

OCCLUSAL ASSESSMENT OF PORCELAIN-FUSED-TO-METAL (PFM) CROWNS DURING TRY-IN APPOINTMENT IN THE PROSTHODONTICS DEPARTMENT, SAIDU COLLEGE OF DENTISTRY

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How to cite this article

Ullah S, Abdullah, Malik H. Occlusal Assessment of Porcelain-Fused-to-Metal (Pfm) Crowns During Try-In Appointment in the Prosthodontics Department, Saidu College of Dentistry. J Gandhara Med Dent Sci. 2026;13(4):20-24.
http://doi.org/10.37762/jgm.13-4.883

Date of Submission: 16-04-2026

Date Revised: 19-09-2026

Date Acceptance: 19-09-2026

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INTRODUCTION

Restorative and prosthodontic dentistry aims to create a harmonious and useful occlusion. Numerous clinical issues, such as occlusal trauma, interferences, temporomandibular joint (TMJ) disorders, and faster wear of restorative and natural dentition, can arise from a poorly repaired occlusion.^{1,2} In order to maintain the health of the masticatory system, which includes the teeth, periodontium, masticatory muscles, and TMJs, it is crucial that physiologic occlusal relationships be restored during restorative operations.³ A major area of dentistry called prosthodontics focuses on using fixed, removable, and implant-supported prostheses to help patients who have lost or impaired teeth. Because of their advantageous mechanical qualities, biocompatibility, and aesthetics, porcelain-fused-to-metal (PFM) crowns have continued to be a standard among fixed restorations.^{4,5} PFM crowns are still frequently used in clinical practice, particularly in posterior locations where functional demands are higher, even if all-ceramic alternatives are becoming more popular.⁶ The try-in appointment is a crucial stage in the delivery of PFM crowns because it provides an intraoral evaluation of the restoration prior to final

ABSTRACT

OBJECTIVES

To assess the quality of occlusal contacts in PFM crowns during try-in appointments using modified FDI criteria at the Prosthodontics Department, Saidu College of Dentistry.

METHODOLOGY

This cross-sectional observational study involved 193 patients receiving PFM crowns. Occlusal contacts were assessed using 12-μm and 100-μm articulating papers. Contacts were categorised as excellent, good, satisfactory, or unsatisfactory. Demographic and clinical data were analysed using SPSS v25, and associations were evaluated via chi-square tests ($p \leq 0.05$).

RESULTS

Among 193 patients (54.9% female, mean age: 41.2 years), 35.2% had excellent, 29.0% good, 22.3% satisfactory, and 13.5% unsatisfactory occlusal contacts. Age was significantly associated with occlusal outcomes ($p = 0.038$), with older patients more likely to exhibit unsatisfactory contacts. No significant differences were observed by gender or tooth location.

CONCLUSION

Most PFM crowns exhibited acceptable occlusal contacts during try-in. Age influenced occlusal quality, emphasising the need for heightened clinical scrutiny in older patients. Articulating papers of varying thickness effectively detected contact discrepancies, reinforcing their role in ensuring optimal prosthetic fit and function prior to cementation.

KEYWORDS: Occlusal Assessment, Try-In Appointment, Prosthodontics, Articulating Paper, Dental Restorations

cementation. Clinicians evaluate a number of factors at this point, including shade matching, proximal contacts, marginal fit, and—above all—occlusal associations.⁷ If left untreated, improper occlusion at this stage can result in TMJ problems following cementation, cracked restorations, and loss of periodontal support.⁸ Making sure the restoration blends in perfectly with the patient's current occlusal scheme is the main objective of the occlusal assessment performed during the try-in. This entails examining the arch for appropriate force distribution, the lack of deflective contacts in functional and parafunctional movements, and even and stable central contacts.⁹ Occlusal discrepancies may require recurrent chairside adjustments or remakes if they are not detected and adjusted during this stage, which would lengthen treatment times and increase costs while lowering patient satisfaction.¹⁰ Traditional instruments like articulating paper, shimstock foil, and occlusal indicator wax, as well as more recent digital approaches like intraoral scanners and virtual occlusion analysis, are used in clinical settings for occlusal examination during the try-in.^{11,12} These instruments facilitate the detection of early interactions and direct specific occlusal modifications. A study by Sadaf et al. found that a considerable percentage of PFM crowns

