PATTERN OF PARTIAL EDENTULISM, DESIGN ACCEPTABILITY AND LEVEL OF PATIENTS' SATISFACTION WITH PROVIDED ACRYLIC REMOVABLE PARTIAL DENTURES AT MUHIMBILI UNIVERSITY DENTAL CLINIC, DAR ES SALAAM

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By

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A Dissertation Submitted in Partial Fulfillment of the Requirement for the Degree of Master of Dentistry in Restorative Dentistry of Muhimbili University of Health and Allied Sciences

October, 2021

CERTIFICATION

The undersigned certify that they have read and hereby recommended for acceptance by Muhimbili University of Health and Allied Sciences a dissertation titled: "Pattern of partial edentulism, design acceptability and level of patients satisfaction of with provided Acrylic Removable Partial Dentures at Muhimbili University dental clinic, Dar es salaam**"** in fulfillment of the requirement for the degree of Master of Dentistry (Restorative Dentistry) of Muhimbili University of Health and Allied Sciences

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Date

DECLARATION

AND

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I, Dr Medetoh Sandrine Teclaire, declare that this dissertation is my own original work and that it has not been presented and will not be presented to any other University for a similar or any degree award.

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DEDICATION

This work is dedicated to THE ALMIGHTY GOD. Father I bring to You, all what I am and all what I have. For Before YOU formed me, YOU knew me, before I was born YOU set me apart; YOU appointed me. YOU know the plans YOU have for me, plans to prosper me and not to harm me, plans to give me hope and a future.

ABSTRACT

Background: The most common treatment option available for the replacement of missing teeth in partially edentulous patients in developing countries like Tanzania is the acrylic removable partial dentures (ARPD). The ARPD is clinically considered as an interim treatment option but is provided as a definitive treatment in this setting. Being an interim denture, most times the practitioners do not consider the design and the long-term use of these ARPD's could become detrimental to the soft and hard structures of the oral cavity. A good design based on biomechanical considerations, that considers patients' satisfaction, seems to be essential for achieving a beneficial ARPD that can be used as a definitive prosthesis.

Objective: Aim of this study was to determine the pattern of partial edentulism, design acceptability and level of patient's satisfaction with provided ARPD at Muhimbili University, Dental Clinic, Dar es Salaam.

Methodology: This cross-sectional study was conducted at the MUHAS dental clinic in Dar es Salaam, Tanzania. The estimated sample size of 173 registered dental patients aged 18 and above, provided with acrylic removable partial dentures as from of January 2019 to January 2021 were recalled using the convenient sampling technique. Data was obtained using a structured questionnaire and clinical examination was performed to those who consented. Gathered data were analyzed using SPSS, version 20.0. The characteristics of assessed variables were described using frequency distribution for categorical variables and in the case of discrete variables; the mean and standard deviation were applied. Chi-square test was used to compare proportions and logistic regression determined any association between independent and dependent variables. Level of statistical significance will be set at $p < 0.05$.

Results: Of the n= 173 enrolled participants, 88 participants had only upper ARPD, 34 lower and 51 both, giving a total of 134 upper and 85 lower ARPD. The most prevalent pattern was Kennedys Class III in both arches with 61.9% for the upper arch and 30.9% for the lower arch. Of the assessed SDF, 62.4% of participants were female and participants with a minimum of secondary education (66.5%) were two times more than those with

less. The younger group age (18-51 years old) had statistically significantly higher prevalence of partial edentulism of the upper jaw than those in the higher age group. Slightly more than a third (39.6%) of ARPD in the upper jaw had acceptable design in comparison to 21.2% on the lower denture. More than three quarters of participants were satisfied with their upper (89.9%) and lower (87.1%) ARPD. Although there were a statistically significant association between the denture design of the upper ARPD (p=0.009) and level of education of participants with lower ARPD (p=0.045) and the patient's satisfaction, logistic regression shows no relationship between patients' satisfaction and design denture.

Conclusion: The study reported that the most prevalent pattern of partial edentulism in both upper and lower jaw was Kennedys class III, and ARPD dentures with an acceptable design was low for both upper and lower jaw, with (21.2%) of lower and more than third (39.6%) for upper having an acceptable design. Age group, denture design of the upper ARPD, level of education of the lower ARPD were found to be significantly statistically associated to the level of patients' satisfaction.

Recommendations: An appropriate students-teacher ratio will be necessary in order to maximize the supervision, teaching and instruction to the dental student on the importance of biomechanically designed denture required for patients seeking tooth replacement with ARPD.

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Figure 1: Conceptual framework. Source: Medetoh Sandrine Teclaire, 2020 4

LIST OF ABBREVIATIONS

ARPD	Acrylic Removable Partial Denture
K. Class	Kennedy's class
MUHAS	Muhimbili University of Health and Allied Sciences
RPD	Removable Partial Denture
SPSS	Statistical Package for Social Sciences
SDF	Socio Demographic Factors

DEFINITION OF TERMS

Removable partial denture: a prosthesis that replaces one or more teeth but not all of the teeth in an arch and can be readily inserted and removed from the mouth by the patient. it can be interim or definitive (1).

Acrylic Removable Partial Denture: is a dental prosthesis made of acrylic material that restores one or more but not all of the natural teeth and / or associated parts, and can be removed and replaced by the patient (1).

Biomechanical denture design is one that has taken into consideration all mechanical forces/stress acting within the oral cavity and its impact on the remaining biological tissues. The mechanical forces that need to be considered are the dislodging, displacing, horizontal and torsional forces/stress while the biological forces considered are the length of the edentulous span, type of oral mucosa, quality of ridge support, clasp design (type, length, flexibility, material) and occlusal harmony (1).

Definitive prosthesis: any dental or maxillofacial prosthesis designed for long-term use (1).

Denture design: a planned visualization of the form and extent of a dental prosthesis arrived at after the study of all factors involved (1).

Edentulism: is the state of being edentulous, or without natural teeth (1).

Interim removable partial denture: is a removable prosthesis designed to enhance esthetics, stabilization and/or function for a limited period of time after which it is to be replaced by a definite prosthesis (1).

Kennedy classification: system developed by Edward Kennedy in 1928 that classifies the partially edentulous arches into four classes:

Kennedy class I - Bilateral edentulous space posterior to the remaining teeth.

Kennedy class II - Unilateral edentulous space posterior to the remaining teeth.

Kennedy class III- Unilateral edentulous with natural teeth bot anterior and posterior.

Kennedy class IV- Single bilateral edentulous area, located anterior to the remaining natural teeth (1).

Patient satisfaction with ARPD: can be defined as patient`s attitudes towards the prosthesis in relation to comfort, esthetics, chewing, phonetics, stability and retention (1)

CHAPTER ONE

1. INTRODUCTION

1.1 Background

The oral health of a population is determined by the partial or complete absence of teeth (2). Tooth loss is the ultimate outcome of different diseases of the oral structures (3). Loss of one or more teeth in the oral cavity presents with a partially edentulous space in the dental arch (4). Several studies have analyzed the correlation between partial edentulism and its influencing factors such as socioeconomic parameters, age, and sex (5). Furthermore, partial edentulism can compromise aesthetics, restrict dietary options, and cause psychological dissatisfaction (6).

The presentation of missing teeth within a dental arch has been classified using different entities, with the primary objective to facilitate the designing and communication between clinicians and laboratory technicians (3). Of these classifications, Kennedy's classification is the most widely used and accepted because of its simplicity, ease of application to all partially edentulous situations, immediate visualization of the type of partially edentulous arch and recognition of prosthesis support (7). Classification of tooth loss allows visualization of partially edentulous spaces that are being considered for replacement using prosthesis (8), but it also helps the dentist to determine the appropriate design of dentures based on the location and the number of missing teeth (9).

Of the several treatment options available for the rehabilitation of the partially edentulous arches (10), Acrylic Removable Partial Dentures (ARPD) are the most commonly used treatment option in developing countries because they are cheaper and easier to fabricate (11). However, the main disadvantage of ARPDs is the low impact strength of the acrylic material that renders them susceptible to fracture. This disadvantage is usually compensated for by increasing the bulk of the material, however, this has the potential of traumatizing the soft tissues (12). ARPD's also have the potential to cause plaque accumulation which can lead to both caries and periodontal disease. In addition, resorption of the residual ridges supporting these partial dentures has been reported. This resorption is known to have a great impact on the patients satisfaction (13). Consequently if the intended temporary restoration is used as a quasi-permanent appliance, it may lead to irreversible damage to the remaining teeth, the soft gingival tissues and the residual ridges

(14) and rendering the patient to pursue more sophisticated dental care. Unlike permanent prosthesis, dentists and dental technicians tend to fabricate acrylic partial dentures without following the biomechanical principles of a definitive prosthesis. As a result most of the ARPDs have little or no tooth support posing a higher potential for soft tissue damage (12). An appropriate denture design, which take into account optimum clinical and biological principles will not injure the oral soft tissues (9,12) and yield a comfortable denture capable of improving masticatory performance.

