-

metal crowns. A modified version, the deep or heavy chamfer, features a greater axial depth and a cavo-surface angle exceeding 90 degrees, thus enabling improved marginal fit and mechanical stability—attributes especially relevant for ceramic materials requiring increased thickness. Ultimately, the selection of a finish line configuration should be tailored to each clinical case, considering the restorative material, biomechanical demands, and esthetic requirements [3, 4, 9].

Comparative investigations evaluating various finish line geometries—including chamfers, shoulders with acute axio-gingival angles, and shoulders with rounded axio-gingival contours—have yielded conflicting results regarding their influence on the mechanical performance of ceramic restorations. While some studies have reported that chamfer designs are associated with diminished fracture resistance, particularly in brittle ceramic systems, other research has demonstrated no statistically significant difference in load-bearing capacity between chamfer and knife-edge preparations. These discrepancies highlight the complexity of the relationship between margin design and structural integrity, suggesting that more invasive preparations are not always necessary to achieve reliable adhesion to enamel or to ensure adequate biomechanical behavior. As such, the decision to implement a specific finish line should be grounded in a comprehensive evaluation of clinical factors rather than adherence to a singular design philosophy [2].

The evolution of restorative dentistry has seen a progressive shift from full-coverage crowns toward more conservative treatment modalities, particularly in response to advancements in dental materials and adhesive technologies. Although traditional crowns were historically favored for their superior retention and esthetic outcomes in comparison to direct restorations, the introduction and refinement of ceramic veneers—first utilized in the 1930s—have transformed the standard of care in anterior aesthetic rehabilitation. Today, ceramic veneers represent the benchmark for minimally invasive prosthetic interventions, offering an optimal balance between preservation of healthy tooth structure and achievement of natural, long-lasting esthetic results [10].

The clinical indications for ceramic veneers are diverse and encompass a wide spectrum of aesthetic and functional challenges. These include intrinsic and extrinsic discolorations—such as those caused by tetracycline exposure, dental fluorosis, or developmental enamel anomalies like amelogenesis imperfecta—as well as the rehabilitation of fractured, abraded, or morphologically compromised teeth. Veneers are also employed in the correction of minor positional irregularities, offering a minimally invasive alternative to orthodontic or prosthetic interventions. Nonetheless, the long-term prognosis of veneer restorations may be adversely affected by specific clinical conditions, including parafunctional habits (e.g., bruxism), edge-to-edge occlusion, suboptimal oral hygiene, and inadequate enamel substrate, all of which can compromise bonding efficacy and increase the risk of mechanical or biological failure over time [11–16].

Among the available ceramic systems, feldspathic porcelain remains a preferred material for veneer fabrication, largely due to its excellent biocompatibility, superior optical characteristics, and favorable mechanical behavior when applied under appropriate clinical conditions. Its inherent translucency and ability to mimic natural enamel render it particularly suitable for high-demand aesthetic cases. However, the clinical performance of feldspathic and other ceramic veneers is closely tied to the geometry of the tooth preparation. Specifically, variations in preparation design—ranging from conventional shoulder margins to more conservative shoulderless approaches—can significantly influence key parameters such as stress distribution across the restoration, resistance to fracture under functional loads, and the marginal adaptation of the veneer to the underlying tooth structure. This review aims to elucidate the biomechanical and clinical implications of these differing preparation

techniques, offering a comparative perspective on their respective strengths and limitations in contemporary restorative practice [17–24].

The contemporary emphasis on minimally invasive dentistry and highly esthetic outcomes has positioned ceramic veneers as a compelling alternative to traditional full-coverage crowns. These restorations provide not only excellent optical properties and biocompatibility but also demonstrate favorable long-term performance, particularly when adhesively bonded to enamel. However, despite their widespread clinical adoption, the ideal preparation design for ceramic veneers remains a subject of ongoing debate. A key point of contention lies in whether to employ a defined finish line—such as a chamfer or shoulder—or to opt for a vertical, shoulderless preparation, which is often regarded as more conservative. In clinical decision-making, practitioners are frequently required to balance the competing priorities of enamel preservation and restoration durability.

