

Self-perceived Preparedness of Undergraduate Dental Students of a Dental College in Performing Various Dental Procedures

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ABSTRACT

Introduction: The transition from undergraduate dental student to actual dental practice is a crucial but challenging step. Dental graduates should feel well prepared to effectively perform clinical tasks even in an unsupervised context. Keeping in mind that the conditions under which the student works are different from the conditions of their future practice, confidence is considered a keystone for successful achievement and will no doubt reflect on their professional, clinical and management skills.

Objective: The aim of this study was to assess self-perceived preparedness of undergraduate dental students in Kathmandu Medical College and Teaching Hospital, Nepal.

Methods: A self-administered questionnaire form including well-validated, self-administered Dental Undergraduates Preparedness Assessment Scale (DU-PAS) was distributed to final year BDS students and interns of Kathmandu Medical College and Teaching Hospital, Nepal. Data were collected and entered into the Microsoft Excel sheet and analysis was done using Statistical Package of Social Sciences (SPSS) software version 20. Independent t test was used to determine the mean difference between males and females in self-perceived preparedness.

Results: A total of 80 participants, comprising final year dental students, interns, and dental surgeons from Kathmandu Medical College and Teaching Hospital (KMCTH), Nepal, took part in the study. The participants' ages ranged from 21 to 35 years, with a mean age of 25.14 years (SD 1.95). The majority of the participants were female (43.8%) and unmarried (87.5%) The total scores obtained by the respondents ranged from 44 to 90, with a mean score of 67.34 (SD 10.77).

Conclusion: The preparedness of undergraduate students of KMCTH was comparable to students of other countries. The data showed the participants felt prepared for the majority of the attributes expected from a dentist but there is need for improvements in the teaching and learning of dental students in the KMCTH to address gaps in their clinical skills and behavioral attributes.

Key words: Dental Students; Dental Procedures; Preparedness; Self-perceived.

Conflict of Interest: None

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INTRODUCTION

The changing healthcare needs in the modern society warrant that the students in healthcare professions are prepared adequately to meet the challenges of delivering predictable and effective prevention and management of disease.¹ Dental graduates face a multitude of

challenges in order to prepare themselves for a smooth transition from a dental school into practice and preparedness of dental graduates is a subject of immense interest worldwide.² In addition to clinical operative procedures, dental graduates are expected to exhibit competence in soft skills that include time management, critical thinking, problem-solving, professionalism, leadership, team working and inter-professional collaborative practice.^{3,4}

During their education journey, dental students gradually go through stepwise phases of education starting from the theoretical part, then followed by the pre-clinical part, and ending with the clinical education. This will ensure students develop necessary knowledge and expertise to become dentists having sufficient capabilities to practice safely in their career.⁵ However, previous research on dental students has identified several areas of weaknesses amongst new dental graduates suggesting dental programs may not always be able to train dental students to the expected standards.⁶⁻⁸ Research in undergraduate medical education involving pedagogy, clinical training, curriculum development and assessment methods is ultimately aimed at informing the stakeholders how best to prepare the graduates for their future careers.⁹⁻¹²

The aim of the study was to assess self-perceived preparedness of dental undergraduate students and interns and dental surgeons of Kathmandu Medical College and Teaching Hospital (KMCTH), Nepal.

METHODS

It was a descriptive cross-sectional questionnaire-based study conducted among final year dental students, interns and dental surgeons of Dental College of KMCTH, Nepal. Ethical clearance was obtained from Institutional Review Committee (IRC) of Kathmandu Medical College Public Ltd., Kathmandu,

Nepal (Reference number: 25062023/04). The data collection was carried out from 2023 July 21 to 2023 August 20.

This study included final year students, interns and dental surgeons of KMCTH, Nepal. Students who were not willing to participate in the study and those under influence of drugs and under psychiatric medication were excluded. Written informed consent was received from each participant who was willing to participate before data collection. The self-administered questionnaire using Dental Undergraduates Preparedness Assessment Scale (DU-PAS) was distributed to the students selected by convenience sampling method and the filled forms were collected.