The success of ARPD treatment is often judged differently by clinicians and patients. Clinicians consider the fabricated dentures to be successful if they meet certain technical standards, whereas patients evaluate them from the viewpoint of their personal satisfaction (7). In spite of meticulous planning and execution in fabricating ARPD, dissatisfaction among patients toward the dentures persists due to lack of proper form, functionality, and esthetics (10). A number of researchers have reported that most cases of patient dissatisfaction are related to the misconception that speech, mastication and aesthetics would be restored to the same level as with natural teeth (15,16). Also, too high or unrealistic expectations of patients might affect the level of post-treatment satisfaction and treatment failure might occur as a result. Chewing ability, esthetics, retention and comfort become the foremost criteria among the expectations of patients replacing missing teeth with prosthetic teeth, however, dissatisfaction of either one may lead to the non-use of dentures (10). In an attempt to fulfill patient expectations, adherence to proper patient selection, education and the principles of partial denture design has been reported to play an important role in changing an interim to a more permanent denture (12).

In Tanzania, it has been reported that tooth loss is prevalent across all age groups, with lower third and first molars being the teeth most frequently lost due to caries, whereas the lower central incisors were the teeth most frequently lost due to reasons other than caries (17). In Tanzania, dental laboratory facilities are currently located at regional, referral and national hospitals. Being a teaching facility, the school of dentistry of the Muhimbili University provides training that spans from dental specialists, residents, registrars, interns, and undergraduate students. Also, it houses the training of dental laboratory technicians. Fabrication of the prosthesis is done at the dental laboratory under the guidance of dental practician through an indirect communication (voucher) and verbal explanation (18).

However, it has been reported that there is paucity of information with regards adequate completion of the dental laboratory prescriptions (18) with regards to the location of missing teeth and classification of the pattern of partial edentulous arches. Furthermore, there is scare information on the acceptability of the denture design and its relationship with patients' satisfaction. This study, therefore, aimed at generating baseline information on pattern of partial edentulism, denture design and the level of patients' satisfaction of with provided ARPD at Muhimbili University, Dental Clinic, Dar es Salaam.

1.2 Problem statement

Acrylic removable partial denture, normally interim treatment option, are utilized as a definitive treatment option in most developing countries including Tanzania. Long term use of these dentures can lead to the destruction of the remaining oral tissues (12).

Considering that the goal of all prosthetic rehabilitation of the partially edentulous arch is to protect and preserve the supporting tissues (9,19) and to enable a patient perform oral functions so as to increase ones quality of life.

Patient satisfaction is the ultimate objective during oral rehabilitation (20) and any appliance which does not contribute to this goal is considered a failure (21). However, if biomechanical principles of partial denture design are incorporated into the ARPD's, an interim denture can be modified to a more definitive denture (12). Lack of consideration of biomechanical principles by practitioners reduces the opportunity for patients who are unable to pay for definitive prosthesis to use their interim prosthesis as a definitive alternative. It is then necessary to consider practitioners education and the biomechanical principles of partial denture design in changing an interim denture to a more definitive denture (12).

The success of ARPD as definitive denture is related not only to the practitioner's education but to technical procedures, functional factors, aesthetics, biological determinants and psychological factors. The latter include preparedness of the patient towards dentures, relation and attitude towards dentist, ability and intelligence to learn use of dentures and the patient's personality (22).

In Tanzania, there is paucity of information about the pattern of partial edentulism or the acceptability of the denture design provided to patients. Nevertheless a previous studies

reported a prevalence of 11% of ARPD wearer (Muhimbili National Hospital) with 73.2% subjectively satisfied with their ARPD (23). Therefore, there is a need to determine the pattern of partial edentulism, design acceptability and level of patients' satisfaction among ARPD wearers at MUHAS dental clinic.

1.3 Conceptual framework

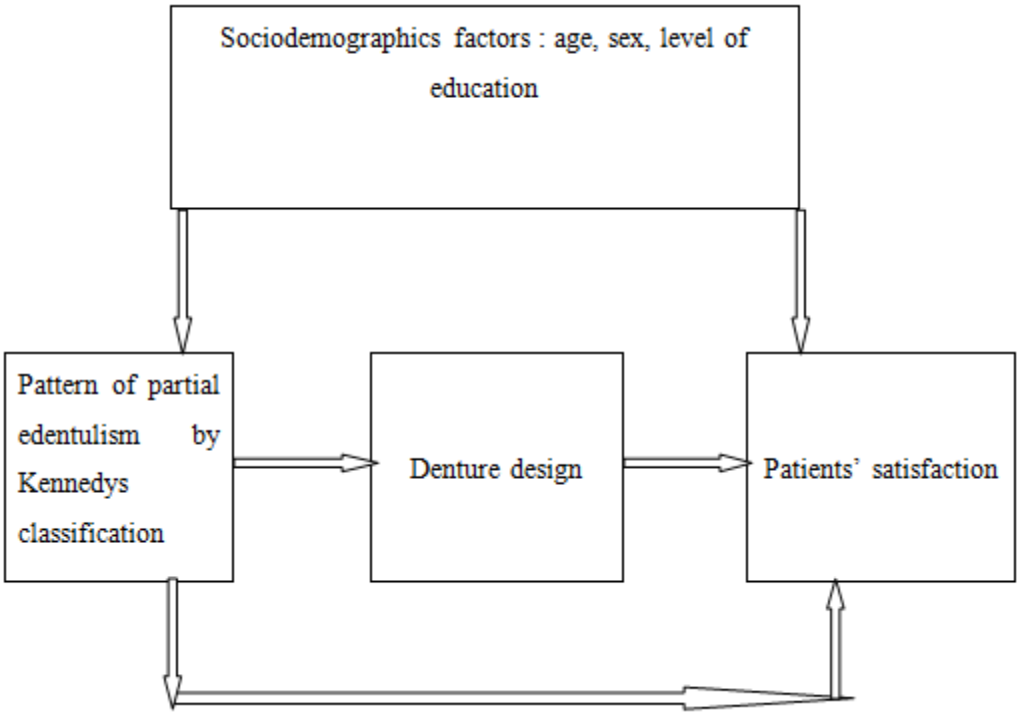


Figure 1: Conceptual framework. Source: Medetoh Sandrine Teclaire, 2020

The conceptual framework indicates that sociodemographic factors like age, gender, level of education, can affect the pattern of partial edentulism as determined by Kennedy's classification which guides the design of the provided acrylic removable partial denture. The adequacy of the denture design has an effect on the preservation of the remaining oral structures, function and esthetics, all of which can influence an individual's level of satisfaction. Various socio demographic factors and the pattern of partial edentulism could also have a direct influence on one's level of satisfaction.

1.4 Rationale of the study

Determining the pattern of partial edentulism, design acceptability and level of patients' satisfaction among ARPD wearers at MUHAS dental clinic will provide important clinical information to the respective authorities and dental practitioners.

By determining the prevalence of the different pattern of partial edentulism, not only rehabilitative but also preventive strategies can be geared towards maintenance of teeth for life.

Furthermore, this study will indicate the proportion of acceptable designed ARPD based on bio-mechanical principles, which can be used as a definitive prosthesis and those that can be harmful to the patient. Baseline data on satisfaction of patient will be useful to practitioners as they will be able to consider the various aspects of patient expectations during provision of ARPD.

This study will also be conducted so as to fulfill the partial requirements for the Degree of Master of Dentistry in Restorative Dentistry of the Muhimbili University of Health and Allied Sciences.

1.5 Research questions

- What is the most prevalent pattern of partial edentulism among ARPD wearers based on Kennedy's classification?
- What proportions of provided ARPD are acceptably designed according the biomechanical principles?
- What proportion of patients are satisfied with their ARPD?
- Does Kennedy classification and the design of ARPD have an influence on the patients' level of satisfaction?

1.6 Objectives

1.6.1 Broad objective

To determine the pattern of partial edentulism, design acceptability and level of patients' satisfaction with provided ARPD at Muhimbili University dental clinic, Dar Es Salaam.