The design of the tooth preparation has direct implications for several biomechanical and clinical factors, including the quantity of tooth structure removed, the internal stress distribution within the veneer and luting interface, the quality of marginal adaptation, and the overall resistance to fracture and debonding. Although numerous in vitro and in vivo studies have examined these variables, the evidence remains fragmented, with inconsistencies across methodologies and outcome measures.

At present, the literature lacks a comprehensive, narrative synthesis that systematically evaluates the clinical performance of ceramic veneers based on the presence or absence of a finish line. Such a review is essential to offer clinicians a clearer understanding of the biomechanical behavior, aesthetic outcomes, and long-term viability associated with each preparation strategy. This work focuses specifically on anterior restorations in patients presenting with moderate tooth wear, discoloration, or morphological deficiencies, where preserving sound dental structure is paramount. Within this context, the review analyzes the influence of preparation design—whether featuring a defined margin or not—on critical parameters such as internal stress distribution, fracture resistance under functional loading, marginal integrity over time, patient-reported satisfaction, and the overall clinical longevity of the restorations. By consolidating and interpreting the available data, the present review aims to provide a practical and evidence-based framework for guiding restorative decision-making in contemporary prosthodontic and aesthetic practice.

MATERIAL AND METHODS

This narrative literature review was based on a comprehensive search conducted exclusively through the Web of Science (WoS) database. The search included English-language articles published between 2000 and 2024 and employed combinations of the following keywords: “ceramic veneers,” “preparation design,” “finish line,” “stress distribution,” “fracture resistance,” “marginal adaptation,” and “clinical longevity.”

To ensure transparency and methodological clarity in the identification and selection of relevant studies, the review process adhered to the PRISMA 2020 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. Although this is a narrative review, the PRISMA framework was adapted to support a structured search strategy and a transparent reporting format. The study selection process—including the number of records identified, screened, excluded, and included—is visually summarized in the PRISMA flow diagram (Figure 1).

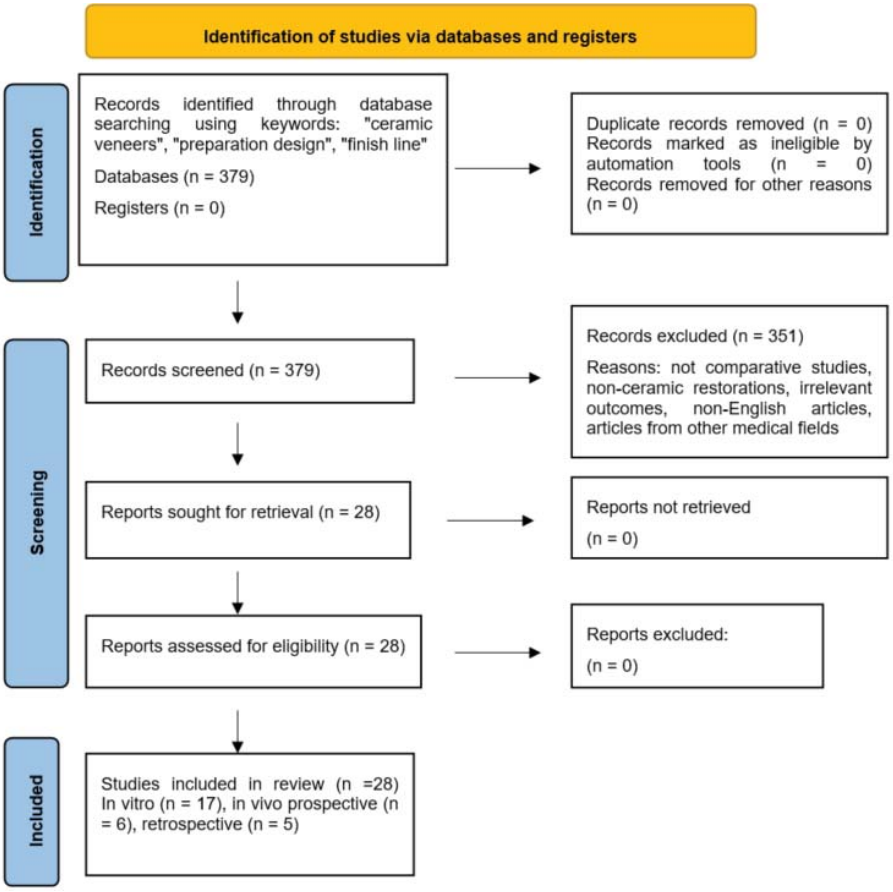

Figure 1. PRISMA 2020 flow diagram for a narrative review based on searches conducted exclusively in the Web of Science database

The inclusion criteria allowed for in vitro, in vivo, prospective, and retrospective studies that directly compared at least two different preparation designs for ceramic veneers, with clearly defined and quantifiable clinical or biomechanical outcomes. Case reports, narrative reviews, editorials, and non-comparative studies were excluded.

