# Clinical Assessment of Retention, Stability and Masticatory Performance of Complete Denture Fabricated in Rangsit University's Undergraduate Clinic

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## Abstract

In recent years, a complete denture prosthesis is the most common way dentists used to treat edentulous patients by enhancing masticatory function, stability, retention, and esthetic. The conventional complete denture has shown to be satisfactory to many patients. However, many complete denture wearers were dissatisfied with their prosthesis, regardless of its quality, instability, poor retention, and compromised esthetics. This study aims to find the relationship between stability and masticatory performance of complete denture fabricated by dental students of the College of Dental Medicine, Rangsit University.

A cross-sectional and observational descriptive study was conducted by a group of examiners at the College of Dental Medicine, Rangsit University, from May 2022 to October 2022. Participants who wore complete dentures were selected by stratified random sampling divided by sex and denture age from Rangsit University. A professionally based denture retention and stability assessment will follow the CU - modified Kapur method and criteria. Masticatory performance of the dentures was tested by letting patients chew 3 grams of equal size roasted peanuts for 20 strokes. The cumulative weight and diameter of each sieve will be plotted as a simple linear regression to determine the median peanut particle size in millimeters 95 % confidence interval. A smaller median peanut particle size indicates higher masticatory performance.

Complete denture retention and stability, evaluated by CU-modified. Kapur criteria were associated with multiple patient-based outcomes. Denture stability and retention were associated with satisfaction, which contradicts the hypothesis. However, it is not statistically significant.

***Keywords:*** *Complete denture, Retention, Stability, Masticatory performance*

## 1. Introduction

Ever since its development, complete denture prosthesis has been the most conventional dental substitute for edentulous patients through enhancement of masticatory function, stability, retention, and esthetic (Celebic et al., 2003). Complete dentures fabricated by conventional method have exhibited satisfactory outcomes for many patients. However many complete denture wearers were dissatisfied with their prosthesis, regarding its quality, instability, poor retention, and compromised esthetics. They have reported trouble performing daily activities after long-term use of the dentures (Celebic et al., 2003). Most of their complaints were due to ill-fitting dentures and discomfort upon mastication. Several studies revealed that poor complete dentures retention and stability and all the difficulties were related to the patient's dissatisfaction. Thus, evaluation of patient satisfaction and clinical assessment, including examining patient's masticatory function, stability and retention, ability to speak, and esthetic evaluated by Chulalongkorn University (CU)-modified Kapur criteria in estimating the outcome were investigated (Celebic et al., 2003).

Assessment of masticatory performance has been evaluated by objective measures (chewing test) and subjective measures is individual perspective (Kapur et al., 1964).

Complete dentures were meant for providing better masticatory performance, supporting phonetics and esthetics (Sabir et al., 2019; Zou & Zhan, 2015). Dentures should function in relation and harmony with the remaining structure. A complete denture consists of two parts; the denture base, and the artificial teeth. The base of the denture is made intentionally to mimic natural gum tissue and is usually made from polymethyl methacrylate or PMMA. The surface is highly polished because of its characteristics that look natural and clean to prevent a build-up of bacteria and plaque. Artificial teeth are put together to rehabilitate

the appearance of one face, occlusion, and oral function and aid in pronunciation (Zhao, Mai, Wang, Yang, & Zhao, 2013). Both upper and lower dentures rest on the edentulous ridge. The upper denture is often extended over the palate covering the premaxilla, hard palate, towards the junction between the hard and the soft palate–providing the posterior palatal seal. At the same time, the lower denture has a U-shape, covering the lower arch and ensuring that the tongue is in place and not irritated.

The relationship between denture base prosthesis and the tissue surface is an essential factor in maintaining stability. The activity of orofacial muscles determines the contour of denture flanges, and movable tissue dictates the extension of the denture flange, which further aids in the stability of denture prosthesis (Mistry, Pisulkar, Borle, Godbole, & Mandhane, 2018). During functional movement speech, deglutition, and mastication, the buccal and labial flanges of the maxillary and mandibular dentures must be concave to allow proper seating by the cheek and lips. The tongue is another element that can be examined in order to attain stability during its maximum function and must be considered in the recording of the lingual flange. When complete dentures have slight under extension of the flange, it does not affect much of their retention. However, excessive under extension is not desirable because it reduces secondary retention and denture stability (Zhao & Wang, 2014).

