

Variations in Contemporary Fixed Prosthodontics Practice in Pakistan: A Cross-Sectional Study

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Abstract

Background: Fixed prosthodontics involve various techniques and materials for fabrication of prostheses. Understanding the current clinical practices and adherence to established protocols among dentists is essential for improving treatment outcomes. This study aimed to assess the knowledge and practice patterns of Pakistani dental practitioners about fixed prosthodontics.

Methods: A cross-sectional survey was conducted across Pakistan from June 2025 to July 2025. Using a convenience sampling technique, an online questionnaire was distributed via social media platforms and email, targeting an estimated 500 dentists. A final sample of 261 dentists was finalized using WHO sample size formula with confidence level of 95% and 5% margin of error. The questionnaire comprised two sections: demographic and personal data, and preferred materials, techniques, and clinical practices for fixed prosthodontic procedures. Data was analyzed using SPSS Version 27.0.1, with descriptive statistics and chi-square tests applied to evaluate associations between variables.

Results: Out of 500 targeted dentists, 261 responded (response rate: 52.20%). Study models were routinely obtained by 41.0% of practitioners, and 66.70% consistently used interocclusal records for multiple tooth preparations. Alginate (85.10%) and glass ionomer cement (69.70%) were the most frequently used impression and luting materials, respectively. Only 35.20% of respondents consistently disinfected impressions, and 55.90% provided both written and verbal instructions to dental technicians. High-speed handpieces (80.10%) and diamond burs (41.40%) were the instruments of choice, while depth-orientation grooves (54.80%) were the preferred technique of tooth preparation. The regular use of retraction cords and provision of interim restorations were reported by only 13.40% of participants.

Conclusion: Dentists across Pakistan generally report following recommended practice patterns in fixed prosthodontics; however, significant deviations from clinical protocols remain. Notably, the inconsistent use of impression disinfection, retraction cords, and interim restorations highlights areas for targeted continuing education and reinforcement of evidence-based guidelines to optimize patient care.

Keywords: Fixed prosthodontics, dental practice, clinical knowledge, Pakistan, practice patterns

Introduction

The main reasons of tooth loss are caries, periodontal diseases, orthodontic treatment and trauma, caries and periodontal pathology being the most common ones.¹ Loss of teeth has a psychological impact on an individual. People now a days seek dental treatment mainly because of esthetic concerns or for functional comfort.^{2,3} Failure to replace missing teeth leads to deranged occlusion which eventually affects the stomatognathic system. Fixed partial denture (FPDs) is one of the treatment modalities for replacing missing teeth.⁴ The replacement of missing teeth with fixed prosthesis is considered a superior prosthodontic option as compared to the removable ones.⁵ Fixed tooth-supported dental prosthesis also improves oral health-related quality of life.⁶ Most of the patients opt for FPDs instead of implants because of financial restraints or poor dental status.⁷ However, acceptability towards various treatment options for missing teeth mainly depend upon patient's education, cultural background, economy, and age.⁸

FPDs are widely practiced by prosthodontists and non-prosthodontists but it should be performed according to the

fundamental clinical guidelines for reliable results. If constructed properly, FPDs can work for longer periods. Proper diagnosis, treatment planning, selection of abutment teeth, preparation of abutment teeth and proper fabrication protocols should be followed for a good prognosis of an FPD.⁹ Several studies are available in literature on knowledge, attitude, and practice of fixed prosthodontics. Alhoumaidan *et al.* study concluded that the Qassim dental practitioners in Saudi Arabia displayed an acceptable level of knowledge of fixed prosthodontics practicing. However, deviation from standard protocols was also observed among practitioners.^{10,11} Another study conducted by Nagarsekar *et al.* found that food impaction is the common complaint among FPD patients and faulty design of an FPD is the major contributing factor for it.¹²

With increasing trend of FPDs being used as an alternative for replacing missing teeth, it becomes important to know the variations in practicing fixed prosthodontists. Furthermore, the question arises, are the protocols being followed in Pakistan up to the standard ones or not. There are limited studies available on this aspect. Hence the main aim of our study was to evaluate the variations of fixed prosthodontics being practiced by Pakistani practitioners and are those protocols in accordance with the standard ones or not.

Material and Methods

This cross-sectional survey was conducted across Pakistan from June 2025 to July 2025. Ethical approval was obtained from the Ethical Committee of Rehman College of Dentistry (RCD) Ref no: RCD-12-25-020, Peshawar. As the study participants were dentists (not patients), a formal written consent form was not required by the institutional ethics committee; however, voluntary participation was ensured, as the first page of the online Google Forms® questionnaire explained the study's purpose and confirmed

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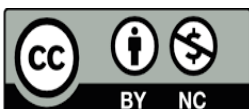
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that submission of responses constituted informed, voluntary online consent. Participants could withdraw or decline to complete the survey at any point before submission. A structured questionnaire was developed using Google Forms Inc®. Content and face validity were established by review from three senior consultants (specialists in Prosthodontics with over 10 years of clinical and academic experience), who independently rated each item for relevance and clarity; items rated as relevant by all three reviewers were retained, yielding a Content Validity Index (CVI) of 1.0 for the final item set. Minor wording revisions were made based on reviewer feedback to improve clarity before distribution. A convenient sampling technique was used. The survey link was shared via several social media platforms (WhatsApp, Instagram, and Facebook, LinkedIn) and through email, aiming to reach approximately 500 dental practitioners. The sample size was calculated using the WHO formula for cross-sectional studies, $n = Z^2P(1-P)/d^2$, where $Z = 1.96$ (corresponding to a 95% confidence level), $P = 0.50$ (assumed expected prevalence of adequate practice, used in the absence of local prevalence data), and $d = 0.05$ (5% absolute precision/margin of error). This yielded a minimum required sample of 384; however, due to resource and time constraints during data collection, 261 dentists were ultimately recruited, which is acknowledged as a limitation. The criteria for inclusion consists of the dentists practicing fixed prosthodontics in Pakistan, including both prosthodontists and non-prosthodontists. Dentists who had no experience with fixed prosthodontics were excluded from the study. Data was entered and analyzed on SPSS version 27.0.1. The study questionnaire was split into two sections. Section one covered the personal and demographic information while section two evaluated participants' preferred materials, techniques, and clinical practices related to fixed prosthodontics.

