Current trends in removable partial prosthodontics teaching in undergraduate dental colleges of Sindh, Pakistan

ABSTRACT: -

Objective: To explore current trends in removable partial prosthodontics teaching in undergraduate dental colleges of Sindh, Pakistan.
Study Design: - Descriptive Cross-sectional
Place and Duration of the Study: - Department of prosthodontics in dental colleges of Sindh in September 2019.
Methodology: A descriptive cross-sectional study was done in which a questionnaire was sent by email to head of Prosthodontics department of 16 dental institutes of Sindh, Pakistan. The survey included different questions regarding current trends in removable partial prosthodontics education in undergraduate dental colleges.
Results: Out of sixteen questionnaires, fourteen were completely filled and returned. Majority (69.2%) of the institutes teach fabrication of removable partial dentures (RPDs) in third year of dental college. Students of only one dental college fabricate 10-12 RPDs in their clinical rotation. All dental colleges teach acrylic RPD construction in their preclinical years. Faculty in 12 (85.7%) dental colleges always give clinical demonstrations to students before their clinical rotations. Eleven out of the fourteen colleges teach cast partial dentures (CPDs) theoretically, but no CPDs are fabricated by the students during their clinical rotation. About 70% dental schools do not have in-house facility to fabricate cast partial dentures.
Conclusion: This study describes current trends of removable prosthodontics teaching in undergraduate colleges of Sindh. A large majority of undergraduate dental students do not fabricate the minimum number of partial dentures as per PMC requirement. Although theoretically cast partial dentures are taught in lectures but students do not construct them in their undergraduate years. Efforts should therefore be made to improve teaching practices and clinical skills of undergraduates, for them to be able to treat partially dentate patients after graduation.

Keywords: Undergraduate, Prosthodontics, Removable partial dentures, Education

INTRODUCTION

Recent developments in dental materials has brought about considerable improvement in preventive dental care over the past years.[1] However, studies have shown that there will still remain a need for removable prosthetic treatment as a result of extended life expectancy and population growth globally.[2, 3] About 4.1% of Pakistanis above 65 years are edentulous, expected to increase to 9.3% by 2030.[3] Conventional removable prosthesis have been used to replace missing teeth as predictable and minimally invasive option for many years.[4,5] In recent years, the focus has shifted to implant retained prosthesis for missing teeth replacement.[6] The expense, complex surgical procedure and risks related to implant retained prosthesis is the reason that conventional removable denture is a treatment modality that is being used worldwide for replacing missing teeth.[1]
For success of a removable denture it is imperative that a holistic treatment plan is formulated and design of denture framework is given utmost importance. Faulty designing and its execution can lead to harmful consequences on the oral tissues because of food packing, plaque accumulation, undue stresses on abutment teeth and underlying residual ridge. This can cause dental caries, gingivitis, periodontitis and accelerated bone resorption.[5]
The Pakistan Medical Commission (PMC) is the body that implements undergraduate curricula and develops the major competencies for Dentistry in the country. An indispensable module of undergraduate

Prosthodontics curriculum is fabrication of removable dentures. Even though didactic teaching is a vital tool to form the initial schema for a topic, it will not provide the competency needed to carry out the skill in clinical situations. Similar to other dental procedures, construction of removable dentures is a skill that will be learnt better when demonstrated clinically.[6, 7] The test for dental educators of today is to train dentists who are proficient oral healthcare providers.[8] Dentists attain knowledge, learn procedural skills and gain initial expertise for management of missing teeth in the undergraduate years.[9, 10] It is the obligation of educators to ensure that students graduate from dental school with the competencies and professional attributes that will help them carry out efficient patient management and provide oral health care to the community. Therefore, if there are disparities in the teachings of removable prosthodontics, dental graduates may not be able to treat patients effectively in clinical settings, subsequently providing below par patient care. In this era of medical education, continuous curricular evaluation should be undertaken to ensure that evidence based current techniques and management are imparted to students, so they are able to fulfil the dental needs of our community after they graduate.[8, 10]

In developed countries, surveys have been carried out that report methods used in undergraduate schools to teach removable partial denture prosthodontics to students.[9, 11-14] To the best of our knowledge, we could not find any published study conducted in Sindh that describes teaching methodologies and practices employed in removable partial Prosthodontics curriculum.