1.6.2 Specific objectives

- To determine the prevalence of partial edentulism using Kennedy classification among patients provided with ARPD attending Muhimbili University Dental Clinic, Dar es Salaam
- To determine the proportion of ARPD with acceptable design among patients at Muhimbili University Dental Clinic, Dar es Salaam.
- To determine the proportion of patients who are satisfied with their ARPD provided at Muhimbili University Dental Clinic, Dar es Salaam.
- To assess the relationship between acceptability of denture design and level of patients' satisfaction amongst patients provided with ARPD at Muhimbili University Dental Clinic, Dar es Salaam.

1.7 Literature review

Edentulousness is the state in which loss of teeth causes adverse aesthetic and biomechanical sequel (24). Tooth loss has a major influence on biologic, social, and psychological levels of the oral health-related quality of life (8). The most important reason to seek prosthetic replacement of missing teeth is to improve appearance, restoration of speech, mastication, confidence, and psychological well-being. Removable partial dentures (RPD) are a versatile, and reversible treatment modality to replace missing teeth in partially edentulous patients (25), especially so in lower socioeconomic groups in whom the highest rates of tooth loss occur (26-28). In addition, many developing countries like Tanzania, do provide to their patients ARPD's as definitive treatment options which entails designing of the ARPD to be biocompatible thereby providing an opportunity for long term use.

Pattern of partial edentulism using Kennedy's classification

While some studies show a relation between age and Kennedy's classification of partial edentulism, gender seems to have no impact. A study conducted at a dental college in Indonesia revealed that there was no correlation between sociodemographic factors (age, gender, and educational level) and pattern of partial edentulism, however, Kennedy's Class III partial edentulism was the most prevalent in patients with ARPD (40%) while Class IV was the least dominant (16.7%) (9).

Similarly in Saudi Arabia, Kennedy's Class III was the most prevalent among all age groups, with the highest percentage in males for both arches (maxillary 80.5% and mandibular 75.2%). Kennedy's Class I was the most frequently observed class in both for both arches of females (28). Contrastingly in Croatia, Class I was the most frequent Kennedy Class with (56% of upper and 74% of lower jaw (13)

Pattern of partial edentulism using Kennedy's classification has been studied to a certain extent in other countries but there is paucity of data in Tanzania. Therefore, we aimed to determine the pattern of partial edentulism using Kennedy's classification.

Assessment of denture design

Among the studies done on evaluation of RPDs, few studies can be found which mostly focused on the quality of RPDs' designs. It has been reported that a denture design for an ARPD can overcome all ill effects by the incorporation of design principles that are bio mechanical (12)

Of the few studies that have assessed the quality of RPDs' designs, a study conducted in Saudi Arabia reported that 88.5% of evaluated the RPD's among female by a dentist, revealed satisfactory retention and stability (29). A study done in Brazil assessing the quality of RPDs' frameworks' designs reported that RPDs' (3% for mandibular arch and 12% for the maxillary arch) were appropriately designed (30).In 2011, in Croatia, it was found that 77% of the partial dentures were tooth supported (13).

There is lack of retrievable information available on the assessment of the denture design in Tanzania. Therefore, we aimed to determine the acceptability of ARPDs denture designs among patients provided with ARPD at Muhimbili University.

Satisfaction of patients with provided ARPD

Satisfaction with RPDs seems to have a multi causal character. According to the results of recent studies, the most frequent areas of dissatisfaction are fit (34%), eating-chewing (30%), natural tooth problems (26%), mouth cleanliness (20%), speech (18%), appearance (18%), denture cleanliness (15%), and odor (13%) (31).

Results from a study done in Croatia, shows that more than half of the patients assessed all variables describing their satisfaction with the RPDs as the best, with the highest percentage assigned to esthetics, and Kennedy classification had no significant effect on patient satisfaction (31). Similar in Iran, where a study which find no relation between Kennedy classification and patient satisfaction (32). However, in Saudi Arabia only 80% were satisfied with their RPD and no significant differences among different age groups and between sexes were established. 26.7% complained of aesthetic problems, 16.7% of pain during mastication, 10% of gag reflex, and 8.3% of phonetic problems (33).

A study done at the Sarajevo university, shows that patients were mostly satisfied with their dentures. Of all factors estimated in the study, only gender was found to have

influence on patient's satisfaction (34). In contrary to India, it was reported that males were more satisfied with the appearance and comfort of the prosthesis compared to females. Females were more satisfied with the functioning of the prosthesis. Satisfaction with the function and appearance of the prosthesis was seen more in subjects of aged over 70 years and least in subjects of age group 21-30. Only 1% of the total population was satisfied with the retention and stability. Patient's satisfaction was found to be very highly significantly related to gender (35).

A previous study conducted in Tanzania in 2015 (23) also reported that the majority of patients were generally satisfied with their RPDs however there are no reports on the relationship between gender, level of education, or denture design. Therefore, we aim to report on the relationship between patient`s satisfaction, and socio demographics factors.

Relationship between denture design and patients' satisfaction with ARPD

Studies on denture design and patients' satisfaction have shown to have contrasting findings.

A study done in Saudi on female patients showed that 85% of patients were satisfied with their dentures. As regards, there was a significant relation between patient's satisfaction and RPDs criteria evaluated by the dentist. Of the 54 (88.5%) evaluated as satisfactory by the dentist, 48 (78.9%) were satisfactory based upon patient's evaluation (29).

In Croatia, a study done to determine the influence of the denture framework's construction on the patients' satisfactions showed that, construction of lower dentures have an influence on patients' satisfaction with speech. And no significant differences were found between the denture base shape and patients' satisfaction with retention, chewing, speech, aesthetics and comfort (31), similarly to a study done in USA which shows that patient satisfaction was not related to standards of design fabrication (36) .

There are no retrievable studies conducted in Tanzania that assesses the relationship between denture design and patients' satisfaction. Therefore, we aimed to assessed the relationship between ARPD design and patient`s satisfaction.

CHAPTER TWO

2. MATERIAL AND METHODS

2.1 Study area

This study was conducted at the Restorative dental clinic of the School of Dentistry, Muhimbili University of Health and Allied Sciences**,** located in Ilala the district, one of the five districts in the city of Dar Es Salaam, Tanzania.

2.2 Study design

Cross-sectional study.

2.3 Study population

The restorative dental clinic attends to patients requiring restorative care including prosthetic care. This study included dental patients aged 18 and above who were registered at the MUHAS dental clinic and provided with acrylic removable partial dentures from as from January 2019 to January 2021.

2.4 Sample size

To calculate the sample size, we used the formula

$$n = \frac{Z^2 p(1-p)}{\varepsilon^2}$$

n= Sample size

Z= Standard deviation, set at 95% (1.96)

P= the prevalence of 11.1% (0.111) (23)

E: margin of error, set at 5% (0.05)

Therefore, n= (1.96) (1.96) * 0.111(1-0.11)/ 0.05*0.05= 151

n= 16

Adding 10% of the above estimate, the estimated sample size is **167**

2.5 Sampling procedure

Using the dental laboratory ledger patients who had received ARPD as from January 2021 going backwards to January 2019 were identified. Using the patient record data base, DENTRIX, patients telephone numbers and other sociodemographic details were obtained.

Convenient sampling method was used, and patients who had received ARPD were contacted by telephone and requested to come for a post-insertion follow up and to participate in the research.

Those who did not respond to the first call were called again and message was send to them. A total of 173 participants were included in the study.

2.6 Inclusion criteria

All consented patients aged from 18 years and above provided with ARPD, with no parafunctional habits, no known disabilities that could have an effect on RPD maintenances.

2.7 Exclusion criteria

Patients with severe disabilities or systemic diseases that could affect oral health, such as uncontrolled diabetes and oral cancer.

Patients with additional tooth loss after provision of an ARPD.

2.8 Data collection

2.8.1 Data collection tools

Data was collected using a structured questionnaire and a clinical form.