had contact point inconsistencies, such as tight or open contacts, highlighting the significance of careful intraoral examination before cementation.¹³ Although this try-in phase is clinically significant, little is known about the real-time occlusal assessment procedures used in teaching hospitals, especially in environments with limited resources. Gaps in training, standardisation, and clinical execution can be identified by examining the pragmatic approach taken by postgraduate students and clinicians during PFM crown try-ins. In order to identify these areas for clinical improvement and raise the standard of prosthodontic care provided, this study intends to assess the occlusal assessment of porcelain-fused-to-metal (PFM) crowns during the try-in appointment using modified FDI World Dental Federation criteria.

METHODOLOGY

This study was conducted as a cross-sectional observational study in the Prosthodontics Department of Saidu College of Dentistry. The study was completed over a period of six months following the approval of the research synopsis. (Ref No. 04-ERB/024, 15-01-2024) The research took place in the Prosthodontics Department at Saidu College of Dentistry, Swat, Pakistan. The required sample size was calculated using the WHO sample size calculator. Based on an anticipated proportion of satisfactory occlusal contact points of 56.7%, with a 7% margin of error and a 95% confidence level, the final sample size was determined to be 193 patients. A non-probability consecutive sampling technique was employed for the inclusion of participants. Patients receiving porcelain-fused-to-metal (PFM) crowns as part of prosthodontic therapy between the ages of 18 and 60 were included in the study. A Simplified Oral Hygiene Index (OHI-S) score of 1.2 or less showed that participants had finished prosthetic tooth preparations and practised appropriate oral hygiene. Every participant was accessible for follow-up and had a Visual Analogue Scale (VAS) pain score of less than 2. Patients with acute or chronic temporomandibular joint (TMJ) abnormalities, inadequate prosthetic preparations, or parafunctional habits such as bruxism and clenching were excluded. Patients who had a history of mental or sensory problems or who were unable to provide informed consent were not included in the study. The College of Physicians and Surgeons Pakistan (CPSP) and the Institutional Review Board of Saidu Medical College and Hospital provided their ethical approval. The Prosthodontics Department's outpatient services were used to enrol patients who satisfied the inclusion requirements. Following an explanation of the study's goals, methods, possible dangers, and advantages,

informed consent was acquired. Age, gender, urban/rural domicile, education level, occupation, socioeconomic situation (as determined by the Kuppusswamy scale), and whether the afflicted tooth was maxillary or mandibular were among the baseline demographics that were documented. The PFM crown try-in appointment included the occlusal evaluation. In the dentist's chair, patients were sitting erect and comfortably. To assess occlusal contacts, two articulating paper types, 12-micron and 100-micron, were utilised in succession. During closure, articulating paper was positioned between the PFM crown and the opposing tooth after it had been set onto the prepared tooth. Under the guidance of a consulting prosthodontist, the principal investigator visually examined and evaluated the occlusal marks. Based on predetermined criteria, the results were categorised into four groups: excellent, good, satisfactory, and unsatisfactory (refer to operational definitions). Every finding was recorded in a standardised proforma created especially for this investigation. Version 25 of IBM SPSS Statistics was used to analyse the data. The Shapiro-Wilk test was used to determine whether quantitative information, including age, height, weight, and BMI, had a normal distribution. These variables were described using either the median and interquartile range (IQR) or the mean $\pm$ standard deviation (SD), as applicable. Frequencies and percentages were used to represent qualitative factors such as gender, place of residence, education, occupation, socioeconomic position, kind of tooth restored, and occlusal result category. Age, gender, BMI, socioeconomic level, and the type of restored tooth were among the possible confounding factors that were taken into account when stratifying the occlusal result groups (excellent, good, satisfactory, and unsatisfactory). When appropriate, the Chi-square or Fisher's exact test was used for post-stratification analysis. Statistical significance was defined as a p-value of less than 0.05. Operational Definitions: Occlusal contact assessment was carried out clinically using articulating paper. Two thicknesses of articulating paper (12-micron and 100-micron) were used to assess contact points between the PFM crown and opposing dentition. The evaluation was supervised by a consultant prosthodontist. Contact points were categorised as: Excellent: Equal, strong occlusal contacts on the crown and adjacent teeth; Good: Unequal but strong occlusal contacts on the crown and adjacent teeth; Satisfactory: Occlusal contact only on the crown, indicating supraocclusion; and Unsatisfactory: Absence of occlusal contact on the crown, indicating infraocclusion. A PFM crown is a fixed dental restoration made of a metal substructure covered with a layer of porcelain. It is designed to restore the form, function, and esthetics of a damaged