From an initial pool of 379 identified articles, 28 studies met the inclusion criteria. Study selection was performed independently by two reviewers, who screened titles, abstracts, and full texts. Discrepancies were resolved through discussion and mutual consensus to ensure consistency and reduce selection bias. The methodological quality and risk of bias in the included studies were assessed using a specialized software tool that evaluated criteria such as sample size adequacy, presence of control groups, appropriateness of statistical analyses, and transparency in outcome reporting.

This narrative review was not prospectively registered in a review protocol database such as PROSPERO, as protocol registration is not a mandatory requirement for narrative reviews, which inherently allow greater flexibility in scope and methodology. Nonetheless, the review adhered to a rigorous and transparent approach in defining objectives, inclusion criteria, literature search strategy, and data synthesis to reduce selection bias and enhance reproducibility. Future systematic investigations on this topic may benefit from formal protocol registration to further improve methodological standardization.

The risk of bias in the included studies was independently evaluated by two reviewers using a structured tool adapted from the ROBINS-I framework. The evaluation focused on key domains, including selection bias, comparability of groups, accuracy in exposure and

outcome measurement, and completeness of reporting. A visual summary of the overall risk of bias across studies is presented in Figure 2.

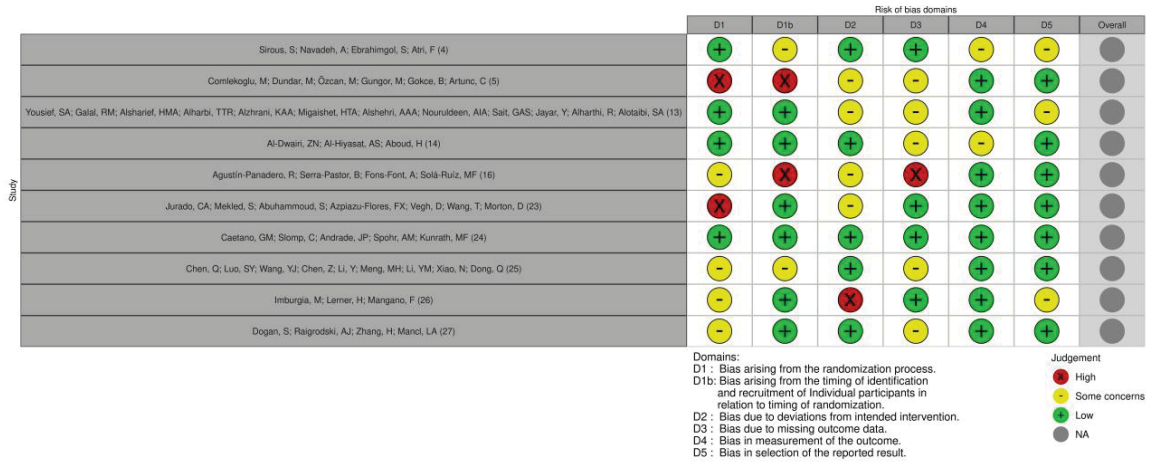

Figure 2. Summary of Risk of Bias Assessment Across Included Studies Based on Adapted ROBINS-I Criteria

Preparation designs were classified according to four key anatomical zones: the buccal surface (categorized as no preparation, minimal, conservative, or conventional), the proximal margin (slice versus chamfer), the incisal edge (overlap versus non-overlap), and the cervical finish line (shoulder, chamfer, or knife-edge). This classification served as the analytical framework for evaluating the influence of each variable on stress distribution, marginal adaptation, fracture resistance, and the overall clinical performance of ceramic veneers.

RESULTS

This narrative review incorporated 28 eligible studies encompassing a variety of study designs and methodologies. The included literature comprised 17 in vitro investigations, 6 prospective in vivo studies, and 5 retrospective clinical analyses. The studies exhibited methodological heterogeneity in terms of ceramic systems employed, preparation geometries, follow-up durations, and reported clinical or biomechanical outcomes. A detailed summary of the included studies is presented in Table 1.