The questionnaire

The questionnaire was a modified version of that designedby Ettinger and Jakobsen (37). It was delivered by the research translator through an interview with the participants. (Appendix 2a)

The questionnaire was developed into two main parts:

- The first part was used to obtain patients socio demographics: age, sex and level of education.
- The second part had five (5) questions that assessed level of patients' satisfaction with regards to their ARPD's. The domains assessed included: esthetics (3 questions), chewing ability (3 questions), comfort (3 questions), phonetics (3 questions) and retention (3 questions);

  Responses for each domain were categorized using 4 points scales, from Strongly dissatisfied for no positive answer, dissatisfied for one positive answer, satisfied for 2 positive answers and strongly satisfied for 3 positive answers. Each area was dichotomized to 1 including original score 1&2, and 2 including score 3 &4. Then the 5 questions were added up to get a score index for the level of satisfaction, whereby the questions were computed by adding them. The score index distribution of level of patients' satisfaction ranged from 5 to 10; which was then dichotomized into Not satisfied (0) including scores 5-7 and Satisfied (1) including scores 8 to 10.

The clinical form

- The clinical assessment form contained items that needed to be evaluated by the dentist such as location of partial edentulism based on Kennedy's classification, ARPD's provided by jaw location (upper jaw, lower jaw or both), assessment of the ARPD design based on support, retention, stability. (Appendix II b)

2.8.2 Variables

Dependent variables

Level of patients Satisfaction with ARPD

Independent variables

- **Socio- demographic variables** was measured in the following categories:

a) Sex: male: coded 1, female: coded 2

b) Age was recorded in years as per last birthday, and categorized into 2groups, based on the mean age: from 18 years to 51 years: coded 1; from above 51 years or 52 years: coded 2

c) Level of education: informal and primary level was coded as (1), while secondary level of education and higher level of education coded as (2).

- **Pattern of edentulism** was evaluated by inspection and visual examination of the arch and denture and were classified using Kennedy's classification as follow:

Kennedy ClassI: The edentulous area is bilateral and posterior to the remaining natural teeth. Coded as 1

Kennedy Class II: The edentulous area is unilateral and posterior to the remaining natural teeth. Coded as 2

Kennedy Class III: The edentulous area is between the anterior and posterior natural teeth and may be either unilateral or bilateral. Coded as 3

Kennedy Class IV: A single edentulous area which crosses the midline and is anterior to the remaining natural teeth. Coded as 4

Jaw location of the ARPD: upper jaw was coded as 1; lower jaw was coded as 2; and in both jaws was coded as 3

Clinical assessment of the denture determined based on:

a) Support: A visual inspection of the coverage of the ARPD base and its ability to resist tissues ward movement including assessment of coverage of essential anatomical landmarks.

Adequate support: visual inspection of the dentures in and out of the mouth; no tissue ward movement, covers -anatomical landmarks; no cracks or under- or overextension coded 1; tissue ward movement, Overextension/easily correctable/ Under extension, cracks or holes or a broken denture which needs treatment coded 2.

b) Retention: Evaluate the ability of the denture to resist application of the vertical forces of dislodgment, by placing fingers on the inside and outside of the ARPD base and applying forces away from the tissues.

- adequate Retention - fingers placed at the incisor region on the lingual or palatal surface and buccal surface and attempt to displace denture away from tissues is counteracted; Good seal/Some movement but functionally adequate: coded 1 - Movement on application of displacement forces /treatment required: coded 2

c) Stability: Evaluate the ability of the denture to resist rocking movements away from the tissues, when tilting forces are applied on either side of the ARPD. **-** Adequate Stability: one finger to attempt to rock the denture from side to side; No movement/Some movement but functionally adequate: coded 1, Movement/treatment required: coded 2

- Denture design:

Adequate design: based on clinical assessment on the biomechanically principles of denture design: support, retention and stability: acceptable: coded 1 or non-acceptable: coded 2.

2.8.3 Data collection procedures

After a verbal communication with the participants, consent was obtained using the prepared consent form (Appendix I), followed by the interview using the modified structured questionnaire, that was translated into Kiswahili (Appendix II a) done by the research translator.

Patients were then examined while seated on a dental chair with an overhead light using a simple mouth mirror so as first to determine presence of missing teeth in each concerned jaw (Findings was recorded in a chart having all 32 teeth (Appendix III).) and secondly to assess the denture on the jaw (Appendix IIb) done by the main researcher.

2.8.4 Validation of research tools

The data collection tools (the questionnaire, and the clinical examination form/chart) were tested at the MUHAS clinic in a pilot study on 17 ARPD wearers, to pre-test the data collection, questionnaire and clinical examination, and reveal their opinion about the wording of the used version.

Two weeks later, the questionnaire was redistributed to the same 17 patients for reliability assessment. All responses to the pretested questionnaire were assessed and those questions observed to be ambiguous were replaced.

2.8.5 Calibration of the examiner and reliability of the research data

The researcher and translator were trained and calibrated by a renowned clinical expert, and inter examiners consistence were ensured through researchers doing clinical examination and being calibrated against a restorative specialist.

Intra-examiners variability and reproducibility testing of the clinical examination were carried out by re-examining 10% of the study population on a daily basis and the Kappa score value obtained was 0.8.

2.9 Data management and analysis

All the gathered data were entered in a computer using Statistical Package for Social Sciences (SPSS, version 20.0) and cleaned. Frequency distributions were performed and dependent variable was assessed against independent variables. Chi square test was used to compare proportions and level of statistical significance was set at $p < 0.05$.

Relationship between statistically significant variables was establish using logistic regression.

Objective one: Classification of pattern of partial edentulism:

- Frequency tables were used to determine the distribution of subjects by sociodemographic factors, distribution of ARPD by jaw and Cross tabulation to determine the occurrence of each Kennedy's classification according to the sociodemographic factors.

Objective two: Denture design of ARPD:

- Frequency tables were used to assess the proportion of ARPDs with acceptable design, and the occurrence of acceptable denture design in different Kennedy's classification was obtained by Cross tabulation.

Objective three: Level of patients' satisfaction with ARPD

- Frequency table were used describe the proportions of different domain of patients' satisfaction, Cross tabulation were used to establish a possible relation between level of patients' satisfaction against sociodemographic factors, patients' expectations, pattern of edentulism and denture design.

Objective four: Relationship between level of patients' Satisfaction and contributing factors

- Binary and multivariate analysis was performed using logistic regression for only those variables which showed statistically significant association at bivariate analysis: patients' satisfaction against denture design, patients' satisfaction against SDF, patients' satisfaction against pattern of partial of edentulism.

2.10 Ethical issues

Ethical clearance for this study was obtained from the Directorate of Research and Publications of the Muhimbili University of Health and Allied Sciences.

And an introductory letter was used to obtain permission to conduct the study at the Restorative Dental clinic of the school of dentistry, MUHAS.

Participants were assured of confidentiality, and had the right to withdraw from the study. Patient confidentiality were maintained by using initials and index numbers and usage of the obtained data were only for the intended purpose. Furthermore, those found with oral problems during clinical examination were educated and referred for management. At their arrival at the department of restorative dentistry, the were directed by the receptionist to the research team.

A comprehensive free dental consultation and treatment plan, the necessity of post insertion maintenance of the denture, the correction of any defective part or irregularity (perceived by participants). Furthermore, it was the responsibility of the researcher to avail time on Saturday's and public holidays to attend participants who were not available on working days, the provision of a container to keep the denture when not in use, and the reimbursement of their transport fees (for those who couldn't afford), were used as motivation to encourage participants attendance.

2.11 Limitations and mitigations

Being a cross sectional study, it could not encompass all patients provided with ARPD at Muhimbili dental clinic and considered not to be a true representation of the general population, however it provides an insight on provided ARPD's as the sample involved patients treated in the university hospital where most of dental clinicians and laboratory technicians working in the country have been trained.

Some patients may not have had the opportunity to come, due to busy weekly schedule and efforts were made to avail time on Saturday's and public holidays to attend to these patients.

Those who were challenged by lack of transportation fees were promised to receive some transportation cost.

CHAPTER THREE

3. RESULTS

One hundred and seventy-three subjects were enrolled in the study with an age range of 20 to 79 years and mean age of 51.86±13.38 years. Based on the mean age of participants, those between 18 to 51 years and those of 52 years and above were of almost similar number. Females (62.4%), and those having secondary level of education and above (66.5 %) formed the majority of the participants (Table 1).

Table 1: Distribution of study subjects by the selected socio-demographic Factors.

SDF		N	%
Age	18 - 51 years	87	50.3
	52 years and above	86	49.7
Sex	Male	65	37.6
	Female	108	62.4
Level of education	Primary education and below	58	33.5
	Secondary education and above	115	66.5

Objective I- To determine the prevalence of partial edentulism using Kennedy's classification among patients provided with ARPD attending Muhimbili University Dental Clinic, Dar es Salaam

Distribution of study participants by location of denture is shown in Table 2. Of the 173 participants, nearly half had dentures on the upper jaw (n= 88) with a fewer number having dentures on the lower jaw (n= 34) and less than a third had denture on both jaws (N= 51) with, giving a total of 224 ARPD's.

