Biomaterials Journal
http://www.biomatj.com
Online ISSN: 2812-5045

Type of the Paper (Research Article)

Knowledge and Attitude Regarding Designing Removable Partial Denture Among Interns and Dental Students; Dental Schools in Benghazi \ Libya

SUAD A. ALMASALATI[1] , Hana E. Mahjoub[2], Khadiga I. Elfallah[3], Sara Mohamed.A.M. Bogazia[4]

Citation: *SUAD A. ALMASALATI , Hana E. Mahjoub, Khadiga I. Elfallah, Sara Mohamed.A.M. Bogazia . Knowledge and Attitude Regarding Designing Removable Partial Denture Among Interns and Dental Students; Dental Schools in Benghazi \ Libya . Biomat. J., 3 (1), 3 – 13 (2024).*

https://doi.org/10.5281/znodo.5829408

Received: 10 December 2024
Accepted: 24 December 2024
Published: 25 December 2024

[1] Assistant lecturer, Department of Removable Prosthodontics, Faculty of Dentistry, University of Benghazi, Benghazi, Libya

[2] Assistant professor, Department of Removable Prosthodontics, Faculty of Dentistry, University of Benghazi, Benghazi, Libya

[3] Lecturer, Department of fixed Prosthodontics, Faculty of Dentistry, University of Benghazi, Benghazi, Libya

[4] Assistant lecturer, Department of oral biology, Faculty of Dentistry, Ajdabia University,Ajdabia, Libya

* Corresponding author e-mail: Lady.dent@yahoo.com

Abstract: A removable partial denture is an economical and reversible treatment option thus it is considered as one of the most successful treatment options for partially edentulous patients .The aim of this study was To evaluate the Knowledge and Attitude of undergraduating students and interns in providing proper design of Removable Partial denture (RPD) to Patients in dental schools of Benghazi \ Libya, to improve the undergraduate curriculum that can be beneficial for the newly graduating student and the practicing dentist. Materials and methods : A cross-sectional study design was conducted among dental students and interns at the Faculties of Dentistry of both the University of Benghazi and LIMU. Results : One hundred and thirty registered dentists completed the questionnaire, It was revealed that half (50%) of participants reported never providing RPD service. The majority (63.8%), indicated that they communicate with the laboratory by both marking on the primary cast and laboratory form. less than half (40.8%) of respondents reported that they survey all the time. Almost half (48.5%) reported that their dental technician follows their design instructions .A significant portion of participants (61.5%) believe that designing an RPD is the responsibility of the dentist, The majority of respondents review their basic knowledge before starting an RPD design following the ADA guidelines. Conclusion : Within the limitation of this study we can conclude that; our dental students in both universities (Benghazi and LIMU) have less chance to practice RPD at dental schools On other hand, showed acceptable level of knowledge about designing of RPD. Further practice is recommended.

Keywords: *Knowledge, Attitude, Designing, Removable partial denture RPD*

1. Introduction

Awareness of the dental health was markedly increased, therefore the incidence of edentulism also declined but the number of edentulous individuals remains high due to the population increase[1]. Prosthetic reconstruction of completely or partially edentulous arches is needed as edentulism is considered as disability according to World Health Organization (WHO). A progressive decrease in complete denture wearers and increase of partial denture wearers were noticed due to preservation of the remaining natural teeth which was enforced by recent trained in dentistry. The treatment modalities of partial edentulism include various solutions like removable partial denture, fixed partial prosthesis, and implant assisted prosthesis[2]. A removable partial denture is an economical and reversible treatment option thus it is considered as one of the most successful treatment options for partially edentulous patients[3]. A proper RPD construction requires clinical and laboratory steps that include proper diagnosis and treatment planning, primary impression, survey of the primary cast, initial designing of the prosthesis on the cast, prosthetic mouth preparation, secondary impression, and secondary cast reorientation on the dental surveyor to check the amount of performed teeth modification. There are several components of an RPD each component has a function. Thus, dentists should have clear knowledge regarding design of the various components of the RPD structure. The final design is drawn up and submitted to the laboratory technician to follow the design instructions[4]. Successful communication between dentist and dental technicians is required to fabricate a proper prosthesis, but proper designing of RPD is the responsibility of dentist and is not the job of the technician[5]. An interactive relationship between dentists and dental technicians is required for achieving a successful outcome as there is an increase in the patient's knowledge and needs. Clear effective communication of design features between dental practitioners and dental technicians is a main factor for the production of high quality fixed and removable prostheses[6,7].