Descriptive statistics (frequencies and percentages) were used to summarize demographic variables and clinical practice patterns. Inferential statistics were applied to assess associations between variables; Chi-square test of independence was used to evaluate relationships between categorical variables such as gender, specialty, impression materials, bite registration materials, retraction cord use, and tooth preparation techniques. A p -value < 0.05 was considered statistically significant.

Results

A total of 261 dentists took part in the research out of which females represented 65.90% participants (Table-1). The largest group was postgraduate residents (57.10%), followed by house officers (20.30%), undergraduate students (9.60%), fresh graduates (7.30%), and consultants (5.70%). General dentists were the majority (54.80%), while prosthodontists and non-prosthodontic specialists accounted for 25.30% and 19.90%, respectively. Most participants worked in government hospitals (54.0%), followed by private hospitals (26.40%) and private practice (19.50%). Most respondents had 1–3 years of clinical experience (81.60%), while 15.30% had 4–10 years, 1.90% had 11–15 years, and 1.10% had more than 16 years of practice. Regarding clinical practice patterns (Table-2), 41.0% of dentists often obtained diagnostic casts prior to treatment, while 25.70% always did so. Comprehensive pretreatment evaluations, including radiographs, clinical examination, and medical/dental history, were performed by 85.80% of clinicians. Vitality testing of abutment teeth was routinely or often conducted by more than half of respondents.

High-speed handpieces were preferred by 80.10% of dentists, and diamond burs were most commonly used

(41.40%). Alginate was the predominant impression material (85.10%), with the putty-wash technique being the most frequently employed among those using elastomeric materials (66.70%). Interocclusal bite records were consistently obtained by 66.70% of respondents, whereas gingival retraction cords and provisional restorations were less frequently utilized, with only 13.40% always employing these methods. Glass ionomer cement was the luting

Table-1: Demographic Characteristics of Study Participants

Variable	Category	N	Percentage (%)
Gender	Male	89	34.10%
	Female	172	65.90%
Specialty	Prosthodontist	66	25.30%
	Non-prosthodontist	52	19.90%
	General dentist	143	54.80%
Years of Practice	1–3 years	213	81.60%
	4–10 years	40	15.30%
	11–15 years	05	1.90%
	>16 years	03	1.10%
Workplace	Government hospital	141	54.0%
	Private hospital	69	26.40%
	Private practice	51	19.50%

agent of choice for 69.70% of participants. Chemical disinfection of impressions was always performed by 35.20% of dentists, and communication with dental laboratories was most commonly carried out via a combination of written prescriptions and verbal instructions (55.90%).

In addition to the tabulated frequencies, graphical summaries were also generated to visually represent major trends in clinical practice. Figure-1 displays the distribution of impression materials and Figure- 2, illustrates the frequency of interocclusal bite record usage, whereas Figure-3 represents the pattern of retraction cord use among practitioners. These figures help highlight key variations in fixed prosthodontic procedures (FDPs).

In addition to the tabulated frequencies, graphical summaries were also generated to visually represent major trends in clinical practice. Figure-1 displays the distribution of impression materials and Figure- 2, illustrates the frequency of interocclusal bite record usage, whereas Figure-3 represents the pattern of retraction cord use among practitioners. These figures help highlight key variations in fixed prosthodontic procedures (FDPs).

Table – 5 reveals the crosstabulation between specialty and the frequency of interocclusal bite record use for multiple teeth placement. Among prosthodontists, 28.70% always used bite records, 15.30% often, 21.40% rarely, 37.50% never, and 16.70% reported “Don’t know.” Among non-prosthodontists, 16.10% always used bite records, 23.70% often, 35.70% rarely, 37.50% never, and 33.30% “Don’t know.” Among general dentists, 55.20% always used bite records, 61.0% often, 42.90% rarely, 25.0% never, and 50.0% “Don’t know.” A chi-square test of association indicated that the relationship between specialty and bite record usage was not statistically significant ($\chi^2(8) = 11.25, p = 0.188$).

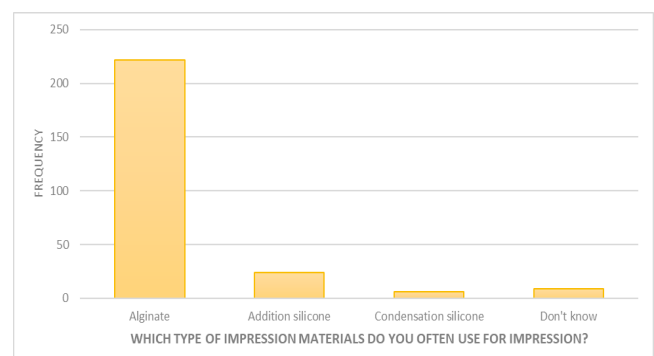
Table-6 depicts the crosstabulation between specialty and the provision of temporary (provisional) prosthesis after finishing the procedure. Among prosthodontists, 13.60%

Table – 2: Distribution of Clinical Practice Variables in Fixed Partial Denture (FPD) Practice.