Table 2: Distribution of study participants by arch where ARPD were located.

Denture location		N	%
Jaw	**Upper**	**88**	**50.9**
	Lower	**34**	**19.7**
	Both	**51**	**29.5**

As shown in Table 3 there were many more 173 participants who presented with partial edentulism of the upper jaw (n=139) compared to the lower jaw (n=85). The most prevalent type of partial edentulism among participants was Kennedy's Class III (50%), mainly of the upper jaw (61.9%) than of the lower jaw (30.6%). There were fewer participants with partial edentulism of Kennedys Class I (9.4%) in upper jaw in comparison to Kennedy's Class IV (16.5%) in lower jaw.

Table 3: Distribution of partial edentulism of the participants based on Kennedy's classification by jaw location.

	Upper jaw	Lower jaw	Total
Pattern of partial edentulism by Kennedy's classification	n (%)	n (%)	n (%)
K. Class I	13 (9.4)	25 (29.4)	38 (17)
K. Class II	24 (17.3)	20 (23.5)	44 (19.6)
K. Class III	86 (61.9)	26 (30.6)	112 (50)
K. Class IV	16 (11.4)	14 (16.5)	30 (13.4)
Total	139 (62.1 %)	85 (37.9%)	224 (100)

Shown in Table 4 is the distribution of pattern of partial edentulism of participants by jaw and selected sociodemographic factors. There was a statistically significantly higher number of participants who were in the age group below 52 years, who presented with partial edentulism of Kennedys Class III in comparison to other Kennedy's classes. Participants with partial edentulism of Kennedys Class III in the upper jaw showed no statistically significant difference by sex (p= 0.343) or level of education (p=0.785). In the lower jaw pattern of partial edentulism most prevalent among participants was also Kennedys Class III, however, there was no statistically significant difference between age groups (p=0.736), sex (p=0.248) or level of education (p=0.118).

Table 4: Distribution of pattern of partial edentulism of participants by jaw and selected socio demographic characteristics

Pattern of partial edentulism						
Socio demographic characteristics		K. Class I	K. Class II	K. Class III	K. Class IV	Chi square; p-value
		UPPER JAW				
		n (%)	n (%)	n (%)	n (%)	
Age	18- 51 years	1(1.4)	11 (15.1)	51 (69.9)	10 (13.6)	χ^2 =13.132; p= 0.004***
	52 years and above	12(18.2)	13(19.7)	35(53)	6 (9.1)	
Sex	Male	7 (13.2)	6 (11.3)	33(62.3)	7 (13.2)	χ^2 = 3.331; p=0.343
	Female	6 (7)	18 (20.9)	53 (61.6)	9 (10.5)	
Level of education	Primary education and below	5 (10.4)	10 (20.8)	27 (56.3)	6 (12.5)	χ^2 = 1.066; p=0.785
	Secondary education and above	8 (8.8)	14(15.4)	59(64.8)	10 (11)	

		LOWER JAW				
Age	18- 51 years	8 (22.9)	9 (25.7)	12 (34.3)	6 (17.1)	$\chi^2 = 1.272$; p=0.736
	52 years and above	17 (34)	11(22)	14 (28)	8 (16)	
Sex	Male	9(26.5)	7 (20.6)	9 (26.5)	9 (26.5)	$\chi^2 = 4.130$; p=0.248
	Female	16(31.4)	13(25.5)	17 (33.3)	5 (9.8)	
Level of education	Primary education and below	14 (45.1)	6 (19.4)	7 (22.6)	4 (12.9)	$\chi^2 = 5.877$; p=0.118
	Secondary education and above	11 (20.4)	14 (25.9)	19 (35.2)	10 (18.5)	

*** some cells have very few counts, making chi square not a reliable measure of association.

Objectives II- To determine the proportion of ARPD with acceptable design among patients at Muhimbili University Dental Clinic, Dar es Salaam.

Clinical assessment of the denture design of participants showed that less than half of the ARPD's had acceptable support (37.5%) and retention (46.4%) while more than half had acceptable stability (60%).

Upper ARPD's had more acceptable, retention (51.1%) and stability (66.9%), than support (43.9%) ARPD's denture designs in the lower jaw had less acceptable support (27.1%), retention (38.8%), and stability (48.2%) (Table 5).

Table 5: Distribution of the clinically assessed ARPD design among study participants by jaw location

Upper jaw		Upper denture	Lower denture	Total
Assessment of ARPD Design		n (%)	n (%)	n (%)
Support	Acceptable	61 (43.9)	23 (27.1)	84 (37.5)
	Not acceptable	78 (56.1)	62 (72.9)	140 (62.5)
Retention	Acceptable	71 (51.1)	33 (38.8)	104 (46.4)
	Not acceptable	68 (48.9)	52 (61.2)	120 (53.6)
Stability	Acceptable	93 (66.9)	41 (48.2)	134 (60)
	Not acceptable	46 (33.1)	44 (51.8)	90 (40)

Table 6: Distribution of the clinically assessed ARPD's among study participants

Participants had a total of 224 ARPD's; with only 32.6% (73) having an acceptable design. Of the 139 ARPD's in the upper jaw 39.6% (n=55) had acceptable designs while of the 85 ARPD's in the lower jaw 21.2% (n=18) had acceptable designs.

	Upper ARPD	Lower ARPD	Total ARPD's
Design denture	n (%)	n (%)	n (%)
Acceptable	55 (39.6)	18 (21.2)	73 (32.6)
Not acceptable	84 (60.4)	67 (78.8)	151 (67.4)
Total	139 (100)	85 (100)	224 (100)

Table 7: Distribution of denture acceptability of participants based on Kennedy's Classification by jaw and pattern of partial edentulism

.Of all the patterns of partial edentulism among participants, Kennedys Class I in the upper jaw had the most acceptable ARPD design (53.8%), however this was not statistically significantly different from the other Kennedy Classes (p>0.05). Regardless of Kennedy's Classification of pattern of partial edentulism in the lower jaw, very few ARPD's had an acceptable design (p>0.05).

		DENTURE DESIGN		
		Acceptable	Not acceptable	
Pattern of partial edentulism		n (%)	n (%)	
Upper Jaw	K. Class I	7 (53.8)	6 (46.2)	χ^2 =1.667; p=0.644
	K. Class II	8 (33.3)	16 (66.7)	
	K. Class III	33(38.4)	53 (61.6)	
	K. Class IV	74 (43,8)	9 (56.2)	
Lower Jaw	K. Class I	7 (28.0)	18 (72)	χ^2 =3.321; p=0.345
	K. Class II	3 (15)	17(85)	
	K. Class III	7 (26.9)	19 (73.1)	
	K. Class IV	1 (7.1)	13 (92.9)	

Objective III-To determine the proportion of patients who are satisfied with their ARPD provided at Muhimbili University Dental Clinic, Dar es Salaam.

Overall, majority (89.9%) of participants having ARPD's in the upper jaw reported that they were satisfied and percentage distribution of assessed items ranged from 79.1% to 94.2%. In the lower jaw, the overall satisfaction was 87.1% and distribution of assessed items ranged from (64.7% to 96.5%). Satisfaction with esthetics was higher in both the upper and lower jaws unlike chewing ability which was least reported (Table 8).

Table 8: level of patients' satisfaction of by jaw location and assessed domains

Upper ARPD	Satisfied	Not satisfied
	n (%)	n (%)
Overall	125 (89.9)	14 (10.1)
Esthetics	131 (94.2)	8 (5.8)
Chewing ability	110 (79.1)	29 (20.9)
Comfort	120 (86.3)	19 (13.7)
Phonetic	119 (85.6)	20 (14.4)
Retention	113 (81.3)	26 (18.7)
lower ARPD	Satisfied	Not satisfied
	n (%)	n (%)
Overall	74 (87.1)	11 (12.9)
Esthetics	82 (96.5)	3 (3.5)
Chewing ability	55 (64.7)	30 (35.7)
Comfort	65 (76.5)	20 (23.5)
Phonetic	70 (82.4)	15 (17.6)
Retention	62 (72.9)	23 (27.1)

Level of participants satisfaction with ARPD's in the upper jaws showed no statistically significant difference by age (p=0.184), sex (p=0.884) or level of education (p=0.477) however, participants under 52 years of age were more satisfied (93.2%) than those of 52 years and above (86.4). Although not statistically significantly different, male participants (73.8%) were more satisfied than female participants (69.4%), and participants with a secondary education or more (89.5%) were less satisfied compared to those with primary education and less (90.6%).

