Postgraduate Training in Prosthodontics: Residents' and Supervisors' Perspectives on Current Training: A Cross-Sectional Study

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ABSTRACT

Objective: To identify postgraduate (PG) prosthodontic trainees' and supervisors' introspective views regarding prosthodontic education and clinical training.

Study Design: Cross-sectional survey.

Place and Duration of the Study: The Aga Khan University Hospital, Karachi, from May to October 2021.

Methodology: Data regarding the trainee induction process, teaching and learning practices, research interests, frequency of assessment, and trainees' satisfaction levels with the adequacy of didactic and clinical training in their centres were collected from Prosthodontic PG trainees and supervisors in Pakistan using REDCap software and analysed using SPSS 23.0. Frequencies of the observed responses from both populations were reported, and associations among private and public training centres were studied with Chi-square (or Fisher's exact). Differences in satisfaction levels across theoretical and clinical training domains were assessed with Mann-Whitney U test.

Results: Out of 17 supervisors and 104 PG trainees, 30% reported having a supervisory board in their institute. Most participants had entry tests conducted in their centres. The interference of influential sources during trainee induction was reported by 88.2% of the supervisors, while 66.7% trainees expressed the need for such influence to acquire training. Simulation-based teaching was available to 43.2% of trainees, 83% expressed interest in publishing research and 85% in publishing cases. Trainees were overall satisfied with their didactic and clinical training, whereas their satisfaction level was found neutral with theory and clinical training in maxillofacial-prosthodontics and clinical training of occlusion and temporomandibular disorders.

Conclusion: The results emphasise the need for regulation and monitoring of the trainee induction process, quality of training, and frequent assessments in the prosthodontics postgraduate training programmes across Pakistan.

Key Words: *Prosthodontics, Programme evaluation, Graduate dental education, Postgraduate dental education, Postgraduate medical education.*

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INTRODUCTION

Prosthodontics has a rich history related to the principles embedded in evidence-based healthcare.[1] Postgraduate (PG) training in Prosthodontics remains integral to the dental curriculum.[2] Competency-based student evaluation enhances dental education, emphasising precise clinical skill development.[3] Thus, proper training and dexterity are essential for trainees, with dental programmes needing to update clinical components to match technical advancements and evolving the population needs. It has been reported that prosthodontics residents significantly contribute to improving the quality of their residency programmes.[1]

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By understanding PG trainees' perceptions of their training and future goals, the faculty and other stakeholders (including the residents, programme management, dental societies, and regulatory authorities) can collectively enhance clinical training and the speciality.[4]

Recruitment and mentoring of top students have been the focus of many prosthodontic organisations.[5] The postgraduate training programme admission process may be complex for candidates. Some prioritise clinical education and mentorship,[6] while others focus on the programme's reputation and clinical resources.[7] Therefore, all stakeholders must ensure merit-based trainee selection.

Limited publications address postgraduate training in prosthodontics, with most studies focusing on the predoctoral level.[8] There exists a paucity of evidence on the perspectives of prosthodontic residents, supervisors, and programme directors regarding postgraduate training in Pakistan. Findings from such surveys may impose important implications for prosthodontics postgraduate training and lay the foundation for future studies.

Therefore, this survey aimed to identify current prosthodontic residents' demographics and perspectives on their clinical training while also aiming to evaluate the introspective view of the current state of prosthodontic education according to supervisors and postgraduate trainees.

METHODOLOGY

Approval for this cross-sectional survey was obtained on 4th May 2021 from the Institutional Ethical Review Board (ERC# 2021-6073-17729). The list of active supervisors and postgraduate trainees involved in prosthodontic training programmes was obtained from the records of the Pakistan Prosthodontist Association (PPA) and College of Physicians and Surgeons of Pakistan (CPSP) registered till May 2021. A total population sampling was employed to arrive at a tentative sample of 200 participants. The survey included prosthodontics postgraduate trainees and supervisors and excluded undergraduate dental students, dental hygienists, supervisors, or PG trainees in dental specialities other than Prosthodontics.