The objectives of this study were to assess current trends in removable partial Prosthodontics teaching in bachelors of dental surgery (BDS) in Sindh and to determine current trends in techniques and materials being used in dental colleges when fabricating removable dentures.

METHODOLOGY:-

The cross-sectional descriptive survey included various questions on current trends in teaching removable partial Prosthodontics in dental colleges of Sindh. The questionnaire used was adapted by a couple of studies, [12, 13] modifications and additions were then done according to local context. The questionnaire was emailed to three content experts; changes were made to the questions as per their suggestions. Ethical review committee approved the research (Ref# AUG-2019- PRSO1).

Names of recognized colleges teaching undergraduate dental students in Sindh was obtained from PMC. A structured questionnaire was emailed in September 2019 to departmental heads of Prosthodontics in these colleges. All departmental heads involved in teaching Prosthodontics to BDS students in Sindh were included; while those who did not consent to be a part of the study were excluded. Two reminders, by phone calls and email, at two week intervals were sent to the study participants to completely fill the questionnaires. Part I of the questionnaire inquired details regarding socio-demographics of the participants. The second part of data collection instrument included questions related to didactic and clinical teaching practices of removable partial Prosthodontics. Data was entered and analysed using SPSS version 23 (SPSS Inc., USA).

RESULTS:-

A total of 16 survey forms were emailed, out of which 14 were mailed back completely filled. Seven (50%) dental schools conduct didactic and clinical teaching of removable partial dentures (RPDs) in 3rd year, 2 (14.3%) in the final year while five of the schools spread the teaching over two or more years of dental school. Figure I illustrates the number of acrylic RPDs students constructed during clinical rotation.

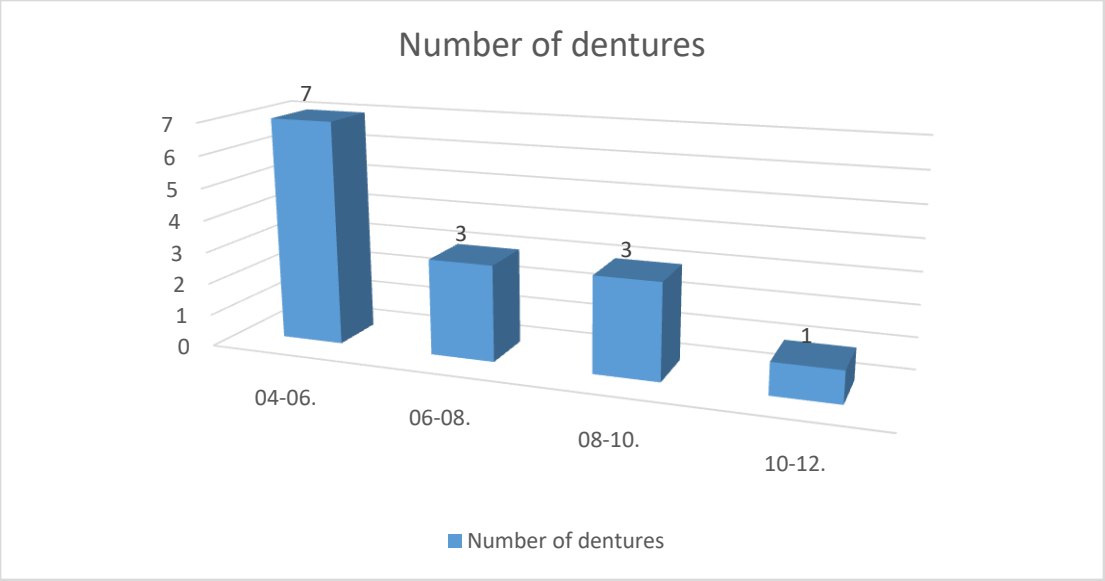

Figure I- Removable acrylic partial denture cases fabricated by students during their Prosthodontic rotation.

Preclinical removable partial denture courses are taught at all 14 dental colleges before the students enter their clinical rotations. Acrylic partial denture construction is taught in all 14 schools. Cast partial dentures (CPD) designing is only taught at 08 (57.1%) dental schools, and surveying is taught in 10 (71.4%) dental schools. Only 01 (7.1%) dental school teaches rest seat preparation to their students during pre-clinical rotation. Faculty of 13 (92.9%) dental colleges always give clinical demonstrations to the undergraduates before they provide treatment to partially dentate patients in clinical settings, while 01 college reports giving demonstrations only some of the times. **Figure II** illustrates the teaching methodologies used during the removable partial prosthodontics (RPDs) course.