Low patient satisfaction with major biological and mechanical complications may result from poorly designed RPDs due to neglecting the biomechanical principle which result from insufficient design information to the technician. Mechanical principles like support, retention and stability should be taken into consideration. Plaque accumulation and oral tissue damage should be minimized by the hygienic principles of the design[8-10]. An inadequate consideration to important clinical and biological factors can cause tissue damage. The final impression should be

made of a dimensionally stable elastomeric material by using a modified metal stock tray or a rigid special tray[11,12]. The responsibilities of the dental practitioners toward the dental laboratory technician and stated definite recommendations for dental educators to deal with the consequences in future[13].

2. Aim of the study:

To evaluate the knowledge and attitude of undergraduating students and interns in providing proper design of removable partial denture (RPD) to patients in dental schools of Benghazi \ Libya, to improve the undergraduate curriculum that can be beneficial for the newly graduating student and the practicing dentist. The null hypothesis was that there was no differnces between the knowledge and attitude of undergraduating students and interns in providing proper design of removable partial denture (RPD) to patients in dental schools of Benghazi \ Libya.

3. Material and method:

A cross-sectional study design was conducted among dental students and interns at the Faculties of Dentistry of both the University of Benghazi and LIMU. A convenience sampling method was employed. Ethical approval (no. 0220) was obtained from the Ethics Committee at the Faculty of Dentistry, University of Benghazi. An online-based questionnaire was used to collect data. The questionnaire included sixteen questions to assess knowledge and attitude about participants' understanding of constructing RPDs, and communication with dental laboratories. Data was collected over a period of 3 months (July -September 2024). Data was analyzed using SPSS (Ver.24), frequencies, and percentages were calculated for all categorical variables.

4. Results:

One hundred and thirty registered dentists completed the questionnaire. Table 1 presents RPD practices among participants. It was revealed that half (50%) of participants reported never providing RPD service, while 15.4% reported 1-2 cases per month. About a quarter (24.6%) of respondents base their decision for the treatment option of RPD on the number of natural teeth present, followed by 23.8% based on cost and patient desire. The majority (63.8%), indicated that they communicate with the laboratory by both marking on the primary cast and laboratory form. A smaller percentage, 8.5%, stated that they do not communicate with the laboratory during the RPD design process. Regarding the survey of the cast, less than half (40.8%) of respondents reported that they survey all the time, and more than one-third (35.4%) of respondents stated that they do sometimes, and 20.8% of respondents reported that they never survey the cast. Almost half (48.5%) reported that their dental technician follows their design instructions most of the time, followed by one quarter (25.4%) whose technician always follows their instructions. On the other hand, a small percentage 9.2%) reported that their technician never followed their design instructions.

Table (1): Respond to questions on RPD practices among participants.

Question	Respond	N (%)

Q1. How often do you provide service of RPD to partially edentulous patient	Never	65 (50%)
	1-2 cases per month.	20 (15.4%)
	More than 3 cases per month	19 (14.6%)
	1-2 cases in 6 months	16 (12.3%)
	1-2 cases per year.	10 (7.7%)
Q2. On which basis do you decide on the treatment option of RPD	fixed not possible	24 (18.5%
	number of natural teeth present	32 (24.6%)
	patient demand	20 (15.4%)
	excessive alveolar bone loss	20 (15.4%)
	cross stabilization	3 (2.3%)
	cost and patient desire	31 (23.8%)
Q3. While designing an RPD how do you communicate with the Laboratory	Verbally	13 (10%)
	Mark on the primary cast	10 (7.7%)
	On laboratory form	1310%)
	both b and c	83 (63.8%)
	None	11 (8.5%)
Q4. How often do you do survey	Never	27 (20.8%)
	No need	4 (3.1%)
	Sometimes	46 (35.4%)

	All the time	53 (40.8%)
Q5. Does your dental technician follow your design instruction	Never	12 (9.2%)
	Sometimes	22 (16.9%)
	Most of the time	63 (48.5%)
	Always	33 (25.4%)

Table (2) presents the participant attitudes regarding RPD design. A significant portion of participants (61.5%) believe that designing an RPD is the responsibility of the dentist, while 38.5% believe it's the responsibility of the dental technicians. The majority of respondents (57.7%) believe that surveying is the job of both a dental technician and a dentist.