The authors used two validated questionnaires[8,9] one intended for postgraduate trainees and another for supervisors and / or programme directors, and used REDCap (Research Electronic Data Capture; 11.0.3; by Vanderbilt University) software for data collection. The questionnaires were then distributed among the potential participants through email and the social media platform WhatsApp. The data collection was carried out between May and October 2021, which included demographic details on the trainee-induction process, teaching and learning practices, assessment frequency in participants' training programmes, and interests in research activities. Trainees rated their satisfaction with theoretical and clinical core training using a five-point Likert-type scale ranging from very unsatisfied (coded as 1) to very satisfied (coded as 5).

Data were analysed with SPSS version 23.0. The normality of the data was assessed with the Shapiro-Wilk's test. Means and standard deviation, or medians and interquartile ranges (IQR), were calculated for normally and non-normally distributed data, respectively. The quantitative data were calculated for age, participants' graduation year from dental school, supervisors' years of experience, the number of trainees enrolled in each programme, and the monthly stipend trainees received. Responses from private- and public-sector trainees were tested with independent t-test (or Mann-Whitney U test). Categorical data were summarised as numbers and percentages, while the differences and associations between the observed frequencies of responses received from respondents of both private and public sectors were studied with Chi-square (or Fisher's exact). Trainee satisfaction with theoretical and clinical training, recorded on a five-point Likert-type scale, was analysed with the Mann-Whitney U test. A p-value of ≤ 0.05 was considered statistically significant for the difference in responses.

RESULTS

Seventeen supervisors and 104 PG trainees, participated in this survey from all provinces of Pakistan except Gilgit Baltistan (GB) and Azad Jammu and Kashmir (AJK). Excluding eight incomplete forms, data were evaluated for 96 PG trainees with a female predominance (67.7%) and preponderantly enrolled in FCPS programmes (85.3%). Eighty-two per cent of the participating supervisors were accredited for FCPS residency training with 6 ± 4.52 years of experience.

Private-sector institute supervisors reported having 11 (IQR; 9), whereas public-sector supervisors reported 25 (IQR; 7) prosthodontic trainees enrolled in their centres. However, PG trainees reported enrolment of a maximum of 50 trainees (IQR; 11) in the private and 48 trainees (IQR; 27) in the public sector (Table I).

The existence of a supervisory board in their centres was reported by 30% of participants (Table II). According to 76.5% of supervisors and 82.3% of trainees, residency induction tests were commonly conducted in their programmes. Only four supervisors, all from the public sector acknowledged giving weightage to gender (preferring the same gender) in selecting trainees. Among the supervisors reporting external interferences from influential sources during trainee inductions, 73.3% lacked a PGME-like regulatory body in their institutes. In comparison, 26.6% of supervisors reported such references for trainee recruitment despite having an established regulatory body in their institutes. Sixty-six per cent ($n = 64$) of PG trainees confirmed the need for the involvement of such resourceful individuals for induction into their training programmes (Table II).

Eighty-two percent of the supervisors allowed private clinic practice to their trainees. More private-sector PG trainees reported being allowed private practice during training (p-value ≤ 0.05). Ninety-two per cent of private-sector trainees, while 84.7% of the public-sector trainees received stipends. Public-sector trainees reported a higher average monthly stipend ($p < 0.05$) compared to private-sector trainees (Table II).

Forty per cent of trainees and 64.7% of supervisors, reported having a formative assessment in their centres, with a greater non-specific or annual frequency. A secondary research project was made compulsory for trainees by 29.4% of supervisors, whereas 83.2% of trainees expressed interest in publishing research in peer-reviewed journals, and 85.3% in publishing clinical cases (Table II).

Prosthodontics learners in this study's sample were largely satisfied with both didactic and clinical training in their centres (Table III). Private-sector trainees showed statistically significantly higher satisfaction ($p < 0.05$) with theoretical training in maxillofacial-prosthodontics, dental materials, and laboratory exercises. Public-sector trainees were dissatisfied with dental implant clinical training, while private-sector trainees were neutral regarding this aspect. The trainees in both sectors felt neutral regarding clinical training in maxillofacial-prosthodontics, occlusion, and temporomandibular disorders (TMD) (Table III)

Table I: Descriptive characteristics of the study population.