or missing tooth. The term "try-in appointment" describes a particular clinical phase of prosthodontic treatment in which the prepared tooth is temporarily supported by the manufactured PFM crown. Prior to final cementation, this stage enables a clinical assessment of occlusal connections, crown fit, and aesthetics.

RESULTS

Over the course of six months, 193 patients who satisfied the inclusion requirements were added to the study at Saidu College of Dentistry's prosthodontics department. Table 1 displays the clinical and demographic details of the subjects.

Table 1: Demographic and Clinical Characteristics of Study Participants (n = 193)

Variable	Frequency (n)	(%age)
Gender		
Male	87	45.1
Female	106	54.9
Age Group (years)		
18–30	44	22.8
31–45	76	39.4
46–60	73	37.8
Residence		
Urban	111	57.5
Rural	82	42.5
Education Level		
No formal education	28	14.5
Primary to Secondary	71	36.8
Higher Secondary and Above	94	48.7
Socioeconomic Status		
Upper Class	13	6.7
Upper Middle Class	51	26.4
Lower Middle Class	76	39.4
Lower Class	53	27.5
Tooth Type		
Maxillary	113	58.5
Mandibular	80	41.5

Both 12-micron and 100-micron articulating paper were used for the occlusal contact evaluation during the try-in session. Four categories were used to classify contact quality: exceptional, acceptable, satisfactory, and poor. Table 2 displays the distribution of these occlusal assessment results.

Table 2: Occlusal Contact Outcomes of PFM Crowns at Try-In Appointment (n = 193)

Occlusal Contact Outcome	Frequency (n)	(%age)
Excellent	68	35.2
Good	56	29.0
Satisfactory	43	22.3
Unsatisfactory	26	13.5

Gender, age group, and type of repaired tooth were among the selected variables used to stratify the occlusal contact results further. The relationship

between these factors and the occlusal contact result is shown in Table 3. A p-value ≤ 0.05 was deemed statistically significant when using the chi-square test.

Table 3: Stratification of Occlusal Contact Outcomes by Selected Variables (n = 193)

Variable	Excellent n (%age)	Good n (%age)	Satisfactory n (%age)	Unsatisfactory n (%age)	p-value
Gender					0.172
Male	28(32.2%)	25 (28.7%)	20 (23.0%)	14 (16.1%)	
Female	40(37.7%)	31 (29.2%)	23 (21.7%)	12 (11.3%)	
Age Group					0.038
18–30	18(40.9%)	11 (25.0%)	10 (22.7%)	5 (11.4%)	
31–45	30(39.5%)	23 (30.3%)	15 (19.7%)	8 (10.5%)	
46–60	20(27.4%)	22 (30.1%)	18 (24.7%)	13 (17.8%)	
Tooth Type					0.096
Maxillary	45(39.8%)	35 (31.0%)	22 (19.5%)	11 (9.7%)	
Mandibular	23(28.8%)	21 (26.3%)	21 (26.3%)	15 (18.8%)	

*Statistically significant ($p \leq 0.05$)