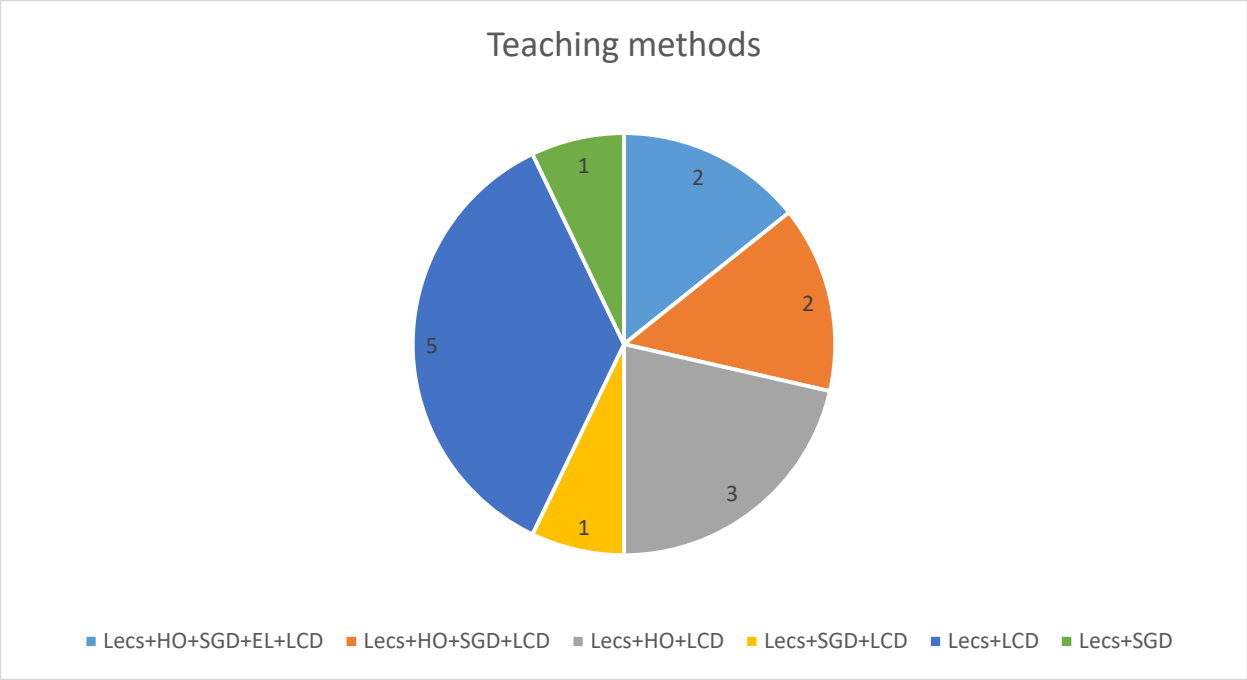

Figure II- Methods employed in teaching removable partial dentures (RPDs) to the undergraduate students.

Lecs- Lectures; HO- Hands on Practice; SGD- Small Group Discussion; EL- E-Learning; LCD- Live clinical demonstration.

Irreversible hydrocolloid is used in all the dental schools for primary impressions of removable partial dentures. The most common material used by students for making secondary impressions was irreversible hydrocolloid 10 (71.4%), followed by polyvinylsiloxane (7.1%) and zinc oxide impression paste (7.1%). All colleges advocate green stick compound for peripheral moulding of impressions of partially dentate arches in Kennedy Class I and II scenarios. For recording impression of mandibular free end saddle RPDs, selective pressure technique was advocated by 12 out of 14 colleges, while 02 colleges supported the use of mucostatic technique. Wax alone (64.3%) was the most commonly used material for interocclusal records followed by combination of wax and bite registration paste (35.7%).

Out of 14, students of 13 schools carry out laboratory steps of acrylic RPDs themselves. When mounting casts, students of only one college (7.1%) use semi-adjustable articulators. Articulator of choice in other 13 colleges (92.9%) was the simple hinge.

