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Original Article

Evaluation of Abutment Parallelism and Path of Withdrawal Using Three Intra- and One Extra-Oral Methods: A Survey and *In vitro* Study

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Abstract

Purpose: The purpose of this study is to evaluate four different methods used to examine preparation taper and relative parallelism of the prepared abutment teeth. **Materials and Methods:** A total of 12 artificial teeth were prepared simulating six sets of prepared abutments. Proximal walls of the premolars in all sets were prepared parallel and 90° to the occlusal plane, whereas walls of the second molars were prepared either 0°, 20°, or 45° to the long axis of the premolar preparation. A total number of 210 participants were involved in the study. All data of the taper evaluation and responses to the questionnaire were coded and entered into an Excel Spreadsheet file. Statistical analyses of the participants' responses were performed using the Chi-square test with $P < 0.05$ was considered statistically significant. **Results:** No significant difference was found between the educational levels relative to their responses to level of difficulty, sensitivity, skills, and technical demands for the four techniques. The intraoral mirror technique in the mandibular arch was found to be statistically significantly ($P < 0.05$) better. The surveyor technique in the maxillary arch was found to be statistically significantly ($P < 0.05$) better. The highest percentage of faculty members (50%) chose dental surveyor (DS) as the most preferred technique to be included into the academic curriculum. **Conclusions:** The DS was more favored among the respondents across all educational levels. This technique presented high potential in accurately evaluating tooth preparation in comparison to the intraoral techniques.

Keywords: Dental surveyor, hand piece, intra-oral mouth mirror, photographic mirror

Clinical Significance

A dental student or a future dental practitioner needs to be trained to visualize their teeth preparations to detect any amount of undercuts present so as to minimize further clinical and laboratory problems such as over taper and open margins.

Introduction

During teeth preparation, our main aim is always to develop a common path of placement/insertion to achieve passive and complete seating of the prosthesis.[1] Path of placement or withdrawal according to GPT is defined as: "the specific direction in which prosthesis is placed on the residual alveolar ridge, abutment teeth, dental implant abutment(s), or attachments."[2] Fixed partial denture (FPD) with unparalleled abutments will necessitate excessive seating force that often results in fractures in the veneering ceramic. In order to avoid these side effects, clinicians tend to over taper the preparation. The excessive reduction of the prepared abutments can compromise restoration retention and resistance and jeopardize the biological health of the dentin-pulp complex in vital abutment teeth.[3,4] el-Ebrashi *et al*.[5] and Jogerson[6] suggested an optimum convergence angle (CA) of 2.5º–6.5º to decrease stress concentrations. Jadhav *et al*.[7] suggested 2º–7º of taper or 4º–14º of CA to obtain maximum retention and stated some

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techniques to measure taper and assess the relative parallelism of the prepared abutment teeth to ensure the long-term success of cement-retained FPD. Nordlander *et al*.[8] stated the use of mouth mirror, photographic mirror (PM), and dental periscope when multiple abutments are being evaluated for a common path of placement. An intraoral direct visual survey of the abutment preparations can be conducted using a mouth mirror held at an angle above one of the prepared abutments, but it unfortunately may be inaccurate and unreliable: Clinicians tend to over taper the preparation when using this technique. Some clinicians use an extraoral indirect technique that consists of surveying the stone cast on a dental surveyor (DS), which is more accurate than the direct visual examination, but it necessitates extra laboratory steps and may require additional visits before making a definitive impression, particularly if the laboratory is far away from the clinic.[3,4] Therefore, Vitsentzos in 1989 developed intraoral devices such as dental periscope to examine the parallelism of abutment teeth.[9] However, these intraoral devices can be bulky and uncomfortable for patients.[10] Lee and So in 2008 used a modified laser pointer attached to a DS to detect the undercut extraorally by surveying the intaglio surface of an irreversible hydrocolloid impression.[11] Unfortunately, the major shortcoming of this technique was that it rendered impossible visualization of the preparation in detail and required survey of the impression, which is a negative reproduction unlike the surveying cast. While Farah in 2016 pointed a technique facilitating the assessment of extra-oral preparation and the detection of undercuts before making a definitive impression. This technique utilizes casts fabricated from polyvinyl siloxane impression material and a class II laser module attached to a DS.[12]

Although there is enough literature stating different CA measuring techniques, there is a lack of documentation regarding the reliability and acceptance of these techniques by different educational levels for measuring the path of insertion or withdrawal of multiple abutments in fixed prostheses. The main aim of the study was to recommend a particular technique to be included and stressed upon the curriculum of the undergraduate course to limit the common mistakes done by dental students during tooth preparation. The null hypotheses stated that there would be no differences in the opinions, attitudes, and adoption of the four techniques across educational levels and no differences in the accuracy within and between these techniques when used to check relative parallelism of the abutment teeth.