Sample size calculation was done using standard deviation of similar study done by Yudin.¹ Following formula has been used for sample size calculation,

$$n = (Z_{1-\alpha/2} \sigma / e)^2$$

Where, n=sample size,

$Z_{1-\alpha/2} = 1.96$ at 95% confidence interval,

SD= 13.495, e= permissible error = 0.05

Placing values in the formula provided above, total sample size = 279834.95

Since the population size is finite, $N = 80$ (including final year dental students, interns and dental surgeons), the corrected sample size is,

$$\begin{aligned} n^1 &= n / [1 + \{(n-1)/N\}] \\ &= 279834.95 / [1 + \{(279834.95-1)/80\}] \\ &= 79.98 \approx 80 \end{aligned}$$

Pre-testing was done among 10% of the sample (fourth year students) before starting the final data collection. Those involved in pre-testing were not included in the final sample.

Data were entered into the Microsoft Excel Sheet and analyzed in Statistical Package of Social Sciences (SPSS) version 20 (IBM Corp., Armonk, N.Y., USA). Mean, standard deviation, frequency and percentage for different variables

were calculated depending upon the nature of data. The independent t test was used to determine the mean difference in self-perceived preparedness among dental students. The significance level was set at $p < 0.01$.

RESULTS

In total, 80 final year dental students, interns and dental surgeons of KMCTH, Nepal participated in the study. The age of the participants was in the range of 21 to 35 years with the mean age of 25.14 years (SD 1.95). Majority of the students were female (43.8%) and unmarried (87.5%). The sociodemographic characteristics of the participants are shown in Table 1. The total score obtained by the respondents ranged from 44-90 with a mean score of 67.34 (SD 10.77) as shown in Table 2.

The mean preparedness scores of males (70.88 ± 11.76) was higher than females (66.38 ± 10.39) as shown in Table 3. However, these gender-related differences were not statistically significant (p value = 0.127).

Part A of the scale comprises the clinical skills experience the participants encountered during their undergraduate dental education program. The scores for Part A are shown in Table 4. The items are ordered by the “No experience” column in a descending order.

Self-reported preparedness was high (they could do independently) in several clinical skills including removing dental caries effectively 77 (96.3%), undertaking peri-apical radiographs 77 (96.3%), restoring teeth with tooth-colored fillings appropriately 72 (90%), obtaining a complete medical history from patients 71 (88.8%), interpreting common

findings on dental radiographs 70(87.5%), obtaining a valid consent from my patients prior to undertaking any treatment 68(85%), undertaking a comprehensive, clinical oral examination 67(83.8%), undertaking non-surgical tooth extractions appropriately 57(71.3%), prescribing appropriate dental radiographs 57(71.3%).

However self-reported preparedness was low (no experience) in several clinical skills including performing endodontic treatment on multi-rooted teeth appropriately (43.8%), providing crowns using principles of tooth preservation (40%), undertaking bitewing radiographs (37.5%) and performing endodontic treatment on single-rooted teeth appropriately (27.5%).

Part B of the scale evaluates cognitive and behavioral attributes. The scores for Part B are shown in Table 5. The items are ordered by the “No experience” column in a descending order.

Self-reported preparedness was high (always) in several cognitive and behavioral attributes including taking appropriate measures to protect patient confidentiality 60(75%), restrict my relations with my patients to a professional level 58(72.5%), feel confident to communicate appropriately with my colleagues 57(71.3%) and aware of my legal responsibilities as a dental professional 48(60%).

However, self-reported preparedness was low (no experience) in several cognitive and behavioral attributes including interpreting the results of research which may influence my practice 51(63.7%), evaluating new dental materials and products using an evidence-based approach 39(48.8%) and referring patients with suspected oral cancer 38(47.5%).

Table 1: Demographic characteristics of the study participants

Characteristics	Category	No. of study participants n (%)
Age in years	21-25	44 (55.0)
	26-30	35 (43.8)
	31-35	1 (1.3)
Gender	Male	17 (21.3)
	Female	63 (78.8)
Marital status	Married	10 (12.5)
	Unmarried	70 (87.5)

Table 2: Total mean score of the study participants

Part	No. of study participants	Mean	SD	Minimum score	Maximum score	Range
A (24 items)	80	34.95	6.01	22	48	26
B (26 items)	80	32.39	6.81	20	50	30
Total A+B	80	67.34	10.77	44	90	46

Table 3: Comparison of preparedness of study participants with gender

Variables	Category	No. of study participants	Sum A (mean±SD)	Sum B (mean±SD)	Total preparedness score (mean±SD)
Sex	Male	17	36.41±6.55	34.47±6.97	70.88±11.76
	Female	63	34.56±5.85	31.83±6.71	66.38±10.39
P value			0.261	0.156	0.127