Variable	Category	Frequency (N)	Percentage (%)
Diagnostic Cast	Always	67	25.70%
	Often	107	41.0%
	Rarely	64	24.50%
	Never	23	8.80%
Impression Material	Alginate	222	85.10%
	Addition silicone	24	9.20%
	Condensation silicone	6	2.30%
	Don't know	9	3.40%
Interocclusal Bite Record	Always	174	66.70%
	Often	59	22.60%
	Rare	14	5.40%
	Never	8	3.10%
Retraction Cord	Always	35	13.40%
	Often	71	27.20%
	Rare	82	31.40%
	Never	73	28.0%
Provision of Provisional Prosthesis	Always	35	13.40%
	Often	67	25.70%
	Rare	94	36.0%
	Never	65	24.90%
Disinfection of Impression	Always	92	35.20%
	Often	56	21.50%
	Rare	62	23.80%
	Never	51	19.50%
Elective Root Canal Referral	Cases with insufficient clearance & symptoms	160	61.30%
	Based on symptoms only	72	27.60%
	All cases	16	6.10%
	Insufficient clearance only	13	5.0%
Patient Assessment Method	Combination of X-ray, clinical evaluation, and history	224	85.80%
	Clinical evaluation only	26	10.0%
	X-ray only	10	3.80%
	History only	1	0.40%
Vitality Testing	Always	84	32.20%
	Often	66	25.30%
	Rarely	67	25.70%
	Never	44	16.90%
Handpiece Type	High-speed	209	80.10%
	Low-speed	51	19.50%
	Both	1	0.40%
Type of Burs	Diamond	108	41.40%
	Carbide	35	13.40%
	Both	103	39.50%
	Don't know	15	5.70%

Impression Material	Alginate	222	85.10%
	Addition silicone	24	9.20%
	Condensation silicone	6	2.30%
	Don't know	9	3.40%
Elastomeric Impression Technique	Putty and wash	26	66.70%
	Single step	5	12.80%
	Monophase	2	5.10%
	Don't know	6	15.40%
Tooth Preparation Method	Depth-orientation grooves	143	54.80%
	Minimal reduction	118	45.20%
Luting Cement	Glass ionomer cement	182	69.70%
	Zinc oxide eugenol	11	4.20%
	Resin-modified GIC	1	0.40%
	Glass ionomer + resin-modified GIC	51	19.50%
	Glass ionomer + resin cement	7	2.70%
	Don't know	9	3.40%
Factors Affecting Retention	Proper tooth preparation	175	67.0%
	Accuracy in lab work	28	10.70%
	Cement	19	7.30%
	Quality of impression	18	6.90%
	All of above	21	8.0%
Communication with Lab	Both written + verbal	146	55.90%
	Verbal only	80	30.70%
	Written only	35	13.40%

always provided a temporary prosthesis, 22.70% often, 43.90% rarely, and 19.70% never. Among non-prosthodontists, 13.50% always, 23.10% often, 34.60% rarely, and 28.80% never provided a temporary prosthesis. Among general dentists, 13.30% always, 28.0% often, 32.90% rarely, and 25.90% never provided a temporary prosthesis. A chi-square test indicated that the relationship between specialty and provision of temporary prosthesis

**Figure –1: Distribution of Impression Materials Used by Dentists**

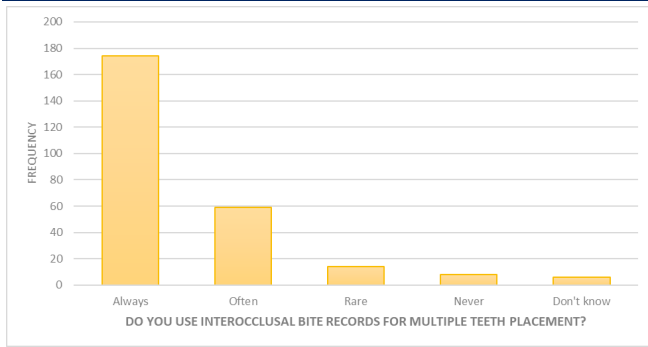


Figure – 2: Frequency of Using Interocclusal Bite Record

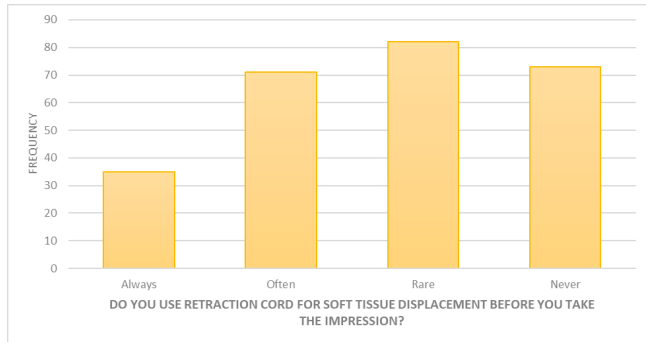


Figure – 3: Frequency of Retraction Cord Usage

Table-3: Crosstabulation and Chi-Square Test Between Specialty and Type of Impression Material Used.