Materials and Methods

Four different techniques, three intraoral (intraoral mouth mirror [IOM], PM, and handpiece with torbido bur [HP]) and one extraoral (DS) were used to examine preparation taper and relative parallelism of the prepared abutment teeth in the maxillary and mandibular arches by participants in different educational levels (dental students, interns, and faculty member). In addition, their level of satisfaction and their opinion, attitudes in regard to difficulty, time consumption, and adoption among these techniques were measured. Three stations were arranged with random combinations of maxillary and mandibular sets to be evaluated by the participants.

Specimen preparation

A total of 12 artificial teeth (3 maxillary right 2nd molars, 3 mandibular right 2nd molars, 3 maxillary right 2nd premolars, and 3 mandibular right 2nd premolars) were mounted on a typodont model (Frasaco An-4 Puk, Pok).[13] The teeth were prepared simulating three completed sets of prepared abutments for 6 three-unit FPD divided equally for both arches. Standard models of occlusal planes parallel to horizon were used. In addition, putty indices were made for the maxillary and mandibular models, separately, to place them along with the digital protractor in the same repeatable position for the determination of molar tooth preparation angle to its long axis and the premolar abutment. In such arrangement, the protractor was held accurately and repeatedly against the buccal surfaces of both abutments for all models. The study set-up was made in the same location to ensure the standard management of the samples. The preparation of premolars was finished first in both arches with the proximal walls parallel to each other and 90º to the occlusal plane. The buccal surface of molars was then prepared to remove any bulge or undercut and a line parallel to premolar preparation was drawn. Another line was marked parallel (0°) (Set A for maxilla and Set B for mandible), 20° (Set C for maxilla and Set D for mandible), and 45° (Set E for maxilla and Set F for mandible) to the first line. The proximal tooth preparation was carried out using the second marked line as reference with a tapered flat-ended diamond bur (201 R). Lingual and occlusal reduction was then followed to finish the preparation [Figure 1a-f]. Abutments with unclear margins were excluded and replaced to avoid confusion when measuring the angulations. Digital protractor was used for all angles measurements [Figure 1g]. The manufacturer reported accuracy for Atrium digital protractor (Model: CR 2032) used was ± 0.1°, which was accurate enough as a guide to achieve the desired pre-determined angles. Duplicating silicone (Dupliflex-22; Protechno, Vilamalla, Girona, Spain) was then used to prepare three sets of molds for both arches, and poured in type IV dental stone (Lab Stone; Dentsply, York, PA) following the manufacturer's instructions using a vacuum mixer (Mix-R; Dentalfarm, Torino, Italy) and a laboratory vibrator[14] (MiniExport; Dentalfarm) [Figure 2a-f].

Experiment and survey

A standard sheet to check teeth parallelism was prepared for this study. In addition, a questionnaire was also prepared for the participants' opinions about difficulty, time, and sensitivity while practicing the techniques. The difficulty was rated on a scale of 1–5; 1 being the easiest and 5 being the most difficult. The next questions were related to time required and sensitivity. Another question was related to individual preference for the techniques on a scale of 1–4, with 1 being the highest while 4 being the lowest. The next part included a question in relation to technique favorable for the adoption in dental school education/teaching or in private clinic. Moreover,