Table 4: Total scores for determining preparedness of clinical skills (Part A)

SN	Questions	Responses n (%)		
		No experience	With help	Independently
1	I am able to perform endodontic treatment on multi-rooted teeth appropriately	35 (43.8)	32 (40.0)	13 (16.3)
2	I am able to prescribe drugs to my patients appropriately	3 (3.8)	52 (65.0)	25 (31.3)
3	I am able to assess the treatment needs of patients requiring orthodontics	11 (13.8)	59 (73.8)	10 (12.5)
4	I am able to provide mechanically sound partial dentures	18 (22.5)	43 (53.8)	19 (23.8)
5	I am able to explain the merits and demerits of various treatment options to my patients	0	26 (32.5)	54 (67.5)
6	I am able to provide crowns using principles of tooth preservation	32 (40.0)	35 (43.8)	13 (16.3)
7	I am able to formulate a comprehensive treatment plan which addresses all treatment needs of my patients	7 (8.8)	50 (62.5)	23 (28.7)
8	I am able to provide a range of treatment options to my patients based on their individual circumstances	2 (2.5)	55 (68.8)	23 (28.7)
9	I am able to provide mechanically sound/safe and functioning full dentures	7 (8.8)	55 (68.8)	18 (22.5)
10	I am able to carry out patients' treatment sessions in an appropriate order	1 (1.3)	34 (42.5)	45 (56.3)

11	I am able to restore teeth with amalgam fillings appropriately	6 (7.5)	22 (27.5)	52 (65.0)
12	I am able to undertake a comprehensive, clinical oral examination	0	13 (16.3)	67 (83.8)
12	I am able to undertake non-surgical tooth extractions appropriately	1 (1.3)	22 (27.5)	57 (71.3)
14	I am able to interpret common findings on dental radiographs	0	10 (12.5)	70 (87.5)
15	I am able to prescribe appropriate dental radiographs	0	23 (28.7)	57 (71.3)
16	I am able to obtain a complete medical history from my patients.	0	9 (11.3)	71 (88.8)
17	I am able to perform endodontic treatment on single-rooted teeth appropriately	22 (27.5)	32 (40.0)	26 (32.5)
18	I am able to undertake peri-apical radiographs	0	3 (3.8)	77 (96.3)
19	I am able to restore teeth with tooth-colored fillings appropriately	1 (1.3)	7 (8.8)	72 (90.0)
20	I am able to administer inferior dental nerve blocks effectively	4 (5.0)	24 (30.0)	52 (65.0)
21	I am able to remove dental caries effectively	0	3 (3.8)	77 (96.3)
22	I am able to obtain valid consent from my patients prior to undertaking any treatment.	0	12 (15.0)	68 (85.0)
23	I am able to perform non-surgical periodontal treatment using appropriate methods	4 (5.0)	22 (27.5)	54 (67.5)
24	I am able to undertake bitewing radiographs	30 (37.5)	33 (41.3)	17 (21.3)

Table 5: Total scores related to cognitive and behavioral attributes (Part B)

SN	Question	No experience	Mostly	Always
1	I feel I can manage peoples' expectations of their treatment	4 (5.0)	71 (88.8)	5 (6.3)
2	I am confident to evaluate new dental materials and products using an evidence-based approach	39 (48.8)	37 (46.3)	4 (5.0)
3	I am confident to interpret the results of research which may influence my practice	51 (63.7)	26 (32.5)	3 (3.8)
4	I have sufficient knowledge of scientific principles which underpin/support my dental practice	30 (37.5)	43 (53.8)	7 (8.8)
5	I am able to manage the behavior of children to enable appropriate dental treatment	2 (2.5)	70 (87.5)	8 (10.0)
6	I feel confident managing anxious patients with appropriate behavioral techniques	18 (22.5)	56 (70.0)	6 (7.5)
7	I feel confident referring patients with suspected oral cancer	38 (47.5)	26 (32.5)	16 (20.0)
8	I use an evidence-informed approach in my clinical practice.	27 (33.8)	38 (47.5)	15 (18.8)
9	I feel able to raise concerns about inappropriate behavior of my colleagues	14 (17.5)	49 (61.3)	17 (21.3)
10	I feel able to motivate my patients to encourage self-care for their dental needs	0	40 (50.0)	40 (50.0)
11	I am able to work within the constraints of clinical appointment schedules	7 (8.8)	51 (63.7)	22 (27.5)
12	I maintain accurate records of my clinical notes	2 (2.5)	45 (63.7)	33 (41.3)
13	I am able to fulfill my responsibilities as an effective member of the dental team	1 (1.3)	43 (53.8)	36 (45.0)