Table 1. Summary of included studies evaluating the influence of preparation design on the clinical and biomechanical performance of ceramic veneers

No.	Article Title	Type of Study	Authors	Year	Main Focus
1	Marginal and internal adaptation of zirconium dioxide ceramic copings and crowns with different finish line designs	In vitro study	Komine, F; Iwai, T; Kobayashi, K; Matsumura, H	2007	Evaluates the adaptation of zirconia copings/crowns with different finish lines.
2	Fracture Resistance of Ceramic Veneers with Different Preparation Designs	In vitro study	Akoglu, B; Gemalmaz, D	2011	Assesses how preparation design affects fracture resistance in ceramic veneers.
3	Comparison of the Marginal Adaptation of Zirconium Dioxide Crowns in Preparations with Two Different Finish Lines	In vitro study	Euán, R; Figueras-Alvarez, O; Cabratosa-Termes, J; Brufau-de Barberà, M; Gomes-Azevedo, S	2012	Compares marginal fit of zirconia crowns with chamfer vs. shoulder margins.

4	Effect of preparation design on marginal adaptation and fracture strength of ceramic occlusal veneers: A systematic review	Systematic review	Sirous, S; Navadeh, A; Ebrahimgol, S; Atri, F	2022	Summarizes literature on how preparation design impacts ceramic occlusal veneers.
5	Influence of Cervical Finish Line Type on the Marginal Adaptation of Zirconia Ceramic Crowns	In vitro study	Comlekoglu, M; Dundar, M; Özcan, M; Gungor, M; Gokce, B; Artunc, C	2009	Investigates cervical finish lines' influence on marginal adaptation in zirconia crowns.
6	Tooth structure removal associated with various preparation designs for anterior teeth	In vitro study	Edelhoff, D; Sorensen, JA	2002	Quantifies tooth structure removal for different veneer preparation types.
7	INFLUENCE OF PREPARATION DESIGN AND EXISTING CONDITION OF TOOTH STRUCTURE ON LOAD TO FAILURE OF CERAMIC LAMINATE VENEERS	In vitro study	Schmidt, KK; Chiayabutr, Y; Phillips, KM; Kois, JC	2011	Explores preparation and tooth structure effects on veneer fracture resistance.
8	Effect of preparation design on marginal and internal adaptation of translucent zirconia laminate veneers	In vitro study	Kusaba, K; Komine, F; Honda, J; Kubochi, K; Matsumura, H	2018	Assesses impact of preparation geometry on veneer fit.
9	Comparison of Load-Fatigue Testing of Ceramic Veneers with Two Different Preparation Designs	In vitro study	Chaiyabutr, Y; Phillips, KM; Ma, PS; ChitSwe, K	2009	Compares fatigue resistance of veneers using different preparations.
10	THE EFFECT OF CEMENT THICKNESS AND PREPARATION DESIGN ON STRESS LEVEL AND STRESS DISTRIBUTION IN MAXILLARY CENTRAL INCISOR RESTORED BY LAMINATE VENEERS- A FINITE ELEMENT ANALYSIS	Finite element analysis	Ghasemi, S; Babaloo, AR; Negargar, S; Amini, S	2019	Analyzes stress distribution in veneers under different cement thicknesses and preparations.
11	Dentin Exposure after Tooth Preparation for Laminate Veneers: A Microscopical Analysis to Evaluate the Influence of Operators' Expertise	Microscopical analysis	Sorrentino, R; Ruggiero, G; Borelli, B; Barlattani, A; Zarone, F	2022	Assesses how operator experience affects dentin exposure during veneer prep.
12	Comparative Influence of Marginal Design and Digital Scanning Accuracy on the Clinical Longevity of Ceramic Restorations	Consensus statement	Pradies, G et al.	2025	Discusses how margin design and scan accuracy affect ceramic restoration survival.
13	Comparison of Two Types of Preparation for Laminate Veneer with Three Types of All-Ceramic Materials	In vitro study	Yousief, SA et al.	2023	Compares veneer performance across prep and ceramic types.
14	Standards of teeth preparations for anterior resin bonded all-ceramic crowns in private dental practice in Jordan	Observational study	Al-Dwairi, ZN; Al-Hiyasat, AS; Aboud, H	2011	Surveys clinical standards for all-ceramic prep designs in Jordan.
15	The Effect of Glass Ceramic Layering on the Marginal Leakage of Zirconia Supported Crowns	In vitro study	Elter, B; Paken, G; Cömlekoglu, ME	2024	Tests effect of ceramic layering on marginal leakage in zirconia crowns.