Theoretically, interim dentures are taught at all of the 14 dental schools. Eleven out of 14 schools carry out didactic teaching of cast partial dentures. Didactic teaching of precision attachment retained, sectional dentures and implant supported dentures at the undergraduate level is done in only 03 (21.4%) of the dental colleges. Students of eight colleges (57.1%) preform cast partial denture (CPD) designing, but none of them construct CPDs or implant supported removable prosthesis in the clinics. The reasons stated were lack of patient affordability and scarce resources in the institutes. Only 04 (28.6%) of the dental colleges have an in-house laboratory facility for CPD fabrication.

The most recommended book for didactic teaching was McCracken's Removable Partial Prosthodontics (100%). Textbooks authored by Steward, Fenn and Nallaswamy were also endorsed by a couple of colleges. Around 1/3rd dental colleges (35.7%) recommended journals along with textbooks.

DISCUSSION:-

This is the pioneer study to the best of our knowledge carried out in Sindh, Pakistan to evaluate current trends in didactic and clinical practice of undergraduate students in removable partial prosthodontics. Even though similar studies have been conducted over the years in other parts of the developed world, none has been carried out to date in our part of the world. [9,11-14]

Pakistan Medical Commission (PMC) regulates the license to practice dentistry in Pakistan. A recent graduate is eligible to start an independent professional practice without undertaking any training/ licensing examination. It is thus important that a dental graduate is competent to rehabilitate partially dentate patients by different treatment modalities, including provision of removable dentures. Acrylic RPDs are considered as interim dental prosthesis that are to be replaced with cast partial dentures in the definitive treatment phase. This is because the stability and function of acrylic dentures deteriorates considerably within a year of use.[15] Designing and fabrication of dentures is a skill that is best learned and retained by hands-on training and practice after attaining baseline knowledge about the procedure. It is therefore alarming to note that even though didactic teaching and designing of cast partial dentures is being taught in some schools, none of the students are fabricating even a single CPD in their undergraduate years. This is dissimilar to undergraduate schools in UK, United States, Ireland and Spain as their students are required to construct cast partial dentures during their undergraduate years.[9,11-14,16]

Preclinical courses are foundation courses before clinical practice. All skills the undergraduates will carry out in clinical settings should ideally be taught and practiced in the preclinical setting beforehand. Preparation of rest seats, an important step during provision of CPDs is only taught to students of only one dental college in their pre-clinical years. Use of a dental surveyor is taught at 10, while cast partial denture deigning is taught in 08 dental colleges. These procedures are important during CPD fabrication and therefore students must be competent enough in all these areas before treating such patients. Khan MF *et al*.[17] in a recent study concluded that almost half of dental practitioners were of the opinion that designing RPD was the technicians job rather their own. However it is the responsibility of dentist to design partial denture rather than dental technician since dentist has evaluated the patient clinically**.** Hence there is a need to formulate guidelines for pre-clinical prosthodontics course so an improved and uniform course is taught across colleges and the students are better prepared when treating patients in the clinical setting.

Even though there are no 'evidence-based' guidelines, recommendations in textbooks used in undergraduate teaching can be used as a reference for use of articulators in various restorative cases.[18, 19] Simple hinge articulator is unable to mimic mandibular movements when fabricating removable dentures in the laboratory. It is therefore recommended that in majority of cases, the average value or semi-adjustable articulator be used for cast mounting when fabricating removable prosthesis, especially in cases with unstable occlusion.[20,21] Petropoulos *et al*[13] reported use of semi-adjustable articulator by 98% dental colleges in US to mount casts to plan and fabricate RPDs. Surveys conducted in US, UK and Ireland report that semi-adjustable articulator is advocated for articulation when replacing missing teeth.[9,13,14,20] In comparison, only 01 school in our survey reported the use of semi adjustable articulator by students. Students of the other 13 schools all use hinge articulators when constructing acrylic partial dentures.