Satisfaction of participants with ARPD's in the lower jaw was statistically significantly higher among those with secondary education and above (92.6%) than their counterparts with primary and lower level of education (77.4 %). Participants aged less than 52 were more satisfied (88.6%) than those aged 52 years and above the difference was not statistically significant. There was no statistically significant difference in patients' satisfaction with ARPD's in the lower jaw among males and females. (Table 9).

Table 9: Distribution of level of patients' satisfaction with ARPD's by SDF

	Level of participants' Satisfaction upper denture		Chi square P value
	Satisfied	Not satisfied	
SDF	n (%)	n (%)	
Age			.
18- 51 years	68(93.2)	5 (6.7)	χ^2 =1.763 p=0.184
52 years and above	57 (86.4)	9 (13.6)	
Sex			
Male	48 (73.8)	5 (26.2)	χ^2 =0.038 p=0.844
Female	75 (69.4)	33 (30.6)	
Level of education			χ^2 =0.499 p=0.477
Primary education and below	42 (90.6)	6 (9.4)	
Secondary education and above	77 (89.5)	9 (10.5)	

	Level of participants' Satisfaction lower denture		Chi square P value
	Satisfied	Not satisfied	
SDF	n (%)	n (%)	
Age			.
18- 51 years	29 (88.6)	5 (11.4)	χ^2 =0.121 p=0.728
52 years and above	43 (86)	7 (14)	
Sex			
Male	48 (85.3)	5 (14.7)	χ^2 =0.157 p=0.692
Female	45 (88.2)	6 (11.8)	
Level of education			χ^2 =4.024 p=0.045*
Primary education and below	24 (77.4)	7 (22.6)	
Secondary education and above	50 (92.6)	4(7.4)	

χ^2 Test, * p-value <0.05;

Table 10: Distribution of level of patients' satisfaction of with ARPD's by Kennedy's classification

Table 10 shows that, on both jaw, patients with Kennedys class IV were having the highest percentage of satisfaction, (100%) for the lower jaw against (93.7%) for the upper jaw, there was no statistical difference for both jaws.

Participants' Satisfaction of upper denture				
		Satisfied	Not satisfied	Chi square p value
Jaw type		n (%)	n (%)	
Upper jaw	K. Class I	11(84.6)	2 (15.4)	χ^2 =4.641 p=0.200
	K. Class II	19 (79.2)	5 (20.8)	
	K. Class III	80 (93)	6 (7)	
	K. Class IV	15 (93.7)	1 (6.3)	
participants satisfaction of lower denture				
Lower jaw	K. Class I	20 (80)	5 (20)	χ^2 =3.478 p=0.324
	K. Class II	18 (90)	2 (10)	
	K. Class III	22 (84.6)	4 (15.4)	
	K. Class IV	14 (100)	0 (0)	

Table 11: Distribution of level of patients' satisfaction by denture design

Table 11 shows the distribution of percentage of patients' satisfaction by denture design. Out of 55 upper ARPDs which were acceptable upon dentist evaluation, 98.2 % were satisfactory upon patient's evaluation. In the lower jaw ARPD's acceptable upon dentist evaluation were also considered satisfactory upon patient's evaluation. There was a high significance of level of satisfaction found with the upper denture ($p \leq 0.05$).

		Satisfaction of participants upper denture		
Denture design		Satisfied	Not satisfied	Chi square P value
		n (%)	n (%)	
Upper denture				χ^2 =6.845
	Acceptable	54 (98.2)	1(1.8)	p=0.009*
	Not acceptable	71 (84.5)	13 (15.5)	
		Satisfaction of participants lower denture		
Lower denture				χ^2 =3.395
	Acceptable	18 (100)	0 (0)	p=0.065
	Not acceptable	56 (63.1)	11 (36.9)	

X^2 Test, * p-value <0.05;

Objectives IV- To assess the relationship between acceptability of denture design and level of patients' satisfaction amongst patients provided with ARPD at Muhimbili University Dental Clinic, Dar es Salaam.

Table 12: Regression analysis of level of patients' satisfaction with ARPD's according to contributing factors.

			95% C.I.	
Upper denture	Sig.	OR	Lower	Upper
Design upper denture	1	6.674	0.001	
Age	0.317	0.706	0.357	1.397
			95% C.I.	
Lower denture	Sig.	OR	Lower	Upper
Level of education	0.608	1.578	0.276	9.019

Bivariate analysis of level of patients' satisfaction of showed a statistically significant difference between patients' satisfaction and level of education in the lower ARPD, and the age and denture design of the upper ARPD. Multivariate analysis using logistic regression revealed that age, denture design of upper ARPD and level of education and lower ARPD was not statistically significantly associated with patients' satisfaction with ARPD.

CHAPTER FOUR

4. DISCUSSION

The primary purpose in using a classification for removable partial edentulous cases is to simplify the description of potential combination of teeth to ridges to enable communication between practitioner and dentist (3) . In this study, the Kennedy's classification was employed as it permits easy visualization of the partially edentulous arch.

Of all participants in this study, about two thirds (62.4%) were females. Similar finding were reported in another study conducted in Nepal (38) where there were a higher prevalence of females compared to males. In contrary, studies done in Pakistan (39) and in Iraq (40) reported a higher prevalence of partial edentulism among males (77.1%). The observed higher prevalence of females who were partially edentulous in this study could be related to more females visiting the dental hospital (41). It has also been reported that most females have a lower level of education and employment status, which could be contributory to them being more partially edentulous (42).

Majority of the study population had a minimum of secondary education level (66.5%). A study in Nigeria (43) also found that a high prevalence (85.1%) of patients in need of removable partial denture had a minimum of secondary education. This can be due to the fact that those with advanced education are more informed about their health needs and may seek dental treatments earlier and more often than those of lower education level. In addition, those of higher educational status are likely to be richer than those of lower educational status. Hence, they are able to afford the cost of dental treatments from time to time (43).

Rehabilitation of patients with removable partial dentures (RPD) is a continuous process and requires attention to the specific needs of the patients (44). In this study, the most common pattern of edentulism was Kennedy class III both in maxilla (61.9%) and mandible (30.6%), which is in agreement with other studies conducted in Nepal (38) , India (45),and Pakistan (39) . Contrary to findings from this study, studies done in Kosovo (44), USA (46), and in Saudi Arabia (47) reported that the most common class of partial edentulism was Kennedy Class I. Findings from this study could be contributed to the fact

that the first molar is the first permanent tooth to erupt into the oral cavity, having a higher caries percentage and a higher chance of the tooth being extracted (39,49).

With increased age there is transition of bounded saddles into free end saddles. In this study, Kennedy class I and II in both maxillary and mandible increased in the in the group of patients aged 52 years and above compared to the those of 51 years and below. Gender wise distribution in relation to Kennedy classification in the upper and lower jaw revealed that Class III was the most prevalent pattern in both jaws. These findings are in line with studies reported in India (45) and Iraq (49) that reported no statistically significant difference between gender and prevalence of various RPDs classes, but women are more prone to partial edentulousness in posterior region. This may be due to their known practice of snaking that leads to dental caries. In addition, most women are dependent on their spouses for dental treatment failure of which could result in tooth loss. However, they are more conscious about their appearance, which explains their preference for replacement of missing teeth (50).

Provision of an RPD depends on accurate diagnosis, management as well as adequate designing of partial dentures (51). In this study, clinical assessment of the ARPD's revealed that, stability (60%) followed by retention (51.1%) were found to have the highest percentage of acceptability in both jaws and support as the least (37.5%) acceptable in the overall assessment. Contrastingly a study conducted in Saudi Arabia (52) found a higher percentage of dentures with acceptable support (95.1%) compared to stability and retention (88.5%). In Iran (51) support was reported to have the highest percentage of acceptability, followed by stability and retention for both jaw. The results of this study could be due to the fact that, unlike definitive removable partial prosthesis, dentists leave the designing of ARPD's to dental technicians who tend to fabricate acrylic removable partial dentures without following the biomechanical principles that guide the fabrication of a definitive prosthesis, as a result most of the dentures have little or no tooth support (12).