	Supervisors				Postgraduate trainees			
	Total	Private sector	Public sector	p-value	Total	Private sector	Public sector	p-value
	n (%)	n (%)	n (%)		n (%)	n (%)	n (%)	
No. of respondents	17 (100)	4 (23.5)	13 (76.5)		96 (100)	37 (38.5)	59 (61.5 %)	
Age (in years)	42.65 (± 5.905)[a]	39.5 (± 8.813)[a]	43.62 (± 4.770)[a]	0.234[§]	29 (3)[b]	29 (3)[b]	29 (4)[b]	0.617[¶]
Gender								
Males	14 (82.4)	4 (100)	10 (76.9)	0.541[‡]	31 (32.3)	13 (35.1)	18 (30.5)	0.804[†]
Females	3 (17.6)	0	3 (23.1)		65 (67.7)	24 (64.9)	41 (69.5)	
Type of postgraduate training programme								
MSc (1 year)	0	0	0		3 (3.2)	1 (1.1)	2 (2.1)	>0.99[‡]
MSc (2 years)	3	1 (25)	2 (15.3)	>0.99[‡]	6 (6.3)	2 (2.1)	4 (4.2)	
MDS (4 years)	2	0	2 (15.3)	>0.99[‡]	5 (5.3)	2 (2.1)	3 (3.2)	
FCPS	14	3 (75)	12 (92.3)	0.121[‡]	81 (85.3)	32 (33.7)	49 (51.6) m = 1	
Marital Status								
Single	1 (5.9)	0	1 (7.7)	>0.99[‡]	30 (31.3)	11 (29.7)	19 (32.2)	0.569[‡]
Engaged	0	0	0		9 (9.4)	5 (13.5)	4 (6.8)	
Married	15 (88.2)	4 (100)	11 (84.6)		55 (57.3)	21 (56.8)	34 (57.6)	
Divorced	1 (5.9)	0	1 (7.7)		2 (2.1)	0	2 (3.4)	
Province of residence								
Sindh	4 (23.5)	1 (25)	3 (23.1)	>0.99[‡]	38 (40)	15 (40.5)	23 (39.7)	<0.001[‡] (0.024 for Punjab with KP and Sindh, and <0.001 for KP with Sindh)
Punjab	7 (41.2)	1 (25)	6 (46.2)		26 (27.4)	17 (45.9)	9 (15.5)	
KPK	3 (17.6)	1 (25)	2 (15.4)		26 (27.4)	3 (8.1)	23 (39.7)	
Islamabad	3 (17.6)	1 (25)	2 (15.4)		2 (2.1)	2 (5.4)	0	
Balochistan	0	0	0		3 (3.2)	0	3 (5.2)	
GB and AJK	0	0	0		0	0	0 m = 1	
Graduation year from dental school	2001.06 (± 5.391)[a]	2004.25 (± 6.946)[a]	2000.08 (± 4.716)[a]	0.184[§]	2015 (3)[b]	2014 (3)[b]	2015 (4)[b]	0.039[¶]
Years of experience as a supervisor	6.06 (± 4.520)[a]	4.25 (± 3.862)[a]	6.62 (± 4.700)[a]	0.377[§]	N/A			
Total number of PG trainees in the programme	8.12 (± 6.071)[a]	5.75 (± 4.787)[a]	8.85 (± 6.401)[a]	0.390[§]	15 (23)[b]	14 (13)[b]	19 (31)[b]	0.245[¶]

Means (SD) are signified with "a", while the medians (IQR) are denoted with "b". p-values generated from Chi-square test are indicated with †, while those from Fischer's exact test are signified with ‡. p-values from independent t-test are marked with §, and those from the Mann-Whitney U test are indicated with ¶. m: Number of missing data; GB: Gilgit Baltistan; AJK: Azad Jammu and Kashmir; N/A: Not Applicable; ±: Standard deviation.

Table II: Induction process, teaching, and training evaluation of prosthodontics postgraduate programmes.