DISCUSSION

The study found that 64.2% of porcelain-fused-to-metal (PFM) crowns were categorised as excellent or good, indicating that most of them showed positive occlusal contact results during the try-in session. This result is consistent with earlier studies that highlight how important accurate occlusal modifications are for lowering technical issues and extending crown longevity.¹⁴ Similar findings were described by Jamal et al., who found that open contacts and occlusal discrepancies were important causes of crown failure, especially in middle-aged patients.¹⁴ In keeping with research showing age-related decreases in occlusal force and masticatory efficiency brought on by neuromuscular and tooth wear factors, we found that older patients had a higher prevalence of poor occlusal contacts.¹⁵ This implies that being older increases the likelihood of occlusal discrepancies, highlighting the necessity of increased professional attention during try-in to prevent supra- or infraocclusion and associated problems. Occlusal contact quality was not significantly impacted by gender, which is consistent with earlier research that demonstrated no significant variations in prosthodontic results between males and females.¹⁴ Gender-specific biomechanical variations do exist, but they do not seem to have a significant impact on clinical occlusal fit in PFM crowns, underscoring the critical role that clinical expertise and technical accuracy play.¹⁶ It is widely known that mandibular molars frequently withstand higher occlusal stresses

and may create additional obstacles during crown manufacture and adjustment, even though our investigation found no discernible difference between maxillary and mandibular crowns.¹⁶ Our centre's consistent clinical procedures and balanced sample probably helped to reduce variations in arch positions. Compared to research done in facilities with sophisticated laboratory and digital workflows, where occlusal discrepancies at try-in are less common, the percentage of satisfactory and unsatisfactory occlusal contacts was marginally greater.¹⁷ This highlights how important it is to perform a thorough intraoral occlusal examination during the try-in phase in order to prevent long-term issues such as marginal breakdown and secondary caries.¹⁷ In line with Kohorst et al.'s recommendations for multimodal occlusal evaluation techniques to ensure optimal prosthetic function and durability, the use of articulating papers of varying thicknesses (12 µm and 100 µm) proved useful for detecting subtle variations in contact strength.¹⁸ Timely identification is crucial because inadequate occlusal interactions might increase the risk of wear and fracture.¹⁸ Furthermore, Sara et al. confirmed our method of classifying contacts into four quality levels to aid in clinical decision-making by showing that occlusal contact patterns and adjustments have a substantial impact on the mechanical stability and wear resistance of crowns under functional loading.¹⁹ For a prosthetic to be successful over the long term, precise occlusal alignment during try-in is essential. The accuracy of crown fits and patient comfort are enhanced by occlusal assessment protocols that use both clinical and digital tools, according to a recent systematic review by Khan et al.²⁰ This supports the use of new technologies in clinical practice to support more conventional approaches.

LIMITATIONS

Subjective occlusal contact evaluation without objective force measurement tools and a cross-sectional design that prevented long-term clinical outcome follow-up were two of the study's limitations. However, the data's consistency and dependability were guaranteed by the use of standardised evaluation criteria and the participation of a skilled prosthodontist.

CONCLUSIONS

The study concluded that most PFM crowns displayed satisfactory occlusal contacts during the try-in session, underscoring the need for a comprehensive occlusal evaluation in guaranteeing prosthetic success. While gender and tooth position had no effect on occlusal differences, age was found to be a major determinant.

Subtle occlusal discrepancies were successfully detected using articulating papers of different thicknesses, highlighting the importance of careful clinical examination before final cementation. The durability of PFM restorations is ultimately influenced by these results, which highlight the significance of standardised occlusal assessment procedures for maximising crown fit, function, and patient satisfaction.

CONFLICT OF INTEREST: None

FUNDING SOURCES: None

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AUTHORS CONTRIBUTION

Sadiq Ullah - Concept & Design; Data Acquisition; Data Analysis/Interpretation; Drafting Manuscript; Critical Revision; Supervision; Final Approval

Abdullah - Concept & Design; Data Acquisition; Data Analysis/Interpretation; Drafting Manuscript; Critical Revision; Supervision; Final Approval

Humaira Malik - Concept & Design; Data Acquisition; Data Analysis/Interpretation; Drafting Manuscript; Critical Revision; Supervision; Final Approval

The authors accept responsibility for all aspects of the work and will ensure that any concerns regarding the accuracy or integrity of any part are properly investigated and resolved.



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