Specialty	Alginate (%)	Addition Silicone (%)	Condensation Silicone (%)	Don't Know (%)	Total
Prosthodontist	56 (84.80%)	4 (6.10%)	1 (1.50%)	5 (7.60%)	66
Non-Prosthodontist	46 (88.50%)	4 (7.70%)	2 (3.80%)	0 (0%)	52
General dentist	120 (83.90%)	16 (11.20%)	3 (2.10%)	4 (2.80%)	143
Total	222	24	6	9	261

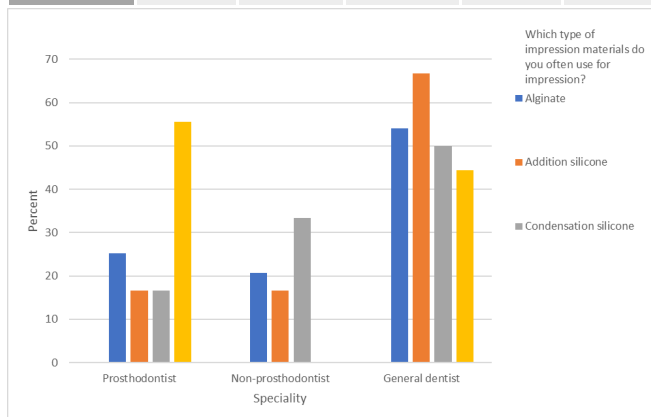


Figure-4: Association Between Specialty and Preferred Impression Materials.

was non-significant ($\chi^2(6) = 3.33, p = 0.767$). Therefore, the use of temporary prosthesis did not differ significantly across prosthodontists, non-prosthodontists, and general dentists.

Table – 4: Crosstabulation Between Specialty and Frequency of Retraction Cord Usage

Specialty	Always N (%)	Often N (%)	Rare N (%)	Never N (%)	Total
Prosthodontist	14 (21.20%)	19 (28.80%)	19 (28.80%)	14 (21.20%)	66
Non-prosthodontist	5 (9.60%)	16 (30.80%)	14 (26.90%)	17 (32.70%)	52
General dentist	16 (11.20%)	36 (25.20%)	49 (34.30%)	42 (29.40%)	143
Total	35	71	82	73	261

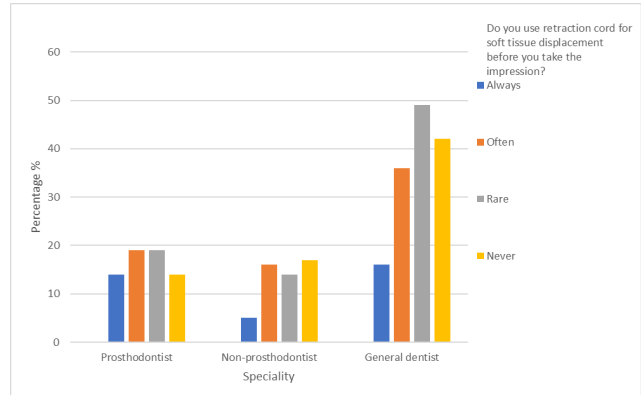


Figure –5: Association Between Specialty and Use of Retraction Cord

Table-7 represents the crosstabulation between years of practice and the frequency of chemically disinfecting impressions after removal from the patient's mouth. Among participants with 1–3 years of practice, 36.60% always disinfected impressions, 21.60% often, 21.10% rarely, and 20.70% never. Among those with 4–10 years of practice, 30.0% always disinfected, 17.50% often, 35.0% rarely, and 17.50% never. Among participants with 11–15 years of practice, 20.0% always disinfected, 60.0% often, 20.0% rarely, and 0.0% never. Among those with more than 16 years of practice, 33.30% always disinfected, 0.0% often, 66.70% rarely, and 0.0% never. A chi-square test indicated that the relationship between years of practice and impression disinfection was not statistically significant ($\chi^2(9) = 12.05, p = 0.211$). Therefore, the frequency of chemical disinfection of impressions did not differ significantly across different years of practice.

Table 8 shows the crosstabulation between workplace and communication method with dental laboratory technicians. Among participants working in government hospitals, 31.90% used verbal communication, 14.20% used written prescriptions, and 53.90% used both. Among participants in private hospitals, 34.8% used verbal communication, 13.0% used written prescriptions, and 52.20% used both. Among those in private practice, 21.60% used verbal communication, 11.80% used written prescriptions, and 66.70% used both. A chi-square test indicated that the relationship between workplace and communication method was non-significant ($\chi^2(4) = 3.33, p = 0.504$). Therefore, the choice of communication method did not differ significantly across government hospitals, private hospitals, and private practices.

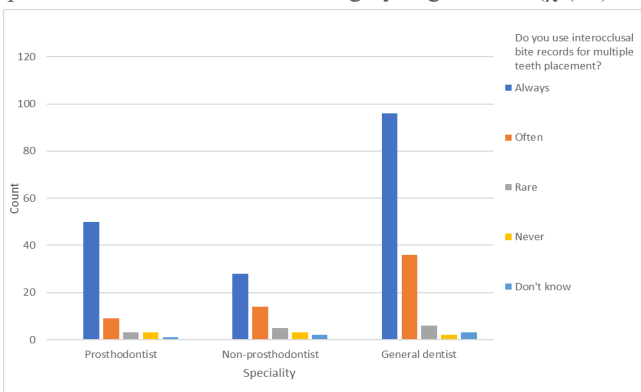
Table-9 depicts the crosstabulation between gender and the frequency of diagnostic cast use. Among male participants, 37.10% often used diagnostic casts, 18.0% always, 31.50% rarely, and 13.50% never. Among female participants, 43.0% often used diagnostic casts, 29.70% always, 20.90% rarely, and 6.40% never. A chi-square test indicat-

Table – 5: Crosstabulation Between Specialty and Use of Interocclusal Bite Records