	Supervisors				Postgraduate Trainees			
	Total n (%)	Private sector n (%)	Public sector n (%)	p-value	Total n (%)	Private sector n (%)	Public sector n (%)	p-value
Induction process evaluation								
Supervisory board (PGME) exists	5 (29.4)	1 (25)	4 (30.8)	>0.99[b]	29 (30.5)	8 (22.2)	21 (35.6)	0.301[a]
Induction test conducted / taken for training	13 (76.5)	3 (75)	10 (76.9)	>0.99[b]	79 (82.3)	29 (78.4)	50 (84.7)	0.426[a]
External interference from influential persons encountered (by supervisors) / needed (by applicants) for induction	15 (88.2)	2 (50)	13 (100)	0.044[b]	64 (66.7)	26 (70.3)	38 (64.4)	0.553[a]
Residents allowed to do private practice during training	14 (82.4)	4 (100)	10 (76.9)	0.541[b]	46 (47.9)	24 (64.9)	22 (37.3)	0.008[*a]
Residents receiving stipends during training	N/A				84 (87.5)	34 (91.9)	50 (84.7)	0.360[b]
Range of amount received per month					Rs. 65 K (35 K)[c]	Rs. 60 K (30 K)[c]	Rs. 75 K (32 K)[c]	0.00[*¶]
Simulation-based teaching								
Availability of dental simulation in training centres[a]	N/A				41 (43.2)	17 (45.9)	24 (41.4)	0.661[a]
Regular training on dental simulation received	N/A				24 (25)	12 (32.4)	12 (20.3)	0.183[a]
Trainees' assessment domain								
Continuous formative assessment	11 (64.7)	3 (75)	8 (61.5)	>0.99[b]	38 (39.6)	17 (45.9)	21 (35.6)	0.403[a]
Preparation for final examination executed	11 (64.7)	4 (100)	7 (53.8)	0.422[b]	49 (51.6)	20 (55.6)	29 (49.2)	0.510[a]
Frequency of assessment								
Quarterly	1 (12.5)	1 (33.3)	0	0.196[b]	6 (6.3)	3 (8.1)	3 (5.1)	0.730[b]
Biannually	0	0	0		12 (12.5)	5 (13.5)	7 (11.9)	
Annually	3 (37.5)	0	3 (37.5)		18 (18.8)	7 (18.9)	11 (18.6)	
At the time of completion	1 (12.5)	1 (33.3)	0		6 (6.3)	1 (2.7)	5 (8.5)	
Not specific	2 (25)	1 (33.3)	1 (20)		36 (37.5)	16 (43.2)	20 (33.9)	
Others	1 (12.5)	0	1 (20) m = 3		18 (18.8)	5 (13.5)	13 (22)	
Research domain								
Secondary research project compulsory in the programme	5 (29.4)	1 (25)	4 (30.8)	>0.99[b]	N/A			
Interested in publishing research in a peer-reviewed journal	N/A				79 (83.2)	31 (86.1)	48 (81.4)	0.695[a]
Interested in publishing cases in peer-reviewed journal	N/A				81 (85.3)	32 (88.9)	49 (83.1)	0.939[a]

p-values ≤0.05 are denoted with "". p-values generated from Chi-square are signified with "a", while those from Fischer's exact test are indicated with "b". Medians (IQR) are denoted with "c" while p-value generated from the Mann-Whitney U test (marked with). PGME: Postgraduate Medical Examination; N/A: Not Applicable; Rs: Rupees; m: number of missing data.*

Table III: Postgraduate trainees' satisfaction with teaching activities in their programme.

Domain	Adequacy of theoretical knowledge			Adequacy of clinical training		
	private sector median (IQR)	Public sector median (IQR)	p-value	Private sector median (IQR)	Public Sector Median (IQR)	p-value
Fixed prosthodontics	4 (0)	4 (1)	0.064	4 (1)	4 (1)	0.947
Complete denture	4 (1)	4 (1)	0.980	4 (1)	4 (1)	0.657
Removable partial denture	4 (1)	4 (1)	0.901	4 (0)	4 (1)	0.364
Dental implant prosthodontics	4 (1)	3 (2)	0.124	3 (2)	2 (2)	0.123
Maxillofacial-prosthodontics	4 (1)	3 (2)	0.017*	4 (2)	3 (3)	0.003*
Occlusion	4 (1)	4 (1)	0.305	3 (1)	3 (2)	0.440
Temporomandibular disorders	4 (1)	3 (2)	0.254	3 (2)	3 (2)	0.247
Dental materials	4 (1)	4 (1)	0.043*	N/A		
Laboratory exercises	4 (1)	4 (1)	0.044*	4 (1)	4 (2)	0.288