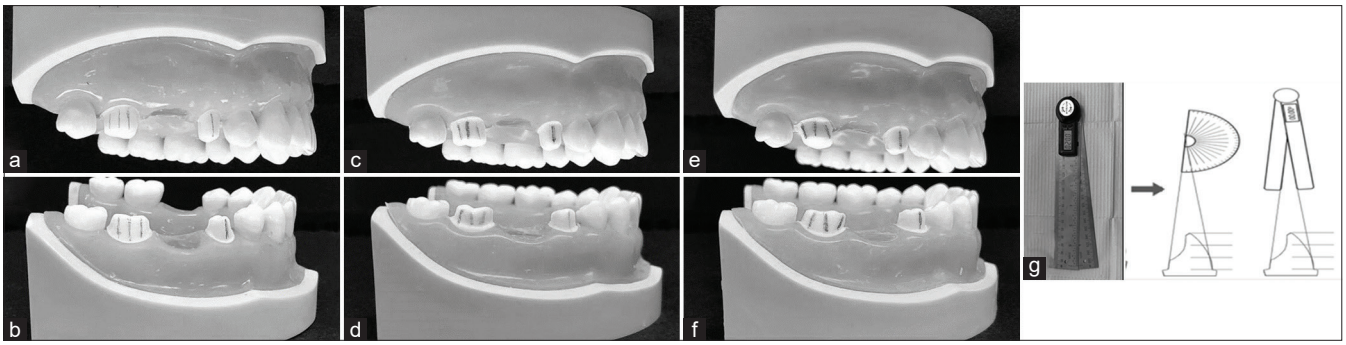

Figure 1: Preparation of the abutment teeth with different angles (a-f) and the digital protractor used in the measurements (g)

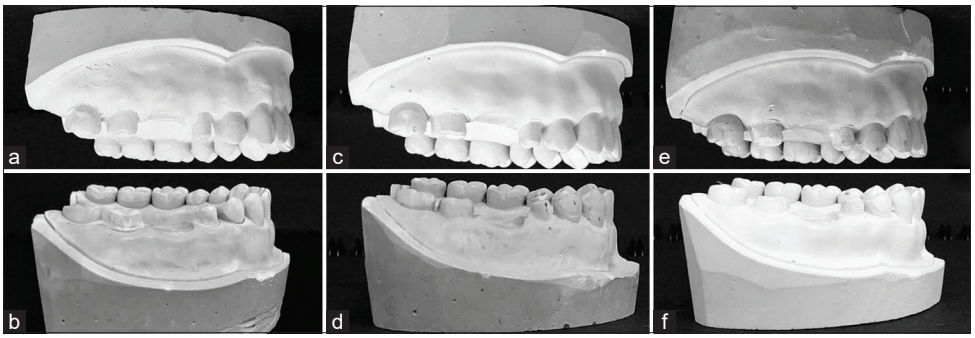

Figure 2: Duplicated maxillary and mandibular casts with second molar preparation as 0º (a and b), 20º (c and d), and 45º (e and f) to the long axis of premolar preparation

the last question was directed to the faculty members in the department of prosthetic dental sciences to nominate the preferred technique to be included in the curriculum. The questionnaire also included a table in the end for the researchers to note down the correct/incorrect entries of the evaluations.

Ethical Approval to conduct this study was obtained from the Institutional Review Board at Jazan University College of Dentistry before initiating the study (Ref letter no. CODJU-18021). Three examiners were trained and calibrated, and a pilot study was conducted to evaluate the intra- and inter-examiner measurement reliability. Intra- and inter-examiner calibration was done in the pilot phase of the study to ensure that data collectors were consistent. Since the study did not include active measurement and it only involved evaluation of agreement between the predetermined angles on the samples and participants assessment, the data collectors were initially blinded and considered by the principal investigators as participants and went through the study. Their responses were evaluated with regard to agreement between them and the angles made on the samples. The measurements in that sense were "correct" if their responses match the angle made on that particular sample or "incorrect" if their responses were not matching. A total of 210 right-handed subjects participated in this study. Of them, 83 were 4th and 5th year students (junior students), 50 were 6th year students (senior students), 61 were interns, and 16 were the faculty members. Each participant evaluated the three stations four times using four different methods. The study was conducted over the period of September 1, 2018, to March 31, 2019. Participants were called individually and each was given a brief description of the study as follows:

1. IOM: Conventional intra-oral examination mirror was used. The mouth mirror is to be centered over one abutment and moved to the next without changing the angulation of the mirror. Preparations are viewed with one eye closed to avoid undetected undercuts with binocular vision
2. PM: Same maxillary and mandibular preparations (confined to one quadrant) are viewed with a buccal photography mirror
3. Hand piece with torbido bur (HP): The participants use a torbido bur mounted on handpiece, directly, to evaluate the path of insertion in two dimensions: Facio-lingually and mesiodistally
4. DS: The casts obtained are positioned on the horizontal plane one by one on the DS (A3005 Surveyor Type A; Dentalfarm) and the participants use analyzing rod to evaluate the parallelism between abutments.