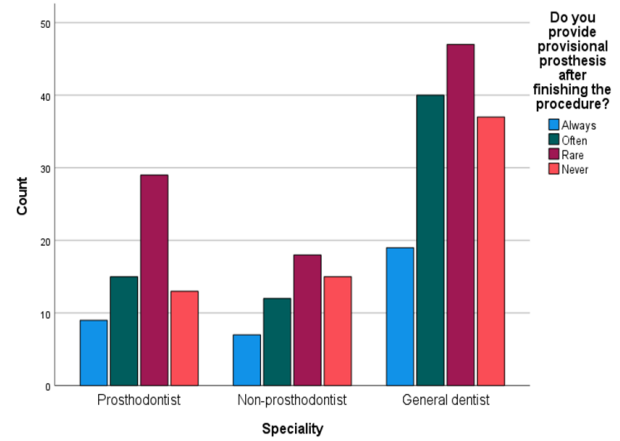
Specialty	Always N (%)	Often N (%)	Rare N (%)	Never N (%)	Don't Know N (%)	Total
Prosthodontist	50 (28.70 %)	9 (15.30 %)	3 (21.40 %)	3 (37.50 %)	1 (16.70 %)	66
Non-prosthodontist	28 (16.10 %)	14 (23.70 %)	5 (35.70 %)	3 (37.50 %)	2 (33.30 %)	52
General dentist	96 (55.20 %)	36 (61.0%)	6 (42.90 %)	2 (25.0 %)	3 (50.0%)	143
Total	174 (100%)	59 (100%)	14 (100%)	8 (100 %)	6 (100%)	261

ed that the relationship between gender and diagnostic cast use was statistically significant ($\chi^2(3) = 9.62, p = 0.022$). This suggests that diagnostic cast usage differs between male and female participants, with females more frequently using diagnostic casts always or often compared to males.

Table–10 shows the crosstabulation between province and the type of impression material most often used. In KPK, 90.0% of participants used alginate, 5.80% used addition silicone, 2.10% used condensation silicone, and 2.10% were unsure. In Punjab, 78.40% used alginate, 16.20% addition silicone, 5.40% condensation silicone, and none were unsure. In Sindh, 40.0% used alginate, 20.0% addition silicone, none used condensation silicone, and 40.0% were unsure. In Baluchistan, the only participant (100.0%) used alginate. In the Federal Territory, 73.90% used alginate, 21.70% addition silicone, none used condensation silicone, and 4.30% were unsure. A chi-square test indicated that the relationship between province and type of impression material used was highly significant ($\chi^2(12) =$

**Figure – 6: Association Between Specialty and Use of Interocclusal Bite Records****Table – 6: Crosstabulation Between Specialty and Provision of Temporary Prosthesis**

Specialty	Always N (%)	Often N (%)	Rare N (%)	Never N (%)	Total
rosthodontist	9 (13.60 %)	15 (22.70%)	29 (43.90%)	13 (19.70%)	66
Non-prosthodontist	7 (13.50 %)	12 (23.10%)	18 (34.60%)	15 (28.80%)	52
General dentist	19 (13.30 %)	40 (28.0%)	47 (32.90%)	37 (25.90%)	143
Total	35 (13.40 %)	67 (25.70%)	94 (36.0%)	65 (24.90%)	261

**Figure – 7: Association Between Specialty and Provision of Temporary Prosthesis****Table–7: Crosstabulation Between Years of Practice and Chemical Disinfection of Impressions**

Years of Practice	Always N (%)	Often N (%)	Rare N (%)	Never N (%)	Total
1–3 years	78 (36.60%)	46 (21.60%)	45 (21.10%)	44 (20.70%)	213
4–10 years	12 (30.0%)	7 (17.50%)	14 (35.0%)	7 (17.50%)	40
11–15 years	1 (20.0%)	3 (60.0%)	1 (20.0%)	0 (0.0%)	5
More than 16 years	1 (33.30%)	0 (0.0%)	2 (66.70%)	0 (0.0%)	3
Total	92 (35.20%)	56 (21.50%)	62 (23.80%)	51 (19.50%)	261

56.64, $p < 0.001$). This suggests that the choice of impression material differs significantly across provinces, with alginate being the predominant material overall, but variation exists in the use of addition silicone and uncertainty in some regions.

Table–11 gives the crosstabulation between level of education and communication method with dental laboratory technicians. Among undergraduates, 36.0% used verbal communication, 20.0% used written prescriptions, and 44.0% used both. Among postgraduates, 30.20% used verbal communication, 14.80% used written prescriptions, and 55.0% used both. Among house officers, 32.10% used verbal communication, 7.50% used written prescriptions, and 60.40% used both. Among consultants, 20.0% used verbal communication, 6.70% used written prescriptions, and 73.30% used both. Among fresh graduates, 31.60% used verbal communication, 15.80% used written prescriptions, and 52.60% used both. A chi-square test indicated that the relationship between education level and communication method was non-significant ($\chi^2(8) = 5.49, p = 0.704$). Therefore, the choice of communication method did not differ significantly across different education levels.

Table–12 presents the crosstabulation between gender and the method of tooth preparation. Among male participants, 53.90% used the method involving depth orientation grooves placement followed by occlusal, labial, lingual, and proximal reductions, while 46.10% used minimal buccal, proximal, and lingual reduction

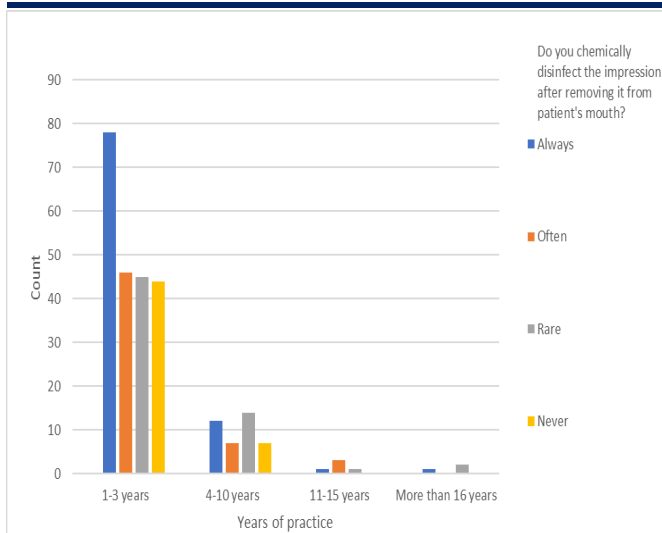


Figure – 8: Association Between Years of Practice and Chemical Disinfection of Impressions

with adequate occlusal clearance. Among female participants, 55.20% used the depth orientation method, and 44.80% used the minimal reduction method. A chi-square test indicated that the relationship between gender and tooth preparation method was statistically not significant ($\chi^2(1) = 0.04, p = 0.841$). Therefore, the choice of tooth preparation technique did not differ significantly between male and female participants.