Responses from a 5-point Likert-type scale with the scores representing; 1 = Very Unsatisfied, 2 = Unsatisfied, 3 = Neutral, 4 = Satisfied, and 5 = Very Satisfied. p-values (≤0.05 denoted with "") are reported from Mann-Whitney U test, N/A: Not Applicable.*

DISCUSSION

This study explored Prosthodontics trainees' and supervisors' introspective views pertaining to the key elements of the existing structure of the postgraduate training programmes across Pakistan. Postgraduate clinical training should encompass international standards and national requirements. In Pakistan, postgraduate training in prosthodontics is either university-based or accredited by CPSP. University-based master's degree programmes include one- and two-year Master of Science (MSc) or four-year Master of Dental Surgery (MDS), whereas CPSP conducts training in four-year Fellow of College of Physicians and Surgeons (FCPS) programmes. The Higher Education Commission (HEC) and Pakistan Medical and Dental Council (PMDC) ultimately govern the foundation of these training programmes. According to an unpublished estimation, most postgraduate trainees are enrolled with CPSP, as reflected in the results of this study, where a majority of the respondents were involved with the FCPS training programme. Acknowledging the importance of medical education, CPSP, with World Health Organization (WHO)'s assistance in 1979, developed the Department of Medical Education (DME), to oversee and guide postgraduate training programmes. The DME was instrumental in introducing competency-based medical education in different residency models.[1-3.]

This study revealed that 67.6% (n = 65) of the postgraduate trainees were females, compared to a predominance of male supervisors, i.e., 82.4% (n = 14). A male predominance in leadership and speaker roles was observed in Spain and Italy, despite an equal gender distribution among general dentists.[10,11] Despite such disparity abroad, a cultural trend towards gender inclusion in the prosthodontics workplace was observed locally, mirroring increased employment options for women in clinical settings and educational institutions. Having 76.5% (n = 13) supervisors and 61.5% (n = 59) trainees in the public-sector centres highlighted the positive role of public-sector institutes in fostering and promoting postgraduate education among dental graduates, which has also been seen in the studies from South Africa where an increasing number of public sector service providers were trained by public training institutes.[12]

Only three trainees participated from Balochistan, whereas neither supervisors nor trainees participated from GB and AJK. It can be attributed to a lack of federally registered dental training institutes in AJK and GB. These findings emphasised the need to establish prosthodontic training centres according to regional needs and uphold their effectiveness in producing skilled professionals nationally / regionally.

A small proportion of the sample population (29.4% supervisors and 30.5% trainees) reported having a PGME-like supervisory board in their centres, which oversees and facilitates training programmes.[4] This lack of oversight may have led supervisors to select trainees based on gender and favouring individuals of the same gender, as reported in this study's results by 23.5% (n = 4) of supervisors. Seventy-three per cent of the supervisors reporting external interference during trainee recruitment were from centres lacking a regulatory body, while 66.7% of PG trainees expressed the need to contact influential sources to secure postgraduate training. This finding contrasts with the fact that 76.5% of supervisors and 82.3% of trainees shared that their centres conduct tests and interviews for trainee recruitment. Variation in induction processes among institutes questions their autonomy and functionality to conduct a fair trainee selection process and further underscores the need for the involvement of various authoritative bodies guiding the PGME to oversee the trainee selection.[13]

Over time, the competency-based medical education (CBME) approach in medical education has gained global acceptance and continues to evolve from PGME,[5,14] advocating for frequent, continuous formative assessment of postgraduate trainees to enhance clinical competencies.[15] The need for more frequent trainee assessments in prosthodontics postgraduate programmes was emphasised from the results of this study as both the study populations (64.7% of supervisors and 39.6% of trainees) reported a non-uniformed frequency of trainee evaluation in their centres (Table II). The need for a functional and autonomous supervisory PGME-like board has been emphasised in the literature in overcoming such shortcomings, thereby improving surgical as well as medical education.[15]