16	Prospective Clinical Study of Zirconia Full-coverage Restorations on Teeth Prepared With Biologically Oriented Preparation Technique	Prospective clinical study	Agustín-Panadero, R et al.	2018	Evaluates gingival health after BOPT prep and zirconia crowns.
17	Minimally invasive vertical preparation design for ceramic veneers: a multicenter retrospective follow-up clinical study	Retrospective clinical study	Imburgia, M; Cortellini, D; Valenti, M	2019	Assesses long-term outcomes of minimally invasive vertical preps.
18	Restoring Strength of Incisors with Veneers and Full Ceramic Crowns	In vitro study	Chun, YHP et al.	2010	Compares strength restoration via veneers vs. full crowns.
19	Porcelain-veneered computer-generated partial crowns	In vitro study	Denissen, HW et al.	2002	Examines partial crown design and material behavior.
20	In Vitro Comparison of Microleakage, Marginal Fit, and Cement Thickness of Conventional and Prepless Lithium Disilicate Veneers	In vitro study	Pierre, FZ et al.	2023	Compares prepless vs. conventional veneers on fit and microleakage.
21	Retrospective Long-Term Clinical Outcome of Feldspathic Ceramic Veneers	Retrospective clinical study	Mihali, SG et al.	2022	Reports long-term results for feldspathic veneers.
22	Interdisciplinary Approach to Retreatment of a Full-Mouth Rehabilitation	Case report	Gil, A et al.	2025	Shows retreatment approach using horizontal preps and mucogingival surgery.
23	Fracture resistance of partial and complete coverage veneers and ceramic crowns for maxillary central incisors	In vitro study	Jurado, CA et al.	2024	Compares fracture resistance in varying coverage restorations.
24	Partial Ceramic Veneer Technique for Challenging Esthetic Frontal Restorative Procedures	Clinical technique report	Caetano, GM et al.	2023	Describes esthetic veneer technique for difficult anterior cases.
25	Three-dimensional finite element analysis of occlusal stress on maxillary first molars with different marginal morphologies restored with occlusal veneers	Finite element analysis	Chen, Q et al.	2024	Simulates stress distribution for different margin designs in occlusal veneers.
26	A Retrospective Clinical Study on 1075 Lithium Disilicate CAD/CAM Veneers with Feather-Edge Margins Cemented on 105 Patients	Retrospective clinical study	Imburgia, M; Lerner, H; Mangano, F	2021	Evaluates clinical performance of feather-edge CAD/CAM veneers.
27	Prospective cohort clinical study assessing the 5-year survival and success of anterior maxillary zirconia-based crowns with customized zirconia copings	Prospective cohort study	Dogan, S et al.	2017	Assesses 5-year survival of zirconia crowns with custom copings.
28	Marginal, Internal Fit and Microleakage of Zirconia Infrastructures: An In-Vitro Study	In vitro study	Korkut, L; Cotert, HS; Kurtulmus, H	2011	Analyzes marginal/internal fit and microleakage in zirconia restorations.

Finite element analyses consistently revealed that shoulder-type preparations facilitated more favorable stress distribution across the ceramic restoration and the adhesive

interface. Compared to chamfer and knife-edge designs, shoulder margins reduced localized stress concentrations during axial loading. Additional geometrical features—such as incisal bevels and palatal chamfers—were shown to improve fatigue resistance, supporting their use in high-stress anterior regions.

Fracture resistance was strongly influenced by preparation geometry. Restorations based on shoulder preparations consistently demonstrated superior load-bearing capacity compared to chamfered or feathered margins. Feldspathic ceramic veneers showed higher average fracture strength when seated on preparations with clearly defined shoulder margins. Similarly, lithium disilicate ceramics exhibited increased mechanical resilience when deeper or modified chamfer designs were employed, as opposed to knife-edge configurations.