Discussion

Complete edentulousness is more prevalent in older age groups (60–70 years), while partial edentulousness is more common among younger adults.¹³ Prosthodontic rehabilitation is crucial for restoring function, esthetics, and patient confidence.^{14,15} This study assessed practitioners prefer-

Table 8: Crosstabulation Between Workplace and Communication Method

Workplace	Verbal Communication (%)	Written Prescription (%)	Both (%)	Total
Government hospital	45 (31.90%)	20 (14.20%)	76 (53.90%)	141
Private hospital	24 (34.80%)	9 (13.0%)	36 (52.20%)	69
Private practice	11 (21.60%)	6 (11.80%)	34 (66.70%)	51
Total	80 (30.70%)	35 (13.40%)	146 (55.90%)	261

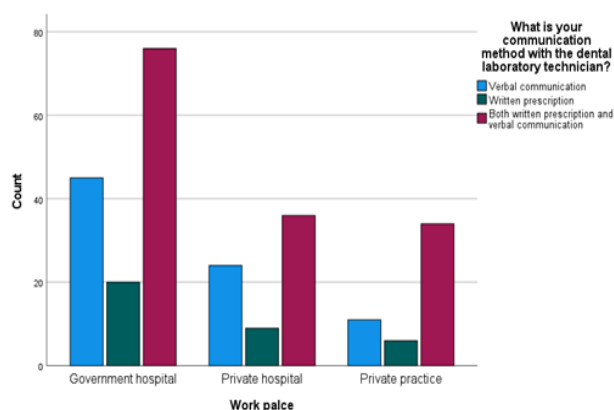


Figure – 9: Association Between Workplace and Communication Method With Dental Laboratory Technicians

Table 9: Crosstabulation Between Gender and Diagnostic Cast Use

Gender	Often (%)	Always (%)	Rarely (%)	Never (%)	Total
Male	33 (37.10%)	16 (18.0%)	28 (31.50%)	12 (13.50%)	89
Female	74	51	36	11	172
Total	107	67	64	23	261

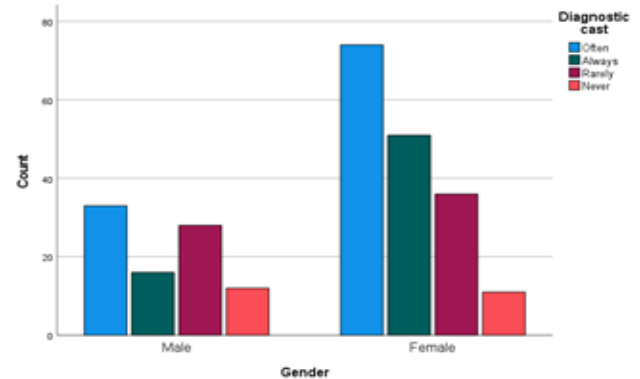


Figure 10: Association Between Gender and Use of Diagnostic Casts

Table 10: Crosstabulation Between Province and Type of Impression Material Used

Province	Alginate (%)	Addition Silicone (%)	Condensation Silicone (%)	Don't Know (%)	Total
KPK	171 (90.0%)	11 (5.80%)	4 (2.10%)	4 (2.10%)	190
Punjab	29 (78.40%)	6 (16.20%)	2 (5.40%)	0 (0.0%)	37
Sindh	4 (40.0%)	2 (20.0%)	0 (0.0%)	4 (40.0%)	10
Baluchistan	1 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1
Federal Territory	17 (73.90%)	5 (21.70%)	0 (0.0%)	1 (4.30%)	23
Total	222 (85.10%)	24 (9.20%)	6 (2.30%)	9 (3.40%)	261

Table 11: Crosstabulation Between Education Level and Communication Method

Level of Education	Verbal Communication (%)	Written Prescription (%)	Both (%)	Total
Undergraduate	9 (36.0%)	5 (20.0%)	11 (44.0%)	25
Postgraduate	45 (30.20%)	22 (14.80%)	82 (55.0%)	149
House officer	17 (32.10%)	4 (7.50%)	32 (60.40%)	53
Consultant	3 (20.0%)	1 (6.70%)	11 (73.30%)	15
Fresh graduate	6 (31.60%)	3 (15.80%)	10 (52.60%)	19
Total	80 (30.70%)	35 (13.40%)	146 (55.90%)	261

ences regarding FPDs practice. A total of 261 dentists participated, comprising 25.30% prosthodontists, 19.90% non-prosthodontists, and 54.80% general dentists. Most respondents were male (60.50%), and 61.30% had less than five years of clinical experience, reflecting a younger workforce with variable exposure to advanced prosthodontic techniques. Diagnostic casts provide a detailed