According to the guidelines provided by PMC, students before graduation should fabricate 12 acrylic partial denture cases in the Prosthodontics OPD. Despite of this, only one college fulfils this requirement. Most (53.85%) of the students fabricate about 4-6 acrylic RPD cases during their Prosthodontic rotation. While this number is far less than what is expected according to the set guidelines, comparable data from UK and Ireland revealed that students, on an average, fabricated 02 acrylic and 03 cobalt chromium dentures, prior to graduation.[9] Similarly, students of Spanish dental schools fabricate 3-4 acrylic and a similar number of cobalt-chromium RPDs prior to graduation.[11] Survey of US dental schools also found a similar number of dentures that students are required to complete in clinical undergraduate years.[13] While the cases of acrylic partial dentures fabricated are comparable to international practices, fabrication of CPDs is negligent in our students. The reasons stated for this include lack of patient affordability and scarce resources in the dental schools. In the authors' view, a conscious effort should thus be made by the colleges to make available the resources at subsidized costs in order to provide students with the clinical familiarity of CPD fabrication in undergraduate years. This will enhance training experience of students and improve their expertise for rehabilitating patients requiring CPDs once they graduate.

It is encouraging to note that along with lectures, faculty of 13 out of 14 colleges give live clinical demonstrations in small groups to students before they treat patients in clinical settings. Only 02 dental colleges utilize e-learning to aid in teaching their students the clinical steps of denture construction. In the era of computers and digitalization, more emphasis can be given to alternate teaching strategies including virtual teaching and online videos to help students learn principles of removable denture construction.[11] Video-taped demonstrations that are accessible to students to watch in their own time, on multiple occasions, have been reported to develop comparable levels of understanding of procedures in students.[22]

Results of our study reported that very few dental colleges of Sindh teach implant supported/ retained partial dentures. Khan FR *et al.* reported more than half the dental colleges nationwide neglect prosthetic component of implants at the undergraduate level.[8] On the flip side, majority (81%) of dental schools in United Kingdom teach implant dentistry in the Restorative and Oral Maxillofacial curriculum. [23] Furthermore, none of the students in dental colleges of Sindh fabricate implant supported partial dentures in their Prosthodontic rotation. This is analogous to results reported by dental schools of UK and Ireland where very few schools provide clinical experience to students for restoration and placement of dental implants.[23, 24]

Results of this study needs to be treated with caution as they only portray the current teaching trends as narrated by senior faculty themselves. A study should be conducted whereby input of students be recorded regarding teaching methodologies and trends in RPD education and then paralleled to results of our study. Nevertheless, this is the first study that highlights the trends of removable partial denture education in our country. Finding of this survey will help in highlighting the insufficiencies in teaching methods as well as clinical practices at the undergraduate level Prosthodontics curriculum in Sindh. In light of these results, recommendations need to be forwarded to governing educational body of the country to expand curriculum needs, thus improving clinical training of undergraduate students.

CONCLUSION:-

This study describes current trends of removable partial prosthodontics teaching in the dental colleges of Sindh. Removable partial denture education program differs from institute to institute.

Majority of the students do not fabricate the minimum number of acrylic partial dentures as per PMC requirement, while none construct cast partial dentures in their formative undergraduate years. Efforts should therefore be made to improve teaching practices and clinical skills at undergraduate level, for graduates to be prepared to treat partially dentate patients.

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ETHICAL CONSIDERATION: - Ethical approval letter from the Institutional review board committee

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CERTIFICATE OF APPROVAL

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PRINCIPAL INVESTIGATORS	DEPARTMENT	BEH NO.
Ahsan Inayat	Prosthodontics	AUG-2019-PRS01

INSTITUTION(S)

Fatima Jinnah Dental College, Karachi Pakistan

TITLE

Current trends in removable prosthodontics education in undergraduate dental colleges of Pakistan.

ORIGINAL REVIEW DATE	APPROVAL ON	APPROVAL OF	EXPIRY DATE
2nd Aug, 2019	19th Aug, 2019	Ethics Application Consent Protocol	19th Aug, 2022
Full Board Meeting		☒	
Delegate Review		☑	

CERTIFICATION

The Fatima Jinnah Dental College Institutional Ethical and Scientific Review Board has reviewed the above named research project. The proposal was found to be acceptable on ethical grounds. The principal investigators have the responsibility for any other administrative or regulatory approvals that may pertain to this research project.

The authorized research should be carried out according to the conditions outlined in the original protocol submitted for ethics review. The Certificate of Approval is valid for the above time period provided there is no change in experimental protocol or consent process or documents.

Dr. Hasan Mehdi
Fatima Jinnah Dental College
Institutional Ethical and Scientific
Review Board