14	I feel confident to address barriers for effective communication with patients appropriately	5 (6.3)	60 (75.0)	15 (18.8)
15	I reflect on my clinical practice in order to address my learning needs	11 (13.8)	44 (55.0)	25 (31.3)
16	I feel I can manage to communicate effectively with my patients	0	49 (61.3)	31 (38.8)
17	I am able to refer patients with complex treatment needs appropriately	3 (3.8)	37 (46.3)	40 (50.0)
18	I feel confident to communicate potential risks of operative procedures to patients	9 (11.3)	44 (55.0)	27 (33.8)
19	I feel comfortable asking for help from supervisor or colleague if needed	0	29 (36.3)	51 (63.7)
20	I recognize my personal limitations in clinical practice	1 (1.3)	35 (43.8)	44 (55.0)
21	I provide opportunities for my patients to express their expectations from dental treatment	1 (1.3)	23 (28.7)	56 (70.0)
22	I take responsibility for my continuing professional development	1 (1.3)	26 (32.5)	53 (66.3)
23	I take appropriate measures to protect patient confidentiality	0	20 (25.0)	60 (75.0)
24	I restrict my relations with my patients to a professional level	1 (1.3)	21 (26.3)	58 (72.5)
25	I am aware of my legal responsibilities as a dental professional	0	32 (40.0)	48 (60.0)
26	I feel confident to communicate appropriately with my colleagues	1 (1.3)	22 (27.5)	57 (71.3)

DISCUSSION

The results of this study showed that the final year dental students, interns and dental surgeons of KMCTH, Nepal are well prepared and comparable to graduates from other countries. The mean total score of the participants in this study was 67.34 (SD 10.77). The mean score is higher than reported in previous studies utilizing DU-PAS in Pakistan (61.10)³ and Pakistan (65.60)⁴ but lower than United Kingdom (74.0)¹³, Malaysia (79.56)¹ and Saudi-Arabia (81.85).¹⁴

Regarding clinical skills, over 80% of the respondents felt most prepared to undertake peri-apical radiographs, remove dental caries effectively, restore teeth with tooth-colored fillings appropriately, obtaining a complete medical history from patients, interpreting common findings on dental radiographs, obtaining a valid consent from my patients prior to undertaking any treatment and

undertaking a comprehensive, clinical oral examination. These findings are similar to those reported in other studies.^{1,14} In contrast to the findings, less than 75% respondents of Pakistan⁴ felt most prepared to undertake peri-apical radiographs, interpreting common findings on dental radiograph, obtaining a valid consent from patients prior to undertaking any treatment, undertaking a comprehensive, clinical oral examination. However, more than 80% felt most prepared to remove dental caries effectively, restore teeth with tooth-colored fillings appropriately.

In this study, regarding areas of deficiency in clinical skills, only 37.5% of the respondents felt prepared to undertake bitewing radiographs whereas in Pakistan⁴ 7.3% felt prepared in undertaking bitewing radiographs. In contrast, the majority of students of Malaysia (89.3%)¹ and Saudi Arabia (87.7%)¹⁴ reported preparedness in undertaking bite-wing radiographs. Availability

and good maintenance of radiographic equipment is important to ensure students have learning experience in doing such procedures.¹

In this study, 43.8% of the respondents did not have any experience in performing endodontic treatment on multi-rooted teeth appropriately and 27.5% of them did not have any experience in performing endodontic treatment on single-rooted teeth appropriately whereas in Pakistan 51.6% of the students had lack of experience in performing endodontic treatment on multirooted teeth and 2.4% of them in single-rooted teeth⁴. Similarly, none of the dental students of Malaysia¹ had any experience in carrying out endodontic treatment on multi-rooted and single-rooted teeth. This may be attributed to the limited availability of suitable patients requiring endodontics in KMCTH. This factor might have impacted the teaching of undergraduate students adversely. These differences are quite remarkable and highlight the need for further clinical experience in endodontic for dental students in KMCTH.