Each participant was given a copy of the questionnaire to complete and asked to leave the study area at the completion of evaluation. The researchers were supposed to note down the correct/incorrect evaluations of the participants.

Data analysis

The questionnaire and the correct/incorrect responses were coded and entered into a Microsoft Excel Spreadsheet (Microsoft Inc., Redmond, WA). The questionnaire documents were stored in the assigned area provided by the college. The

participants' responses to the questionnaires were presented in terms of frequencies, percentages, and charts. Statistical analyses for the differences between the different educational levels in relative to the different methods were utilized using the Chi-square test with $P < 0.05$ was regarded as statistically significant. Data were analyzed using the statistical software program for Windows (IBM SPSS Statistics v20; IBM Corp., Armonk, NY, USA).

Results

Table 1 shows the results of the evaluation of the maxillary prepared abutments by the four techniques in Sets A, C, and E. The technique that was correctly used by majority of participants for Set A was the DS (77.4%), followed by PM (51.9%), HP (48.1%), and IOM (47.6%). For Set C, the maximum correct responses were with the HP (57.1%) followed by DS (55.7%), IOM (50.5%), and PM (48.1%). In Set E, IOM (75.0%) had the highest correct response rate followed by the PM (74.1%) and the DS (47.6%) was the least. The results of the evaluation of the mandibular prepared abutments by the four techniques in Sets B, D, and F are presented in Table 2. Correct responses for Set B, the same was true with the DS (47.6%), followed by HP (44.3%) IOM (38.7%), and PM (37.3%). While in Set F was with DS (77.4%) followed by HP (70.8%) and the IOM (65.1%) was the least. While the technique that was correctly used by the majority of participants for Set D was DS (46.7%) followed by HP and IOM (37.3% and 36.3%, respectively). The PM group had the least correct responses (30.2%). There were no significant differences among the correct responses (a correct response is a true match between the participant's response and the angle made on the samples) for different techniques for both maxillary and mandibular arches across the education levels.

Table 3 detects that PM was considered as easiest among faculty members (43.8%) followed by juniors (26.5%), interns (26.2%), and the senior students (25.0%). While IOM was rated as the easiest among faculty members (37.6%), followed by seniors (36.5%). HP was easy for all participants, while DS was the easiest among the most participants except among dental interns for whom responses were equally distributed as the easiest and most difficult technique (37.5% each). There were no significant differences in the distribution of difficulty of PM, IOM, and HP, but it was near to be significant between the study groups for DS with $P = 0.051$.

Figure 3 shows that DS required maximum time among the different participants. There was a significant difference between different techniques and participants with $P = 0.04$. DS was the technique which was assumed to have less errors, but more expensive with more equipment usage. As illustrated in Figure 4, most of the participants rated IOM as the most skilful technique, while for the faculty members, it was the DS. There were no significant differences in the responses for errors, skill required and

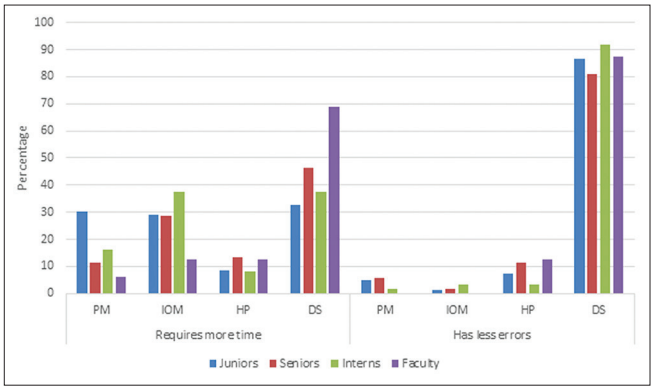

Figure 3: Composite graph showing the percentages among the different participants of the time needed and less error of the different techniques used to check teeth parallelism

Table 1: The reported correct responses across the educational levels to the four techniques with regard to angle differences in the preparations of maxillary abutments