More supervisors, i.e., 82.4% (n = 14), allowed their trainees to practice privately. Literature, however, supports that part-time PG training is insufficient to meet the needs of dental postgraduate education.[16] This finding is in line with the CPSP mandate, which endorses full-time postgraduate training to gain the unwavering attention of the trainee towards their education and training. On average, private-sector trainees were paid less per month in stipends than public-sector trainees. Training institutes should carefully consider the stipend aspect as it also factors in attracting applicants to apply to a training centre.[17]

The pandemic of COVID-19 motivated dental schools universally to adopt Augmented Reality (AR) / Virtual Reality (VR) as a part of the dental curriculum.[18] This survey found that 43.2% (n = 41) of trainees have access to simulation in their centres, yet only half of them have regular training opportunities. Stakeholders must provide sufficient resources and promote the adoption of simulation-based learning to enhance training and engagement, as its importance is emphasised in other reports as well.[19]

Practising evidence-based dentistry (EBD) was implemented to improve confidence among practitioners when employing novel clinical procedures for diverse dental problems while addressing limitations in the traditional care model.[20] This study found high interest among trainees in publishing research (83.2%; n = 79), and case reports (85.3%; n = 81) in peer-reviewed journals, while only 29.4% (n = 5) of supervisors agreed with making secondary research necessary for trainees apart from the mandatory thesis / dissertation. Increased encouragement from supervisors has been shown to boost trainees' research development in prosthodontic training programmes.[21]

Although prosthodontic trainees expressed overall satisfaction with their programme's theoretical education, they had varied opinions regarding clinical training (Table III), perhaps due to differences in postgraduate training quality across institutions. Regardless of the training environment, a regulatory body overseen by a federal legislative authority must supervise training programmes. In this survey, the trainees reported lower satisfaction levels with their clinical training on dental occlusion and TMD, which can negatively affect their competency in patient care. It may be due to their limited exposure and experiences managing dental patients with TMDs or occlusal discrepancies. The global consensus on TMD management[22] can enhance practices in centres where there is a lack and help to overcome this.

In line with the previous research,[23] the results of this study also emphasise the need for the establishment of maxillofacial-prosthodontics training centres in Pakistan, as the trainees reported varying levels of satisfaction with regard to receiving clinical training in this field. Comprehensive re-evaluation is needed to enhance postgraduate education in all domains of prosthodontics,[5,7-9] especially maxillofacial prosthodontics, dental implants, and TMDs. Continual efforts to standardise prosthodontics training for postgraduates could improve the quality of professionals nationwide. Given the limited number of responses from participants across Pakistan, caution must be exercised with generalising the results of this study. Furthermore, it is imperative to emphasise the necessity for maintaining high standards in residency programmes and ensuring continuous monitoring by CPSP and PMDC through programme evaluation. Although this may pose an additional burden for the CPSP and PMDC, it is essential for upholding the quality and effectiveness of prosthodontics training. The need to develop maxillofacial-prosthodontics training centres in Pakistan is well established. At the same time, a super-speciality of dental implants and TMDs should be explored. The findings from this study underscore key areas for improvement for the stakeholders involved, including institutional management, programme directors, supervisors, and PG trainees, to enhance the quality and effectiveness of prosthodontics training programmes, thereby potentially strengthening educational outcomes and clinical competencies for PG trainees. Nevertheless, the survey gathered limited responses from the target population in a few provinces of Pakistan, which may have prevented an accurate representation of the respondents' actual intentions or approaches. Future studies can work on devising strategies to overcome the challenges highlighted through this research.

CONCLUSION

The findings from this survey emphasise the need for regulation and monitoring of the trainee induction process, quality of training, and frequent assessments in the prosthodontics postgraduate training programmes across Pakistan. Stakeholders and regulatory bodies should continually strive to improve academic and clinical training quality and incorporate technological advancements into teaching methods.

ETHICAL APPROVAL:

The study, bearing reference No: 2021-6073-17729, was approved by the Aga Khan University Hospital's Ethical Review Committee (ERC).

PATIENTS' CONSENT:

All participants provided informed consent before participating in this research.

COMPETING INTEREST:

The authors declared no conflict of interest.

AUTHORS' CONTRIBUTION:

SMRK, TK: Conceptualised the research, collected the data and critically reviewed the manuscript.

MSB, FAS, ZAS: Analysed the data and prepared the manuscript.

All authors approved the final version of the manuscript to be published.

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