The design of RPD has an important role in the health of dental and periodontal tissues and the stability of the denture. Adequate Designing of an ARPD necessitates mechanical and biological considerations identified through clinical examination. Because of this concern, dentists are responsible for the RPD design as an ethical obligation. A proper transfer of design information to the dental laboratory provides increased professional quality assurance in an RPD service (18).

In Brazil (30), a study evaluating senior Brazilian dental students removable partial Denture Design found a low percentage of appropriate design for both jaw: maxillary (12%) and mandible (3%). Another study in the USA (36) evaluated the acceptability of design made in the university of Washington and found that (43%) of the RPDs were rated as acceptable which is slightly above the result found in this study, whereby 32.6% of ARPD's had an acceptable design. This may be highly correlated to the fact that the standards of communication between practitioners and dental laboratory technicians at the dental unit of the Muhimbili dental clinic in the fabrication of removable acrylic prostheses is generally inadequate and in most instances the technician is required to make decisions on behalf of the dentist as most of the required specifications are not indicated as reported in a previous study (18). Practitioners in most cases tend to delineate their responsibility of designing to the dental laboratory technician especially so when there is oversight on the importance of communication using a dental laboratory prescription (48). Furthermore, the dental technician is able to design according to mechanical aspects but not according to knowledge of the patients' biological factors (48). This could contribute to an inadequately designed appliance (18)**.** Clear communication between the dentist and dental laboratory is an essential component of proper and high-quality prosthetic rehabilitation (18).

Considering that the use of ARPD is dependent on patient satisfaction (33,20), in our study, the overall satisfaction was 89.9% for the maxillary denture against 87.1% for the mandible. These results are almost similar to a study in Saudi Arabia (47) that reported an overall satisfaction of 85.2%. In contrary to findings reported in this study , a study in Iraq (53), reported that only 47.05% of patients were satisfied with their ARPD. Patient's satisfaction with provided ARPD's in this study found that majority of participants were satisfied with esthetics in both jaws, 94.2% in maxillary and 96.5% in the mandible. Also chewing ability was found to contribute to satisfaction in 79.1% of maxillary and 64.7% of mandibular ARPD's. Chewing ability, comfort, aesthetics and retention are important factors for acceptance by RDP wearers. For some patients, the overall satisfaction with RDP is related to comfort and the ability to chew. For other individuals, aesthetics and retention seem to be the most important factors (20,55).

Many different factors may influence patient's satisfaction with their dentures. The influence of the patient's age and sex on the patient's satisfaction were reported in another study (55). A study done in India, reported that age, and sex was significantly associated with overall patient satisfaction (56). In contrary, this study, observed that patients age, sex, level of education, Kennedy's classification of the arch supporting the ARDP were not significantly associated with patients' satisfaction with the exception of level of education with the patients' satisfaction with the lower denture. Also, age and patient's satisfaction with the upper denture were significantly associated. A study in Saudi Arabia (57), found no difference in patient satisfaction and type of Kennedy classification.

Satisfaction of patients with removable partial denture (RPD) therapy has become an increasingly important factor in prosthetic treatment. A number of studies have reported on the relationship between RPDs and patient's satisfaction with their dentures quality (52). A study in Saudi Arabia (52) reported a significant relation between patient's satisfaction and RPDs criteria evaluated by the dentist. Unlike findings of this study that showed a relationship between denture design and patients' satisfaction, other studies reported different findings. In our study, no relationship was found between Patients' satisfaction and denture design of the lower denture, while, in the upper denture, it was significantly associated. Two studies done in Kosovo (13,59) also revealed no statistically significant difference between patient's satisfaction related to denture design of partial denture.

5. CONCLUSIONS

From the statistical analysis the following conclusions were made:

1. The most prevalent pattern of partial edentulism among participants in this study was Kennedy class III in both the upper and lower jaws.
2. Less than a quarter of provided dentures were having an unacceptable design in the lower jaw, and less than the half with an acceptable design on the upper jaw.
3. Patients' satisfaction with their ARPD's was high for both upper and lower jaws and patients' satisfaction were statistically significant associate with denture design of the upper denture.
4. Multivariate analysis using logistic regression revealed that denture design of upper ARPD and level of education and lower ARPD was not statistically significantly associated with patients' satisfaction with ARPD.

The present results underscore the importance of high technical quality as a cornerstone of prosthetic dentistry.

6. RECOMMENDATIONS

Further studies should be done in order to have more information which will help to improve the patients' satisfaction of ARPD. Since there is a high prevalence of Kennedy class III, which change to free end saddle with age, more measures should be taken to emphasized on the need to prevent tooth loss. An inacceptable design is an iatrogenic appliance which cause more harm to the oral tissues. An appropriate students-teacher ratio will be necessary in order to supervise, teach and instruct the dental student on the biomechanically design denture that is required for patients seeking ARPD. More emphasis should be put on the necessity of a better communication between dentist and technician for the fabrication of ARPD. A platform for workshop or continuous education should be put in place on regular basis, in order to refresh and share among practitioner, the up-to-date knowledge and advances in the dentistry.

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7APPENDICES

Appendix I(a)INFORMED CONSENT FORM - English version (DIRECTORATE OF RESEARCH AND PUBLICATIONS, MUHAS)

ID. No. [__|__|__] Date of birth…/…/…… Sex: (*M, F*) [__]

Consent to Participate in a Study

Greetings! My name is Dr. MEDETOH Sandrine Teclaire; I am doing a research on

Pattern of partial edentulism, design acceptability and level of patients' satisfaction with provided acrylic removable partial dentures at Muhimbili University dental clinic, Dar es Salaam.

Purpose of the study

The study is conducted in partial fulfillment of the requirements for the degree of Master of Dentistry in Restorative of Muhimbili University. Therefore, it aims to determine the pattern of edentulism, acceptability of denture design and level of patients' satisfaction with provided ARPD at Muhimbili University dental clinic Dar es Salaam

You are kindly requested to participate in this study as part of major stakeholders in the field and information will contribute value important information for improving services and science. Kindly please be honest and true for betterment of the results that could lead to better intervention and recommendations for future.

What Participation Involves

If you agree to join the study, you will first have an interview in order to answer some questions. Secondly, a dentist will perform a brief examination of your denture. The examiner will provide you with a summary of the findings offer advice and refer for suitable treatment.

Confidentiality

All information collected on forms will be entered into computers with only the study identification number. Confidentiality will be observed and unauthorized persons will have no access to the data collected.

Risks: There no any harm expected to happen to you because of participating in this study. Some questions could potentially make you feel uncomfortable or raise your consciousness about dental appearance.

Right to Withdraw and Alternatives

Taking part in this study is completely voluntary. You can stop participating in this study at any time, even if you have already given your consent. Refusal to participate or withdrawal from the study will not involve penalty or affect your scheduled treatment.

Benefits

If you agree to participate in this study, you will be offered a free dental consultation, oral health education, and education on the maintenance of your ARPD for its long term use. You will be given advice according to the result from the assessment of your denture and referred for change or modification if necessary.

The information you provide as well as the findings obtained from denture examination will be useful for clinicians during denture designing and will provide information on patient expectations

Who to Contact

If you ever have questions about this study, you should contact

- The Principal Investigator, Dr MEDETOH Sandrine Teclaire (0620429644) of Muhimbili University of Health and Allied Sciences, P. O. Box 65001, Dar es Salaam.
- The Chairperson of the Senate Research and Publications Committee, P. O. Box 65001, Telephone : +255 22 21 52 489 Dar es Salaam
- Supervisor: Dr CARNEIRO LORNA(Tel: 0713835140)

Signature: …… Do you agree?

Participant agrees …….. doesn't agree……..…….

I ……. have read the contents in this form. My questions have been answered. I agree to participate in this study.

Signature of participant …….

Date of signed consent …….

Appendix I (b) INFORMED CONSENT FORM - Swahili version
(KURUGENZI YA TAFITI NA UCHAPISHAJI CHUO KIKUU CHA SAYANSI ZA AFYA MUHIMBILI)

FOMU YA RIDHAA

Namba ya utambulisho [__|__|__] Umri: ….. (miaka); Jinsia: (me=1, ke=2) [__]

Ridhaa ya kushiriki kwenye utafiti

Hujambo! Ninaitwa Dr MEDETOH Sandrine Teclaire, nashughulika kwenye utafiti huu wenye lengo la kutafiti kuhusu ``Uainishaji, muundo na kuridhika kuhusu meno bandia ya kuweka na kutoa kwa wagonjwa wanao hudhuria katika klinic ya meno ya Muhimbili university

Utafiti huu unafanyika katika kutimiza sehemu ya matakwa ya shahada ya uzamili ya matibabu ya kurekebisha na kuziba meno ya Chuo Kikuu cha Afya na Sayansi ya Tiba Muhimbili. Unaombwa kushiriki katika utafiti huu kutokana na upeo na ufahamu ulionao ambavyo ni muhimu kwa utafiti huu. Tafadhali kuwa mkweli na muwazi kwa vile matokeo ya utafiti huu yanaweza yakatoa maamuzi na mapendekezo ya baadaye.