	Juniors	Seniors	Interns	Faculty	Total
Maxillary second molars prepared with 0° (Set A)					
PM	49 (59.0)	19 (36.5)	33 (54.1)	9 (56.3)	110 (51.9)
IOM	44 (53.0)	17 (32.7)	30 (49.2)	10 (62.5)	101 (47.6)
HP	45 (54.2)	18 (34.6)	29 (47.5)	10 (62.5)	102 (48.1)
DS	66 (79.5)	39 (75.0)	48 (78.7)	11 (68.8)	164 (77.4)
Maxillary second molars prepared with 20° (Set C)					
PM	42 (50.6)	22 (42.3)	33 (54.1)	5 (31.3)	102 (48.1)
IOM	45 (54.2)	21 (40.4)	34 (55.7)	7 (43.8)	107 (50.5)
HP	53 (63.9)	23 (44.2)	34 (55.7)	11 (68.8)	121 (57.1)
DS	56 (67.5)	25 (48.1)	31 (50.8)	6 (37.5)	118 (55.7)
Maxillary second molars prepared with 45° (Set E)					
PM	66 (79.5)	32 (61.5)	49 (80.3)	10 (62.5)	157 (74.1)
IOM	64 (77.1)	36 (69.2)	49 (80.3)	10 (62.5)	159 (75.0)
HP	57 (68.7)	33 (63.5)	41 (67.2)	8 (50.0)	139 (65.6)
DS	43 (51.8)	27 (51.9)	33 (54.1)	8 (50.0)	111 (52.4)

IOM: Intra-oral mouth mirror, PM: Photographic mirror, HP: Hand piece, DS: Dental surveyor

Table 2: The reported correct responses across the educational levels to the four techniques with regard to angle differences in the preparations of mandibular abutments

	Juniors	Seniors	Interns	Faculty	Total
Mandibular second molars prepared with 0° (Set B)					
PM	28 (33.7)	17 (32.7)	27 (44.3)	7 (43.8)	79 (37.3)
IOM	39 (47.0)	20 (38.5)	14 (23.0)	9 (56.3)	82 (38.7)
HP	38 (45.8)	25 (48.1)	25 (41.0)	6 (37.5)	94 (44.3)
DS	46 (55.4)	21 (40.4)	27 (44.3)	7 (43.8)	101 (47.6)
Mandibular second molars prepared with 20° (Set D)					
PM	28 (33.7)	12 (23.1)	20 (32.8)	4 (25.0)	64 (30.2)
IOM	34 (41.0)	16 (30.8)	22 (36.1)	5 (31.3)	77 (36.3)
HP	30 (36.1)	19 (36.5)	24 (39.3)	6 (37.5)	79 (37.3)
DS	43 (51.8)	24 (46.2)	27 (44.3)	5 (31.3)	99 (46.7)
Mandibular second molars prepared with 45° (Set F)					
PM	61 (73.5)	35 (67.3)	38 (62.3)	10 (62.5)	144 (67.9)
IOM	57 (68.7)	34 (65.4)	36 (59.0)	11 (68.8)	138 (65.1)
HP	61 (73.5)	36 (69.2)	43 (70.5)	10 (62.5)	150 (70.8)
DS	68 (81.9)	42 (80.8)	41 (67.2)	13 (81.3)	164 (77.4)

IOM: Intra-oral mouth mirror, PM: Photographic mirror, HP: Hand piece, DS: Dental surveyor

Table 3: Percentages of participants' reported scores across techniques and educational levels relative to technique difficulty (score 1 means the easiest, while score 5 means the most difficult)