Table(2): Responses to participant attitudes regarding RPD design.

Question	**Respond**	**N (%)**
Q6. In your opinion who should be responsible for designing an RPD	Dental laboratory technician	50 (38.5%)
	Dentist	80 (61.5%)
Q7. Is surveying the job of dental technician or a dentist	Dentist	23 (17.7%)
	Dental Technician	31 (23.8%)
	Both	75 (57.7%)
	Not required	1 (0.8%)

Table (3) presents the participant's knowledge regarding RPD design. It was found that less than one-third (30%) of participants were fully aware of how to transfer the need for tooth modification to the patient's mouth. The majority of respondents review their basic knowledge before starting an RPD design either most of the time (38.5%) or always (35.4%). 32.3% follow the ADA guidelines, which are considered a standard in the field, while one quarter (25.4%) rely on their notes and experiences in designing RPDs. 39.2% take rigidity into account when choosing a major connector, reporting that it is always a priority. 47.7% of respondents believe that indirect retainers are necessary in Kennedy's class I, II, and IV cases most of the time, while 21.5%, believe that indirect retainers are sometimes necessary.

Regarding the choices to modify the natural tooth structure, enameloplasty was the most preferred option, followed by changing the path of insertion and crowns, 40.8%, 20.8%, and 18.5% respectively. Only a small percentage of respondents 3.1% indicated that they would choose restoration as their preferred method for modifying the natural tooth structure. Gingivally approaching retainers were the most preferred choice among respondents, with 45.4%, followed by precession attachments, and occlusally approaching retainers, 24.6% and 19.2%, respectively.

Table (3): Responds to the understanding of RPD design and techniques.

Question	Respond	N (%)
Q8. Are you aware of how to transfer the need of tooth modification to be transferred in the patient's mouth	Not aware	13 (10%)
	Little bit	50 (38.5%)
	Aware	39 (30%)
	Fully aware	28 21.5%)
Q9. When you start designing an RPD do you review your basic knowledge of designing	Never	3 (2.3%)
	Sometimes	31(23.8%)
	Most of the times	50 (38.5%)
	Always	46 (35.4%)
Q10. Which reference do you follow in designing an RPD	BDJ	3 (2.3%)
	Mc Cracken's	16 (12.3%)
	Stewart's.	15 (11.5%)
	ADA guidelines	42 (32.3%)
	Other notes	33 (25.4%)
	No need	21 (16.2%)
Q11 . Are you aware of the function of dental implants in providing retention and support in RPD	Not aware	8 (6.2%)
	Little bit	33 (25.4%)
	Aware	58 (44.6%)
	Fully aware	31 (23.8%)
Q12 What do you think when selecting a major connector for RPD rigidity is an important factor	Never	6 (4.6%)
	Sometimes	29 (22.3%)
	Most of the time	44 (33.8%)
	Always	51 (39.2%)
	Never	5 (3.8%)

Q13. Do you agree when we design a clasp it should always be supported by a rest	Sometimes	44 (33.8%)
	Most of the time	37 (28.5%)
	Always	44 (33.8%)
Q14. Do we need to put indirect retainers in Kennedy's class I, II & IV cases	Sometimes	28 (21.5%)
	Most of the times	62 (47.7%)
	Always	40 (30.8%)
	Sometimes	28 (21.5%)
Q15. If you need to modify the natural tooth structure to create or reduce an undercut, what option will you prefer	Enameloplasty	53 (40.8%)
	Restoration	4 (3.1%)
	Crown	24 (18.5%)
	No need	8 (6.2%)
	Altering the RPD design	14 (10.8%)
	Change the path of insertion	27 (20.8%)
Q16. What type of retainer do you prefer in the maxillary esthetic zone for an RPD	Wrought Wire	14 (10.8%)
	Occlusally approaching	25 (19.2%)
	Gingivally approaching	59 (45.4%)
	Precession attachments	32 (24.6%)
	Wrought Wire	14 (10.8%)