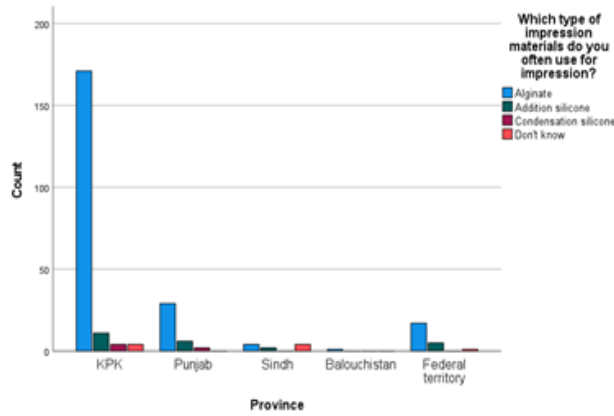


Figure 11: Association Between Province and Type of

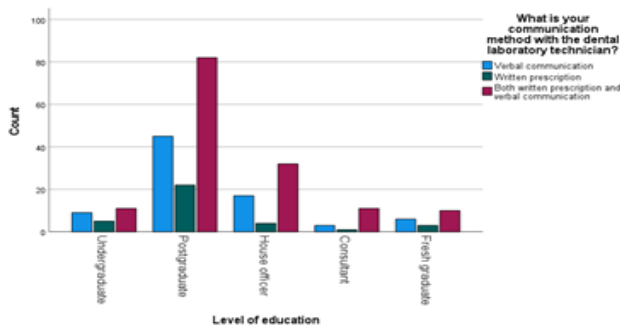


Figure12: Association Between Education Level and Communication Method With Dental Laboratory Technicians

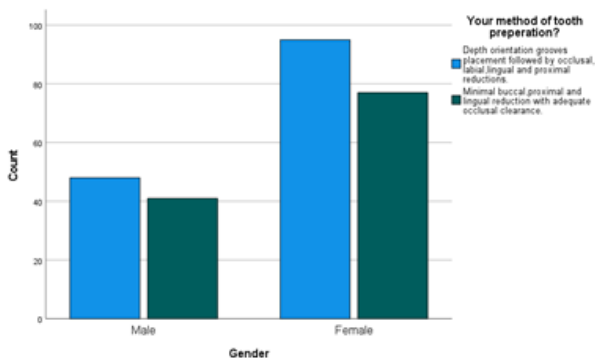


Figure 13: Association Between Gender and Tooth Preparation Method

model for treatment planning and prosthesis fabrication.^{16,17} It also provides understanding of biomechanical inter-relationship between prosthesis and surrounding structures which eventually helps in proper treatment.¹⁸ In our study, ²⁵.70% of dentists always fabricated diagnostic casts, while 41.0% did so often. Inferential analysis (Table –9) indicated a significant association between gender and diagnostic cast usage ($p = 0.022$), with females more consistent in cast fabrication. This aligns with Talabani et al., who reported higher compliance among female practitioners regarding pre-prosthetic evaluations.¹⁹ Comprehensive pretreatment evaluation—including radiographs, medical/dental history, and clinical examination—was routinely performed by 85.80% of participants. Vitality testing of abutment teeth was carried out by 57.50% of dentists. These findings highlight moderate adherence to recommended protocols.

Accurate abutment selection and proper tooth preparation are critical for long-term success of FPDs.²⁰ Elective

Table 12:Crosstabulation Between Gender and Tooth Preparation Method

Gender	Depth Orientation Method (%)	Minimal Reduction Method (%)	Total
Male	48 (53.90%)	41 (46.10%)	89
Female	95 (55.20%)	77 (44.80%)	172
Total	143 (54.80%)	118 (45.20%)	261

RCTs are usually indicated in cases with insufficient clearance or in teeth with deep restorations that might irritate the pulp.²¹ The majority (61.30%) referred patients for elective root canal treatment in teeth with insufficient clearance or clinical symptoms. Depth orientation grooves if practiced properly aids in guiding precise amount of tooth reduction.^{22,23} Depth-orientation grooves were used by 54.80% of participants to guide preparation. No significant association was observed between gender and tooth preparation method ($p = 0.842$, Table–12), suggesting consistent preparation techniques between male and female practitioners. High-speed handpieces and diamond burs were the most commonly used instruments, consistent with previous studies.^{10,24} who emphasized their precision and efficiency.¹⁰

Alginate was the most widely used impression material (85.10%) in our study, despite its limited dimensional stability.^{25,26} Putty-wash was the preferred technique among elastomeric users (66.70%). Province showed a significant association with type of impression material used ($p < 0.001$, Table–10), indicating regional variations in material preference. This mirrors results from Maru K et al., who noted similar geographic differences in impression practices.²⁷

Accurate interocclusal records can avoid need for extensive intraoral adjustments.²⁸ However, poor interocclusal records can result in occlusal discrepancies in permanent restorations.²⁸ Plaster, wax, ZOE paste, polyether, polyvinyl siloxane, and auto polymerizing acrylic resin are usually used for this purpose.²⁹ Maru K *et al.*, in their study showed that (79.0%) of the participants use interocclusal recording materials for the fabrication of crowns and bridge works.²⁷ Wax (55.0%) was the most commonly used material.²⁷ 66.70% of our respondents used interocclusal records for multiple teeth placement.

Provisional restorations protect prepared teeth, maintain occlusion, and prevent bacterial contamination.³⁰ Only 13.40% of participants always provided provisional prostheses. Specialty was not significantly associated with provisional restoration usage ($p = 0.767$, Table–6), suggesting gaps in practice are not specialty-dependent. These results echo findings by Sedky et al., highlighting the need for better emphasis on interim restorations in clinical training.³¹

Proper gingival management is essential for accurate impressions.^{32,33} through different means can help in achieving adequate isolation and precise recording of teeth, finish line and surrounding structures.³⁴ Only 13.40% consistently used retraction cords. Specialty did not significantly influence retraction cord usage ($p = 0.317$, Table–4), showing similar trends among prosthodontists and general dentists. This underlines a common practice gap observed in several international surveys.