Nevertheless, if the students are able to demonstrate competence in performing simple endodontics on single rooted teeth as shown by the results of this study, they may be able to develop their skills in multi-rooted endodontics with further experience.¹⁵ Improving the learning experience by increasing clinical hours for independent practice may be an effective strategy to enhance clinical skills of the students during undergraduate education.¹⁶

In this study 40% of the respondents didn't have any experience in providing crowns using principles of tooth preservation which is similar to that of Pakistan (41.9%)¹³ and contrast to that of Malaysia (0%)¹ and Saudi Arabia (1.8%).¹⁴

Regarding cognitive and behavioral attributes, in this study majority of the respondents felt prepared to take appropriate measures to protect patient confidentiality, restrict

relations with patients to a professional level, communicate appropriately with my colleagues and aware of legal responsibilities as a dental professional. These observations are positive and demonstrate a professional and ethical culture in educational and clinical settings. This is similar to that of Pakistan.^{3,4} However, self-reported preparedness was low (no experience) in interpreting the results of research which may influence their practice (63.7%), evaluating new dental materials and products using an evidence-based approach (48.8%) and the referral of patients with suspected oral cancer (47.5%). Similar observations have been reported in previous studies on the preparedness of dental students and new graduates.^{1,14} Understanding and applying evidence-based dentistry in undergraduate dental education remains a challenge globally despite the growing emphasis on its importance in the last two decades.

In this present study, a small fraction of the respondents expressed confidence in evaluating new dental materials and products using an evidence-based approach. These findings corroborate with other published studies which report limited confidence in research methodology and evidence-based practice amongst undergraduate dental students.^{1, 3,4,14} There is a growing recognition of the gaps in the research skills of undergraduate dental students, and many dental institutions now require students to develop skills in conducting critical appraisal of literature and undertake research projects as part of their undergraduate curriculum.

A large percentage of the participants reported a lack of experience in referral of suspected oral cancer patients. These findings are similar to the findings of previous studies.^{1,3,4,14} This lack of confidence may be attributed to a lack of clinical exposure to patients with oral cancer cases in comparison to routine dental problems. Structured exposure to oral cancer patients in

specialist oral and maxillofacial surgery settings is essential to improve students' confidence in the recognition and referral to oral cancer.

The main limitation of the study is that the results are based on the self-evaluation of the students and it is possible the mean person ability (perceived preparedness) may be inflated. Evidence from studies on health professions training has consistently shown poor correlations between perceived self-confidence and observed competence.¹³ The next step may be to compare the scores of self-assessments with the assessment by dental educators and clinical supervisors, which may identify differences in scores and provide a more realistic measurement of person ability. Any differences in self-assessment and assessment by the educational supervisors can help to gauge the insight of students.¹⁷

CONCLUSIONS

This study explores the preparedness of undergraduate dental students at a dental college of KMCTH, Nepal. The scale used in this study explored the self-perceived preparedness on a range of cognitive, clinical and behavioral attributes. The data showed the participants felt prepared for the majority of the attributes expected from a dentist. However, a number of areas for improvements are there to enhance clinical skills related to endodontic treatment on multi-rooted teeth, undertaking bitewing radiographs providing crowns. Regarding behavioral attributes, the participants reported low confidence in oral cancer referral and evaluating evidence related to new materials and products. These findings underscore the need for improvements in the teaching and learning of dental students in the KMCTH to address gaps in their clinical skills and behavioral attributes.

REFERENCES

1. Mat Yudin Z, Ali K, Wan Ahmad WMA, Ahmad A, Khamis MF, Brian Graville

Monteiro N', Che Ab Aziz ZA, Saub R, Rosli TI, Alias A, Abdul Hamid NF, Harun NA. Self-perceived preparedness of undergraduate dental students in dental public universities in Malaysia: A national study. *Eur J Dent Educ*. 2020 Feb;24(1):163-8. Doi: 10.1111/eje.12480. PMID: 31698535.