Technique	Score	Juniors	Seniors	Interns	Faculty	Total	χ^2	*P*
PM	1	22 (26.5)	17 (32.7)	13 (21.3)	7 (43.8)	59 (27.8)	13.607	0.556
	2	12 (14.5)	13 (25.0)	16 (26.2)	2 (12.5)	43 (20.3)		
	3	21 (25.3)	10 (19.2)	12 (19.7)	2 (12.5)	45 (21.2)		
	4	14 (16.9)	6 (11.5)	11 (18.0)	2 (12.5)	33 (15.6)		
	5	14 (16.9)	6 (11.5)	9 (14.8)	3 (18.8)	32 (15.1)		
IOM	1	20 (24.1)	14 (26.9)	18 (29.5)	6 (37.6)	58 (27.3)	21.465	0.123
	2	14 (16.9)	9 (17.3)	15 (24.6)	4 (25.0)	42 (19.8)		
	3	21 (25.3)	19 (36.5)	8 (13.1)	3 (18.8)	51 (24.1)		
	4	16 (19.3)	6 (11.5)	10 (16.4)	2 (12.5)	34 (16.0)		
	5	12 (14.5)	4 (7.7)	10 (16.4)	1 (6.3)	27 (12.7)		
HP	1	44 (53.0)	27 (51.9)	23 (37.7)	9 (56.3)	103 (48.6)	16.644	0.341
	2	19 (22.9)	8 (15.4)	14 (23.0)	4 (25.0)	45 (21.2)		
	3	12 (14.5)	6 (11.5)	12 (19.7)	1 (6.3)	31 (14.6)		
	4	3 (3.6)	5 (9.6)	10 (16.4)	2 (12.5)	20 (9.4)		
	5	5 (6.0)	6 (11.5)	2 (3.3)	0	13 (6.1)		
DS	1	57 (68.7)	37 (71.1)	33 (52.4)	6 (37.5)	132 (62.3)	24.888	0.051
	2	9 (10.8)	2 (3.8)	4 (6.6)	0	15 (7.1)		
	3	6 (7.2)	4 (7.7)	7 (11.5)	1 (6.3)	18 (8.5)		
	4	3 (3.6)	5 (9.6)	7 (11.5)	3 (18.8)	18 (8.5)		
	5	8 (9.6)	4 (7.7)	11 (18.0)	6 (37.5)	29 (13.7)		

IOM: Intraoral mouth mirror, PM: Photographic mirror, HP: Hand piece, DS: Dental surveyor

expense and equipment needed between the participants and different techniques with the $P = 0.662$, 0.235, and 0.612, respectively.

All participants chose DS as the method that requires more steps (57.6%), followed by IOM (19.0%), PM (14.3%), and least method was HP (9.0%). Senior and junior dental students as well as the faculty members preferred the use of DS as the technique that must be adopted during their education and teaching program or in their private clinics. PM was the least preferred among all participants followed by IOM and HP. There were no significant differences for a particular technique to be preferred ($P = 0.548$, 0.214, and 0.658, respectively). For DS, it was obvious that all participants recommended this technique for teeth parallelism measurements except the interns (43.8%), where it was least preferred. There was a significant difference between participants in DS technique with $P = 0.004$. Half of the faculty members chose DS to be implemented in the academic curriculum, while 25% found HP is more suitable, 18.8% chose PM, and only one faculty member (6.3%) chose PM.

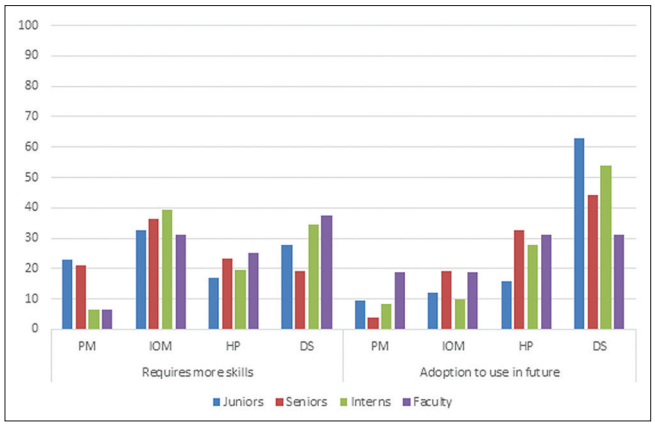

Figure 4: Composite graph showing the percentages among the different participants of the skills and less adoption of the different techniques used to check teeth parallelism

Discussion

With the advent of more complex fixed prostheses that involve multiple abutment teeth, the difficulties of achieving the stated ideal tapers are multiplied. The conventional method of the use of a freely held hand piece and "eye-balling" tooth preparations for intra- and inter-tooth convergence has at least two obvious shortcomings.[15,16] First, during the process of preparation, the dentist must depend on whatever degree of hand-eye coordination and visibility he or she has at that moment. Second, it is impossible to put back tooth structure if the tapers turn out to be excessive. Previous studies have reported that the CA prepared by dental students was greater than that recommended in textbooks, with a mean CA of 19.2° mesiodistally and 23° buccolingually for vital teeth.[17] Most of the students used freehand methods during preparation. However, it is difficult to prepare teeth with the minimal tapers deemed necessary in the literature, particularly in multiple abutment prostheses, when freehand methods were used.[18,19] When evaluating the tooth preparation path of placement parallelism for multiple abutments intraoral PM s may allow easy visualization. Multiple preparations confined to one quadrant or sextant may be viewed with a buccal photography mirror, whereas an occlusal photography mirror provides a better view of multiple preparations in an entire arch.[20]