Jinsi ya kushiriki

Ukikubali kushiriki katika utafiti huu, utasailiwa ili kuweza kujibu maswali toka kwenye dodoso lililo andaliwa kwaajili ya utafiti huu.

Usiri

Taarifa zote zitakazo kusanywa kupitia dodoso zitaingizwa kwenye ngamizi kwa kutumia namba za utambulisho. Kutakuwa na Usirina hakuna mtu yeyote asiye husika atakayepata taarifa zilizo kusanywa.

Hatari

Hatutegemei madhara yoyote kukutokea kwa kushiriki kwako kwenye utafiti huu.

Faida

Kama utakubali ushiriki kwenye utafiti huu taarifa utakazotoa zitatuwezesha kutupa mwanga zaidi juu ya hali ya meno bandia yaliyo tolewa kwa wagonjwa. Matokeo ya utafiti huu yanaweza kutoa taarifa ambazo zitaweza kusaidia katika kuonyesha na kuongeza uelewa kuhusu meno bandia na kuwezesha kujua mapema iwapo kuna tatizo na kulitibu

Athari na kukitokea madhara

Hutegemewi kupata madhara yoyote kutokana na ushiriki wako katika utafiti huu. Baadhi ya maswali yanaweza yasikupendeze, unaweza kukataa kujibu swali lolote la aina hiyo.

Uhuru wa kushiriki na haki ya kujitoa

Kushiriki kwenye utafiti huu ni hiari. Unaweza kujitoa kwenye utafiti huu wakati wowote hatakama umeshajaza fomu ya ridhaa ya kushiri kiutafiti huu. Kukataa kushiriki au kujitoa kwenye utafiti huu hakutaambatana na masharti yoyote.

Mawasiliano

Kama unamaswali kuhusiana na utafitihuu, wasiliana na hawawafuatao :

- Mtafitimkuu : Dr MEDETOH Sandrine Teclaire wa ChuoKikuu chaAfya na Sayansi ya Tiba Muhimbili, S. L. P. 65001, Tel +255 604 29 644, Dar es Salaam.
- Mwenyekiti wa kamati ya Utafiti na Uchapishaji,(MUHAS) S.L.P 65001, Simu: 255 22 2152489 Dar es Salaam
- Msimamizi wa utafiti huu au msimamizi msaidizi Dr CARNEIRO LORNA, simu : +255 713835140

Mshiriki amekubali ……..... Mshiriki hajakubali …….....

Mimi ..... nimesoma maelezo ya fomu hii.

Maswali yangu yamejibiwa. Nakubali kushiriki katika utafiti huu.

Sahihi ya mshiriki……

Sahihi ya mtafiti msaidizi……

Tarehe ya kutiasahihi ya idhini ya kushiriki……

Appendix IIa: Questionnaire (English version) Patients' satisfaction

Part 1: Sociodemographic parameters

Identification number: ……..

Date of birth: …. /…. /…..

Sex : male (1)

Female (2)

Level of education: No formal schooling (1)

Primary level of education (2)

Secondary level of education (3)

Higher level of education (4)

Part 2: Level of satisfaction

ESTHETICS	**YES**	**NO**
*Do you have any problem with the color, of the teeth of your denture**?**		
*Do you have any problem with the, size of the teeth of your denture**?**		
*Do you feel uncomfortable to smile or enjoying others company**?**		
CHEWING ABILITY		
*Do you feel any pain associated with chewing**?**		
*Are you avoiding eating some food because of the denture?		
*Are you chewing food with difficulty**?**		

COMFORT *Have you been worried wearing your denture**?** * Do you feel some discomfort or pain during the insertion or the of the denture**?** *Do you feel some discomfort or pain during the removal of the denture**?**		
PHONETICS *Do your teeth touch while speaking**?** *Do you have a major change in the pronunciation of the words**?** *Do you feel any difficulty while speaking with the denture**?**		
RETENTION * Does the denture fit well at rest**?** * Does the denture fit well during function**?** *Is the opposite side of your denture lift up when you bite?		

Appendix IIb: clinical examination

* ARPD : Upper jaw (1)

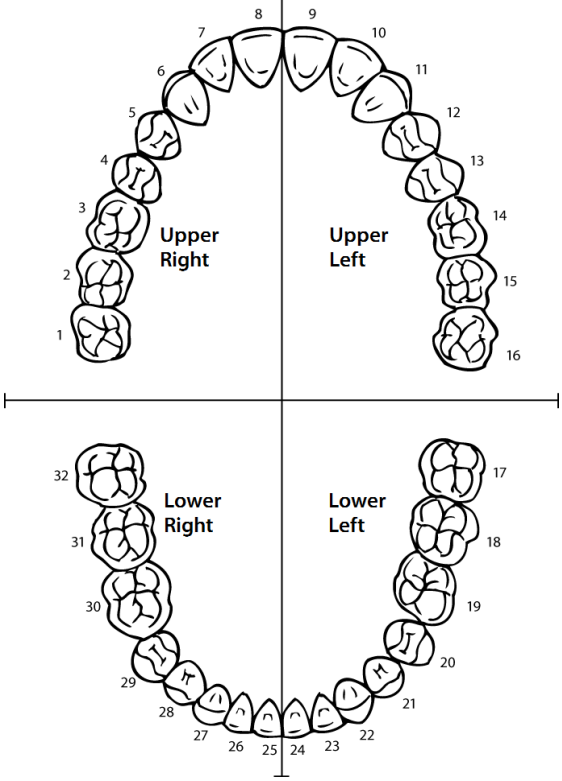
Lower jaw (2)

Upper and lower jaw (3)

Kennedy's classification	**Upper jaw**	**Lower jaw**
Kennedys class I (1)		
Kennedys class II (2)		
Kennedys class III (3)		
Kennedys class IV (4)		
***Adequate support**		
Yes (1)		
No (2)		

Upper jaw	Lower jaw

Retention Yes (1) No (2) *** Stability** Yes (1) No (2) **adequate design** Yes (1) No (2)		


Upper
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Lower
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Appendix IIc: Questionnaire (Swahili version) Patients' satisfaction

Sehemuya 1: Taarifa za kijamii

Namba ya utambulisho: …….. Namba ya usajili ya hospitali….. …….

Tarehe ya kuzaliwa:…./…./……

Jinsi: Mwanaume (1)

Mwanamke (2)

Kiwango cha elimu: Sina elimu ya darasani (1)

Elimu ya msingi (2)

Elimu ya sekondari (3)

Elimu ya juu (4)

MUONEKANO	NDIO	HAPANA
***Je unatatizo lolote juu ya rangi, ukubwa na umbile la meno yako ya bandia?** *Umeridhika na jinsi yalivyo kaa na mfanano wake na meno yako halisi yapembeni yake**?** *Unajisikia vizuri unapo ongea, kutabasamu au kufurahi na wenzako**?**		
UWEZO WA KUTAFUNA ***Je unasikia maumivu yoyote pale unapotafuna?** *Je mabaki ya chakula hukwama kwenye meno na katikati ya meno**?** *Je una shida yoyote unapokunywa maji au kimiminika chochote**?**		
UTULIVU *Je ushawahi kuwa na wasiwasi kuvaa meno yako ya bandia? *Je unahisi maumivu yoyote au kidonda kinacho husiana na matumizi ya meno bandia**?** *Unahisi usumbufu wowote au maumivu wakati wa kuvaa au kuvua meno bandia**?**		

KUZUNGUMZA *Je meno yako hugusana wakati wa kuzungumza**?** *Je kuna mabadiliko makubwa ya sauti yako**?** *Je unahisi usumbufu wowote unapoongea ukiwa umevaa meno bandia**?**		
UKAAJI * Je meno yanakaa vizuri mdomoni ukiwa umeupumzisha mdomo**?** * Je meno yanakaa vizuri mdomoni wakati wa kula au kutafuna**?** * Je meno hulegea au kutokukaa vizuri wakati unazungumza au unakula**?**		

Appendix III: Kennedy's classification of edentulous arch