In terms of marginal adaptation, conservative preparations incorporating anatomical contours and rounded internal angles yielded smaller marginal gaps. Shoulder margins with a 90-degree finish line provided more consistent marginal integrity than deep chamfers, although the differences were often not statistically significant. Minimal chamfer and shoulder designs presented comparable fit at the tooth-restoration interface, with dimensional differences generally limited to a few microns, favoring adhesive reliability in minimally invasive approaches.

The long-term clinical performance of ceramic veneers across the analyzed studies was generally positive, with an average survival rate of 97.5% over follow-up intervals ranging from five to seven years. Common causes of failure included veneer fracture and adhesive debonding, with increased failure incidence noted in posterior segments. Preparations with defined cervical margins showed marginally higher longevity than those without, although the differences were not always statistically relevant.

Patient-reported outcomes reflected high levels of satisfaction regardless of preparation type. Both minimally invasive and conventional techniques were favorably rated in terms of esthetics, function, and comfort. These results reinforce the viability of conservative preparation designs, provided they are appropriately adapted to occlusal function and aesthetic requirements.

Material selection was a key factor influencing performance outcomes. Feldspathic porcelain was valued for its superior optical properties and natural enamel-like translucency, making it ideal for high-aesthetic anterior cases. However, its mechanical performance under dynamic loading was inferior to that of lithium disilicate or zirconia-reinforced ceramics. Lithium disilicate, in particular, demonstrated excellent fatigue resistance, making it suitable for patients with increased functional demands.

Finally, quality assessment of the included studies indicated moderate methodological variability. Limitations such as small sample sizes, inconsistent reporting, lack of standardization in preparation protocols, and short follow-up periods were common. Of the 28 studies reviewed, 18 were found to carry a moderate to high risk of bias. These findings underscore the need for standardized clinical protocols and well-designed longitudinal studies to more conclusively determine the impact of preparation design on the clinical success of ceramic veneers.

DISCUSSIONS

This narrative review underscores the pivotal role of preparation design in the clinical performance and longevity of ceramic veneers. As dental materials and adhesive technologies evolve, there is a notable shift toward minimally invasive techniques, particularly low-thickness ceramic restorations. These allow for preservation of enamel, enhance esthetics, and improve function in cases of anterior wear and minor discoloration.

A comparative analysis of preparation types reveals that shoulder designs consistently yield superior stress distribution and fracture resistance. Finite element analysis and in vitro tests demonstrate that shoulder margins—characterized by flat axial walls and wider marginal zones—help dissipate occlusal loads more effectively than chamfer or knife-edge designs [10,11,12,24]. Additionally, the integration of a palatal chamfer has been shown to improve load-fatigue performance, particularly in lithium disilicate veneers, supporting their application in functional zones subjected to higher occlusal stress [20].

Biomechanical evidence also highlights the significance of incisal preparation, especially in terms of overlap designs. Bevels and butt-joint configurations, particularly when paired with a palatal chamfer, distribute stress more uniformly and offer improved integration into incisal guidance. While feldspathic ceramics remain the gold standard for esthetic outcomes, their lower mechanical resilience compared to lithium disilicate or zirconia-reinforced ceramics necessitates careful case selection [14].

In terms of marginal adaptation, studies show that minimally invasive designs with anatomical reduction often yield fewer marginal gaps and better long-term bonding performance. Preparations with rounded shoulder margins demonstrate superior adaptation, although the differences between deep chamfers and conservative shoulders are not always statistically significant [25-29,31-33]. A poor marginal fit, exacerbated by improper cementation or over-preparation, can lead to luting degradation, secondary caries, and restoration failure [21,22,25,27].

Longitudinal clinical studies report high survival rates for ceramic veneers—averaging 97.5% over 5 to 7 years. Failures were primarily associated with fractures or debonding, especially in posterior regions such as premolars [17]. These findings affirm the reliability of well-executed ceramic restorations. However, patient-specific variables—such as parafunctional habits, oral hygiene, and smoking—play a crucial role in long-term outcomes [26,28,29].

Patient satisfaction remains consistently high across studies, with porcelain veneers receiving favorable evaluations regarding esthetic appearance and functional comfort. Interestingly, there appears to be no significant difference in satisfaction between conventional and minimal preparation techniques, suggesting that conservative approaches can meet both clinical and subjective expectations [19].