The major problem in complete denture patients often revolves around the retention and stability of upper and lower complete dentures. Retention and stability are defined as displacement in the vertical plane and movement in the horizontal plane, respectively (Rendell, Grasso & Gay, 1995). Dentures that fit have been proven to produce less movement during function. Therefore, the denture that fits should have good retention and stability. However, it is recognized that some patients with poorly fitting dentures do not complain of excessive movement during function (Rendell et al., 1995). In order to determine the relationship between the quality of dentures and patient satisfaction and masticatory performance, the retention, and stability of complete dentures must be considered (Limpuangthip, Somkotra, & Arksornnukit, 2018). Retention and stability of dentures could be evaluated based on two categories. The first is the physical quality of retention and stability, and the other is the perception of stability and retention. To this day, there are no standard criteria for evaluating the retention and stability of dentures. One of the literature that mentioned retention and stability criteria was the Conventional Kapur Criteria (Kapur, 1967). Conventional Kapur Criteria offers clinical assessment for a denture, but the criteria were created using subjective terms such as fair retention, which were difficult to comprehend instantly.

CU-modified Kapur Criteria (Limpuangthip et al., 2018) have been advocated as they could be used to assess the clinical impression of the quality of maxillary and mandibular dentures more specifically from each other, which Conventional Kapur criteria did not offer (Kapur, 1967). After CU-modified, Kapur criteria are used to clarify the physical quality of retention and stability into a score. These scores will be used to classify the dentures as *acceptable* and *unacceptable* (Kapur, 1967).

Acceptability of dentures will provide an impression of denture quality, and masticatory performance, all of which could be used to convey the dentures' quality after being delivered. Other factors, such as occlusion, may also affect retention and stability. When artificial teeth come into contact, a negative displacing force can occur. Much classical kinds of literature advocated that bilateral balanced occlusion is ideal for a complete denture. Contrary to that, many authors reviewed that lingualized occlusion may render more satisfactory regarding masticatory function than bilateral balanced occlusion.

The masticatory performance measures the comminution of food attainable under standardized testing conditions (Gibbs et al., 1981,561-567). In full edentulism, artificial dentition is used for mastication as a substitute for natural dentition. Due to the difference in physical properties between natural dentition and artificial dentition used in the complete denture, often fabricated from cross-linked PMMA, the masticatory performance of complete denture patients is often inferior compared to that of patients with natural dentition (Gibbs et al., 1981,443-449; Kapur & Garrett, 1984). Therefore, in complete denture patients, retention and stability of complete dentures would be considered factors that affect masticatory performance (Konno et al., 2016). Mastication has many effects on our lives in various ways, not limited to only food digestion, but also contributes to physical and mental well-being. In the study of the Relationships Between Gum-Chewing and Stress, masticatories can affect the emotions of the patient because chewing can reduce stress (Yurkstas &

Manly, 1950). Dentists share responsibility with patients to maintain the appropriate level of masticatory performance to meet their needs. The relationship between denture and masticatory performance is evaluated by having participants chew sample food. In this case, we used homogenous, common, inexpensive, and palatable food like peanuts (Kapur et al., 1964; Limpuangthip, Somkotra, & Arksornnukit, 2021). Masticatory performance by letting the participants masticate 3 grams of peanuts for 20 strokes repeated 3 times and keep the particles of peanuts in the vacuum keeper. Testing by vibratory sieve shaker to measure masticatory performance and plotted linear regression to distinguish the good and the bad masticatory performance.

Complete denture prosthesis had been appointed as a minimum requirement for dental students in Thailand for undergraduate school. The dentures were completed mainly by conventional method under the supervision of their prosthodontic instructors.

Theoretically, the treatment outcomes should be at least in an acceptable quality. The null hypothesis of our research is acceptable denture does not affect either the patient's satisfaction or the masticatory performance of a complete denture. The alternative hypothesis would be acceptable denture does affect patient's satisfaction or masticatory performance of complete denture.

## 2. Objective

To evaluate the stability and masticatory performance of dentures fabricated by dental students of the College of Dental Medicine, Rangsit University

## 3. Material and methods

3.1 Ethical Approval

The preliminary and final protocols of the study were approved by the Research Ethics Office of Rangsit University; number RSUERB2022-058. Informed consent was obtained from all participants. Evaluation of Retention and Stability

3.2 Sample Selection

Samples were selected by stratified random sampling. Out of 378 denture wearers from Dental medicine at Rangsit university were stratified using sex (male, female) and denture age (<3 years, > 3 years). After randomization, they were asked to attend the study via telephone contact. A final total of 20 samples participated in this study. However, it was noted that some denture wearers were unable to participate in the study for either of the following reasons; non-available telephone contact, passing away, household responsibility, health issues, covid situation, difficulty in transportation, or no longer use the denture obtained from the faculty. A cross-sectional and observational descriptive study was conducted by a group of examiners at the College of Dental Medicine, Rangsit University from May 2022 to October 2022. Participants who wore complete dentures were selected by stratified random sampling divided by sex and denture age from Rangsit University.