Appropriate selection of luting agent and successful luting is critical for retention of restoration. It also increases the fracture resistance of tooth and the restoration and reduces microleakage. Choice of luting agent should be

Table- 13: Summary of Inferential Analysis (Chi-Square Tests)

Variable / Practice	Association Tested	p-value	Significance	Notes / Comparison with Literature
Impression material choice	Specialty	0.276	Not significant	Material preference fairly consistent across specialties; matches Table-3.
Retraction cord usage	Specialty	0.317	Not significant	Similar trends across specialties; international surveys report common gaps. Matches Table-4.
Interocclusal bite record use	Specialty	0.188	Not significant	Consistent use across specialties; matches Table-5.
Provisional (temporary) restorations	Specialty	0.767	Not significant	Gap in practice not specialty-dependent. Sedky et al. reported similar trends. Matches Table-6.
Impression chemical disinfection	Years of practice	0.211	Not significant	Moderate compliance regardless of experience; consistent with global trends. Matches Table-7.
Dentist-laboratory communication method	Workplace	0.504	Not significant	Communication approach fairly uniform across practice settings. Matches Table-8.
Diagnostic cast fabrication	Gender	0.022	Significant	Females more consistent. Similar to Talabani et al. Matches Table-9.
Impression material choice	Province	<0.001	Significant	Regional variation; mirrors Maru K et al. Matches Table-10.
Dentist-laboratory communication method	Level of education	0.704	Not significant	Communication approach fairly uniform across training levels. Matches Table-11.
Tooth preparation method	Gender	0.842	Not significant	Consistent preparation technique between male and female practitioners. Matches Table-12.

made after critical evaluation of biological, chemical, and mechanical properties of luting agent.^{35,36} Glass ionomer cement was the most frequently used luting agent (69.70%). Resin-based cements were less common, despite higher fracture resistance. These trends align with Gresnigt et al., emphasizing that material choice often reflects habit rather than evidence-based preferences.³⁷

Effective dentist-technician communication is crucial for prosthesis accuracy.³⁸ No significant association was found between workplace and communication method used ($p = 0.504$, Table-8), or between level of education and communication method ($p = 0.704$, Table-11), suggesting that the choice of verbal, written, or combined communication is fairly uniform across practice settings and training levels in this sample. This finding adds context to Tulbah et al., who emphasized the role of structured communication in minimizing fabrication errors.³⁹

Chemical disinfection of impressions is a critical infection-control measure.⁴⁰ Only 35.20% of dentists always disinfected impressions. Nabila A Sedky, in her survey concluded that there was a moderate communication between dental laboratory technicians and prosthodontists regarding disinfection of impressions, 50.0% of prosthodontists in her study weren't sure that technicians disinfect impressions before pouring.³¹ No significant association was found between years of practice and disinfection protocol adherence ($p = 0.211$, Table-7). Moderate compliance with infection-control protocols has been observed globally, emphasizing the need for continuous professional training. This study has several limitations that should be considered when interpreting the findings. First, participants were recruited using a convenience sampling technique through social media platforms and email, which introduces a substantial risk of selection bias; respondents were largely self-selected, and the sample is unlikely to be representative of all practicing dentists in Pakistan. National-level conclusions should therefore be drawn with caution. Second, provincial representation was highly unequal, with nearly 73% of respondents (190 of 261) based in Khyber Pakhtunkhwa (KPK), while provinces such as Baluchistan contributed as few as one respondent; several cross-tabulations (e.g., province, and years of practice greater than 16 years, $n = 3$) therefore included cells with very low expected frequencies, which may vio-

late chi-square test assumptions and reduce the reliability of those specific associations. Third, all data were based on self-reported practices rather than objectively observed clinical behaviour or tested knowledge, making the findings susceptible to recall bias and social desirability bias, whereby participants may over-report adherence to recommended protocols. Finally, as this was a cross-sectional survey conducted at a single time point, causal relationships between practitioner characteristics and clinical practice patterns cannot be inferred. Future studies would benefit from random or stratified sampling across provinces, validated knowledge-assessment tools, and longitudinal or observational designs to corroborate self-reported findings. This study suggests strengthening dental curriculum with better training in tooth preparation, soft tissue management use of elastomeric impression materials, digital impressions and interim restorations. Clinicians should take regular workshops to enhance their clinical and communication skills. Improved verbal and written communication with the laboratory should be emphasized. Further research, including more diverse samples across the country, should assess barriers to adopting the recommended practices.

Conclusion

It can be concluded that FPDs are widely practiced in Pakistan by prosthodontists, non-prosthodontists, and general dentists. Based on self-reported practice patterns, several variations were found in the provision of crowns and bridges; however, a considerable proportion of practitioners did not consistently adhere to recommended clinical protocols, including inconsistent use of vitality testing, temporary restorations, retraction cords, and elastomeric impression techniques, indicating a divergence between evidence-based standards and daily practice. As this study assessed self-reported practices only and did not include an objective knowledge assessment, these findings should be interpreted as a reflection of reported clinical behaviour rather than practitioners' underlying knowledge. The heavy reliance on alginate impressions further highlights the need for improved clinical precision, particularly among non-prosthodontists, who accounted for a large share of these deviations. Emphasis should be given to translating evidence-based knowledge from the literature into routine clinical practice. Furthermore, practitioners should remain

aware of advances in this field in the best interest of their patients.

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Author Contributions

1. **Maheen Khan:** Data collection and manuscript writing.
2. **Haseeb Jamil:** Data collection and statistical analysis.
3. **Mohammad Tayyab:** Ahmad: Manuscript review and statistical analysis using SPSS.
4. **Sumbul Mukhtar:** Data collection.
5. **Asif Ullah Khan:** Article review.
6. **Nida Sajjad:** Data collection.