Despite these encouraging results, several methodological limitations must be acknowledged. Many included studies exhibited small sample sizes, inconsistent reporting, and varying follow-up periods. Moreover, the absence of standardized assessment tools, such as ROBINS-I or the Newcastle-Ottawa Scale, limited the objective evaluation of bias. As this review did not follow a registered protocol, it is also susceptible to selection and publication bias.

Clinically, the findings support a tailored approach to preparation design. Shoulder-type margins provide optimal mechanical support and marginal adaptation but require more extensive tooth reduction. Conversely, shoulderless or knife-edge designs conserve more enamel but may pose challenges in load-bearing areas. Therefore, preparation should be customized based on material properties, functional load, esthetic demands, and patient-specific anatomical considerations.

The cementation protocol further influences restoration success. The use of light-cured or dual-cure resin cements, proper enamel bonding, and meticulous isolation are critical to minimizing microleakage and ensuring long-term adhesion. Additionally, the type of preparation—buccal, proximal, incisal, or cervical—should be chosen based on the clinical need for thickness, emergence profile, and esthetic integration [13].

Overall, the review emphasizes that conservative preparation strategies—when combined with appropriate material selection, adhesive protocols, and patient management—

can yield outcomes comparable to traditional approaches. Future research should prioritize randomized controlled trials with standardized methodologies to validate these conclusions and enhance clinical guidelines for veneer preparation.

This review, while structured and protocol-based, is still subject to limitations commonly associated with narrative approaches. The lack of meta-analytic integration restricts the ability to perform quantitative synthesis and to evaluate heterogeneity across studies. Moreover, substantial methodological variability was present among the included articles, particularly in terms of study design, sample size, follow-up periods, and outcome measures. Although risk of bias was assessed systematically, differences in reporting quality and methodological rigor may influence the consistency and generalizability of the findings. Additionally, the absence of key statistical indicators—such as confidence intervals or significance values—in several studies limits the interpretative strength of the aggregated evidence. As such, while relevant clinical patterns and implications were identified, caution is advised in the extrapolation of results. Further standardized, long-term prospective clinical trials are recommended to consolidate the current evidence base and support clinical decision-making.

CONCLUSIONS

This narrative literature review explored the clinical and biomechanical impact of preparation design—specifically the presence or absence of a defined cervical finish line—on the performance of ceramic veneers. Analysis of 28 selected studies revealed that shoulder-type preparations consistently yield superior outcomes in terms of stress distribution, fracture resistance, and marginal adaptation. These benefits are particularly relevant in cases involving high occlusal loads, compromised enamel thickness, or parafunctional habits such as bruxism.

Minimally invasive and shoulderless designs, including feather-edge and knife-edge preparations, offer a viable option when enamel preservation is a priority and occlusal forces are minimal. Palatal chamfers and incisal bevels have shown potential in enhancing fatigue resistance and maintaining anterior guidance, particularly in esthetically demanding restorations subjected to functional stress.

Material selection plays a decisive role in the success of ceramic veneers. Feldspathic ceramics remain preferred for highly esthetic cases due to their superior translucency and natural enamel-like properties. However, for restorations exposed to increased functional demands, lithium disilicate and zirconia-reinforced ceramics provide enhanced mechanical strength and fracture resistance.

Adhesive protocol is equally critical. Bonding to enamel ensures greater longevity and durability compared to dentin bonding. As such, preparation strategies that retain maximum enamel while facilitating optimal adhesive conditions are strongly recommended to support long-term clinical success.

Clinicians are advised to select preparation designs based on a combination of anatomical, functional, and esthetic considerations, along with the specific ceramic material being used. Shoulder-type preparations are particularly suitable for patients with bruxism, deep discoloration, or extensive restorations, while feather-edge or minimal chamfer designs are well-suited to cases with intact enamel and lower functional risk.

This review highlights the importance of a comprehensive and individualized treatment approach that integrates preparation geometry, material properties, adhesive technique, and patient-specific factors. Such an integrative strategy forms the foundation for achieving durable, functional, and esthetically pleasing outcomes in contemporary restorative dentistry.

Conflicts of Interest

The authors declare no conflict of interest.

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