2. Mohan M, Ravindran TKS. Conceptual Framework Explaining "Preparedness for Practice" of Dental Graduates: A Systematic Review. *J Dent Educ*. 2018 Nov; 82(11):1194-1202. Doi: 10.21815/JDE.018.124. PMID: 30385686.
3. Javed, M.Q.; Nawabi, S.; Bhatti, U.A.; Atique, S.; AlAttas, M.H.; Abulhamael, A.M.; Zahra, D.; Ali, K. How Well Prepared Are Dental Students and New Graduates in Pakistan—A Cross-Sectional National Study. *Int. J. Environ. Res. Public Health*. 2023; 20,1506. <https://doi.org/10.3390/ijerph20021506>
4. Ali K, Cockerill J, Zahra D, Qazi HS, Raja U, Ataullah K. Self-perceived preparedness of final year dental students in a developing country-A multi-institution study. *Eur J Dent Educ*. 2018 Nov;22(4): e745-e750. Doi: 10.1111/eje.12389. Epub 2018 Aug 11. PMID: 30098082.
5. Elmanaseer WR, Al-Omoush SA, Alamoush RA, Abu Zaghlan R, Alsoleihat F. Dental Students' Perception and Self-Perceived Confidence Level in Key Dental Procedures for General Practice and the Impact of Competency Implementation on Their Confidence Level, Part I (Prosthodontics and Conservative Dentistry). *Int J Dent*. 2023 Oct 11; 2023:2015331. Doi: 10.1155/2023/2015331. PMID: 37868108; PMCID: PMC10586436.
6. Rodd HD, Farman M, Albadri S, Mackie IC. Undergraduate experience and self-assessed confidence in paediatric dentistry: Comparison of three UK dental schools. *Br Dent J*. 2010 Mar; 208(5), 221–5. Doi: 10.1038/sj.bdj.2010.207. PMID: 20228757.
7. Kumar M, Duncan HF. Radiographic evaluation of the technical quality of undergraduate endodontic 'competence' cases in the Dublin Dental University Hospital: An audit. *J Ir Dent Assoc*. 2012 Jun, 58(3), 162–6. PMID: 22888740.
8. Durham JA, Moore UJ, Corbett IP, Thomson

- PJ. Assessing competency in Dentoalveolar surgery: A 3-year study of cumulative experience in the undergraduate curriculum. *Eur J Dent Educ*. 2007 Nov, 11(4), 200–7. Doi: 10.1111/j.1600-0579.2007.00455. x. PMID: 17935559.
9. Miles S, Kellett J, Leinster SJ. Medical graduates' preparedness to practice: a comparison of undergraduate medical school training. *BMC Med Educ*. 2017 Feb 6;17(1):33. Doi: 10.1186/s12909-017-0859-6. PMID: 28166769; PMCID: PMC5295184.
 10. Kellett J, Papageorgiou A, Cavenagh P, Salter C, Miles S, Leinster SJ. The preparedness of newly qualified doctors - Views of Foundation doctors and supervisors. *Med Teach*. 2015; 37(10):949-54. Doi: 10.3109/0142159X.2014.970619. Epub 2015 Sep 4. PMID: 25308805.
 11. Monrouxe LV, Bullock A, Gormley G, Kaufhold K, Kelly N, Roberts CE, Mattick K, Rees C. New graduate doctors' preparedness for practice: a multistakeholder, multicentre narrative study. *BMJ Open*. 2018 Aug; 29; 8(8): e023146. Doi: 10.1136/bmjopen-2018-023146. PMID: 30158236.
 12. Banneheke H, Nadarajah VD, Ramamurthy S, Sumera A, Ravindranath S, Jeevaratnam K, Efendie B, Chellamuthu L, Krishnappa P, Peterson R. Student preparedness characteristics important for clinical learning: perspectives of supervisors from medicine, pharmacy and nursing. *BMC Med Educ*. 2017 Aug; 17(1):130f. Doi: 10.1186/s12909-017-0966-4. PMID: 28789645.
 13. Ali, K.; Slade, A.; Kay, E.; Zahra, D.; Tredwin, C. Preparedness of undergraduate dental students in the United Kingdom: A national study. *Br. Dent. J.* 2017; 222: 472–7.
 14. Javed MQ, Abulhamael AM, Ahmad Z, Muhammad M, Faridi MA, Khan KI, Habib SR, Ali K. Self-reported preparedness of final year undergraduate dental students and interns in Saudi Arabia: a multi-institutional study. *BMC Med Educ*. 2024 Mar 13;24(1):282. doi: 10.1186/s12909-024-05246-z. PMID: 38481299; PMCID: PMC10938702.
 15. Qualtrough AJ. Undergraduate endodontic education: what are the challenges? *Br Dent J*. 2014;216(6):361.
 16. Manakil J, George R. Self-perceived work preparedness of the graduating dental students. *Eur J Dent Educ*. 2013;17(2):101-5.
 17. Ali K, Tredwin C, Kay EJ, Slade A, Pooler J. Preparedness of dental graduates for foundation training: a qualitative study. *Br Dent J*. 2014 Aug;217(3):145-9. Doi: 10.1038/sj.bdj.2014.648. PMID: 25104700.