A dental student or a future dental practitioner needs to be trained to visualize their teeth preparations to detect any amount of undercuts present to minimize further clinical and laboratory problems such as over taper and open margins. Careful literature review revealed that this was the first study to survey and experimentally compares the choices of different techniques to check the relative parallelism across all educational levels and the faculty. The main aim was to recommend the most preferred technique in the future curriculum which could save patients from more invasive procedures later on by limiting common mistakes done by the students. The results of the present study supported rejection of the null hypotheses. The results stated that the technique that DS gave the maximum correct responses except in the maxillary arch when the molar preparation was 20° to the premolar preparation where it was the hand piece and bur technique and when the preparation of molar was 45° to the premolar preparation where it was the intraoral mirror technique. DS being an extraoral technique was easier for most of the participants to give correct answers for both the arches. With the correct use of analyzing rod, it was easy for most of the respondents to detect the amount of undercuts. The final position subsequent to cast orientation is crucial in a surveyor, as changes in AP and lateral tilt may result in changes in the path of insertion.[14] Passively adapted on the surveyor's horizontal shelf upon the placement of the casts which could have perhaps led to small amount of incorrect responses for the surveyor technique.

With PM, all the preparations need to be viewed with single eye centered over one abutment and shifting to the next is done without moving the mirror. The undercut areas relative to the opposing axial walls are difficult to examine since an operator does not have any guideline to move the eye from over one abutment to the other.[20] Furthermore, this technique is not commonly used among the students. These could have been the two most important reasons for maximum incorrect responses regarding the PM technique. Study by Surathu and Nasim[21] stated that with regard to types of procedures that influence mouth mirror use, only 20% of the dental students felt that it was mandatory to use a mouth mirror during tooth preparation of posterior teeth. Moreover, only 10% of respondents used a mouth mirror for indirect vision. This study clearly demonstrates the deficiencies in the understanding of the use of a mouth mirror by dental students and suggested that most students are not using the mouth mirror to its maximum advantage and are either unaware of its potential for use or are simply not employing it for all its functions. This could perhaps be a possible reason of many incorrect responses for the mouth mirror technique.

The use of PM technique was rated as easiest among the interns (26.2%). This could because of their experience in using PMs in the 6th year comprehensive course and internship training programme. In addition, consistent responses from all educational levels disclosed DS as the least difficult and most practical of the studied techniques except among dental interns (37.5%) for whom it was the most difficult technique. This could be related to the multiple factors including stress during graduation requirements, instructor's evaluation methods or student experience.[13] However, the skills for using surveyor could be improved with proper clinical training. The majority of the participants reported higher preference and adoption rates for surveyor technique, except for dental interns who preferred hand piece (43.8%). The intern group was freshly graduated dentists who were familiar with the techniques used in the study; however, their preference tends to use much easier techniques that utilize less steps, technical sensitivity, and armamentaria. In contrast, the faculty members prefer the DS due their academic background and ample experience

with such device and they believe in its accuracy, while the undergraduate students may felt excited about the application of such sophisticated tool and got enthusiastic in term of preferring it among other techniques. Although this finding is supported in the literature and familiar, it not used as a chair side technique due to increase in number of appointments. The existence of special types of mirrors, particularly front surface and concave surface mirror is not familiar with the dental students. The use of these special mirrors can enhance the accuracy factor that indirect vision brings to dentistry.[10] There is certainly scope to make students more aware of the advantages of indirect vision and focused training on the use of indirect vision will help many students incorporate this ergonomically useful technique into their clinical technique. Even the undercut evaluation were incorrect by some participants, still their answers to the questionnaire were accepted. Future questionnaires can include questions about the techniques' steps so as to know the particular steps which need to be stressed upon in the undergraduate curriculum.

Conclusions

Within the limitations of this study, it can be concluded that:

- The DS was more favored among the respondents across all educational levels
- This technique presented high potential in accurately evaluating tooth preparation undercut, abutments parallelism, and path of withdrawal in comparison to the intraoral techniques.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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