5. Discussion:

A correct long-term prosthetic solution can be achieved with the patient's diagnosis of the remaining tissues. If an RPD is the chosen solution, analysis of support, followed by stability and only then, decide upon the necessary retentive elements are the systematic sequence. All other parts should be considered later[14]. The dentist may depend on the dental technician to design the partial denture due to weak undergraduate training in writing laboratory instructions which leads to inadequate communication between the dentist and technician[15]. Lynch and Allenref mentioned important guidelines for designing removable partial dentures. A faulty design of the prosthesis may result due to a lack of information on mechanical and biological principles for RPD design therefore, dental practitioners are responsible

legally and ethically that will not cause harm to oral structures[16,17]. The color coding may be used to mark the different components of RPD and similar terminology should be used by the dentist and the dental technician to get good communication. An online communication between dental clinics and dental laboratories may be provided by Computerized RPD systems[18]. It is not an acceptable practice to leave important parameters in removable prosthodontics like occlusal scheme, carving of posterior palatal seal, and information on finishing and contouring of the dental prosthesis to the decision of the dental technician due to insufficient education[16,17,19]. The interaction between dentists and dental technicians has been termed a ''love-hate relationship'' and the laboratory work authorization has been called the most frequently used and abused form of communication between them[20]. This study revealed the majority communicate with the laboratory by both marking on the primary cast and laboratory form. A smaller percentage do not communicate with the laboratory during the RPD design process. Less than half of respondents reported that they survey all the time, more than one-third of respondents stated that they do sometimes, and 20.8% of respondents reported that they never survey the cast. Almost half of the participants reported that their dental technician follows their design instructions most of the time, followed by one quarter whose technician always follows their instructions. On the other hand, a small percentage reported that their technician never followed their design instructions. In this study, a significant portion of participants believe that designing an RPD is the responsibility of the dentist, and the majority of respondents believe that surveying is the job of both a dental technician and a dentist. Preservation of existing oral structures is the primary purpose of treatment by removable partial denture and natural abutment teeth are selected to provide the necessary support, bracing, and retention for the removable prosthesis sometimes are unable to perform their task without some modification, therefore, altering the tooth's enamel surface or fabricating and placing a crown may be needed[21]. It was found that less than one-third of participants were fully aware of how to transfer the need for tooth modification to the patient's mouth and enameloplasty was the most preferred option and a small percentage of respondents would choose restoration as their preferred method for modifying the natural tooth structure. The Major connector of the cast partial denture should be rigid to resist flexing and torquing forces, it provides cross arch stability and resists displacement by functional stresses. An unequal distribution of forces may be caused by a flexible major connector which in turn may cause damage to the supporting structures[22]. The use of indirect retainers depends on any given case. It is important to apply an indirect retainer in Kennedy Class I, II and IV situations with long-span edentulous areas in the form of rests (occlusal, cingulum, incisal), Continuous bar or Cingulum bar[23]. In this survey 39.2% take rigidity into account when choosing a major connector, reporting that it is always a priority. 47.7% of

respondents believe that indirect retainers are necessary in Kennedy's class I, II, and IV cases most of the time, while 21.5%, believe that indirect retainers are sometimes necessary. A survey was made in in commercial laboratories in Athens, Greece to record removable partial denture (RPD) retentive elements and abutment teeth in partially edentulous patients, Roach clasps were found to be used in the majority of cases whereas RPI clasps and attachments were rarely used[24]. Similarly, in our survey gingivally approaching retainers were the most preferred choice among respondents followed by precession attachments, and occlusally approaching retainers respectively.

6. Conclusion:

Within the limitation of this study we can conclude that; our undergraduated students have less chance to practice RPD thats why they miss some of the basic of treatment option for partial edontilism. On other hand, they belived in the communication with dental technitions . They aggred that the survey and designing of RPD is mainly the responsibility of the dentist. Most of them consideder ADA as a refrence. They belived in the importance of implant to support RPD , and the importance of major connector and gingivally approach retained in esthetic zone. Dental students in both universities (Benghazi and LIMU) showed acceptable level of knowledge about designing of RPD. Further practice is recommended.

Refernces:

1. Nesreen Salim., et al. “First exposure of undergraduate students to removable prosthodontics concepts: opinions, attitudes and current trends in teaching”. Jordan Medical Journal 55.3 (2021): 131-144.

2. Al-Angari N., et al. “Various classes of removable partial dentures: A study of prevalence among patients attending a dental and educational institute in Riyadh, Saudi Arabia”. The Saudi Dental Journal 33.7 (2021): 656-660.

3. Sadig WM and Idowu AT. “Removable partial denture design: A study of a selected population in Saudi Arabia”. The Journal of Contemporary Dental Practice 3.4 (2002): 40-53.

4. Khan MF., et al. “Knowledge and attitude regarding designing removable partial denture among interns and dentist; dental schools in Pakistan”. JPDA 29.02 (2020).

5. Alshiddi IF. “Communication between dental office and dental laboratory: From paper-based to web-based”. Pakistan Oral and Dental Journal 34.3 (2014).

6. Z. Afsharzand, B. Rashedi, V.C. Petropoulos: Communication between the dental laboratory technician and dentist: work authorization for fixed partial dentures. J prosthodont, 15 (2) (2006), pp. 123-128

7. American dental association: statement of prosthetic care and dental laboratories; 2000. p. 455.

8. Öwall B., et al. "Removable partial denture design: a need to focus on hygienic principles?" International Journal of Prosthodontics 15.4 (2020).

9. Phoenix RD., et al. "Stewart's clinical removable partial prosthodontics". Quintessence Chicago (2003).

10. Carr AB and Brown DT. "McCracken's Removable Partial Prosthodontics". 12th edition (2011): 95-128.

11. D. Lynch, P.F. Allen:Quality of written prescriptions and master impressions for fixed and removable prosthodontics: a comparative study.Br Dent J, 198 (1) (2005), pp. 17-20

12. C.D. Lynch, P.F. Allen:Quality of communication between dental practitioners and dental technicians for fixed prosthodontics in Ireland.J Oral Rehab, 32 (2005), pp. 901-905

13. C. Goodacre: Review of the literature predoctoral fixed prosthodontics education. J Prosthet Dent, 64 (3) (1990), pp. 319-325

14. N Samet , M Shohat: A systematic approach for removable partial denture design , Refuat Hapeh Vehashinayim 2003 Apr;20(2):71-6, 83.

15. Afsharzand Z, Rashedi B, Petropoulos VC. Communication between the dental laboratory technician and dentist: work autho-rization for fixed partial dentures. J prosthodont 2006;15(2):123–8.

16. Lynch D, Allen PF. Quality of written prescriptions and masterimpressions for fixed and removable prosthodontics: a compar-ative study. Br Dent J 2005;198(1):17–20.

17. Lynch CD, Allen PF. Quality of communication between dentalpractitioners and dental technicians for fixed prosthodontics inIreland. J Oral Rehab 2005;32:901–5.

18. Davenport JC, Basker RM, Heath JR, Ralph JP, Glantz P-O,Hammond P. Communication between the dentist and the dentaltechnician. Br Dent J 2000;189(9):471–4.

19. Tuominen R, Ranta K, Paunio L. Wearing removable partialdentures in relation to periodontal pockets. J Oral Rehabil1989;16:119–26.

20. Leeper SH. Dentist and laboratory: a love-hate relationship. DentClin North Am 1979;23:87–99.

21. Wright WE. Abutment tooth modification for removable partial denture therapy. Compendium. 1989 Jan;10(1):40-3, 46-7. PMID: 2688890.

22. Bhojaraju N, Srilakshmi J, Vishwanath G. Study of deflections in maxillary major connectors: a finite element analysis. J Indian Prosthodont Soc. 2014 Mar;14(1):50-60. doi: 10.1007/s13191-012-0237-3. Epub 2012 Dec 27. PMID: 24604998; PMCID: PMC3935043.

23. Phoenix RD, Cagna DR. DeFreest, CF – editors. Stewart's clinical removable partial prosthodontics. 3th ed. Chicago: Quintessence Publishing Co.; 2003.

24. Polychronakis N, Sotiriou M, Zissis A. A Survey of Removable Partial Denture (RPD) Retentive Elements in Relation to the Type of Edentulism and Abutment Teeth Found in Commercial Laboratories, Athens, Greece. Acta Stomatol Croat. 2014 Sep;48(3):199-207. doi: 10.15644/asc48/3/4. PMID: 27688367; PMCID: PMC4872824.