Inclusion criteria include completely edentulism patients that still use complete dentures obtained from the College of Dental Medicine Rangsit University within the period of 2-8 years, the denture is still in the condition that can be used and does not have impaired neuromuscular function. Exclusion criteria are as follows: Defective complete denture and having any allergy that may be threatening the life of the participant. Participants were contacted by telephone number and set an appointment for the test. The test was designed to answer the hypothesis by dividing into two main parts the physical property of dentures and the outcome parts

3.3 Assessment of Retention and Stability

In the first part, a professionally based assessment of denture retention and stability would follow the CU - modified Kapur method and criteria. Before each evaluation, the examiner calibrated the applied force with a digital luggage scale. The thumb and index fingers were placed on the labial and lingual sides of the central incisor teeth to assess denture retention. A vertical pulling force of about 10.0, 5.0, or 2.5 N was applied along the insertion route. Pulling force will be applied each time equally by one person. Attachment of boxing wax with digital luggage that has been tested multiple times. It will be torn off at 1 kg.

These figures were derived from a pilot study that tested the amount of pulling force necessary to remove dentures with various retention levels (Limpuangthip et al., 2018).

The thumb and index fingers were placed on the buccal surface of the premolar teeth, and the denture was moved horizontally, anteroposteriorly, and mediolaterally to evaluate stability. As remarked, the examiner was calibrated before every test to gain intraobserver reliability.

Various retention and stability levels were classified into Acceptable and Unacceptable dentures to simplify the outcome of the test.

**Table 1** CU - modified Kapur method and score for evaluating complete denture retention

| | **Retention** |
|---|---|
| 3 Good | Maximal resistance to vertical pulling and lateral force (>10 N for dislodgement) |
| 2 Moderate | Moderate resistance to 5 N vertical pulling and/or lateral force (5 to 10 N for dislodgement) |
| 1 Minimum | Slight resistance to 2.5 N vertical pull and/or lateral force (2.5 to 5 N for dislodgement) |
| 0 No | Displaced itself when seated |

**Table 2** CU - modified Kapur method and score for evaluating complete denture stability

| | **Stability** |
|---|---|
| 2 (Sufficient) | Slightly/No rocking on supporting structure under pressure |
| 1 (Some) | Moderate rocking or horizontal movement (2 to 4 mm) |
| 0 (No) | Extreme visible rocking or horizontal movement (> 4 mm) |

**Table 3** CU - modified Kapur criteria for evaluating complete denture clinical quality

| **CU- modified Kapur** | **Retention (0-3)** | **Stability (0-2)** |
|---|---|---|
| Acceptable maxilla | ≥2 | 2 |
| Acceptable mandible | ≥1 | 2 |
| Acceptable CD | Acceptable both max and mand denture | |

(Limpuangthip et al., 2018)

3.4 Evaluation of Masticatory Performance

Masticatory performance was tested by letting patients chew 3 rounds of 3 grams of equal size roasted peanuts for 20 strokes. The previous study determined the number of chewing strokes that 20 strokes were enough to swallow in some patients (Helkimo, Carlsson, & Helkim, 1978). The comminuted peanuts were then packed in the container and dried in an incubator at 37°C for 24 hours. Twelve standard test sieves (Test sieve; Retcsh Technology GmbH) were used on a vibratory sieve shaker. The cumulative weight and diameter of each sieve were plotted as a simple linear regression to determine the mean of median peanut particle size in millimeters 95 % confidence interval, which was defined as the sieve diameter through which 50% of the comminuted peanut particles passed the third round of mastication to evaluate.

Median peanut particle size, which is defined as the sieve diameter through which 50% of comminuted particles could pass. The mean was calculated by simple linear regression from the plot. The smaller median particle size indicated higher masticatory performance.

**Statistical analysis**

The data were analyzed by using statistical software (SPSS). Denture quality was calculated according to the denture quality criteria. For masticatory performance, the cumulative weight of each sieve and diameter of each test sieve was used to plot into simple linear regression to determine median peanut particle size. Median peanut particle size was defined as the sieve diameter through which 50% of comminuted particles could pass which was calculated by simple linear regression from the plot. The cut-off value was determined at 3.6 mm to categorize the masticatory performance

The associations between denture quality and masticatory performance were analyzed using descriptive statistics.

## 4. Results and Discussion

### 4.1 Results

Participants were selected from removable complete denture wearers fabricated from the College of Dental Medicine, Rangsit University.

There were 20 participants in total. 55% of participants are male. The most systemic diseases they have were hypertension and hyperlipidemia. There were 80 % non-smokers. Participants usually consume a normal diet, 55% of all participants usually eat sticky food once a week and 75% of all participants eat a hard diet 1-3 times a week. (Table 4.)

**Table 4** General information of participants related to inclusion criteria (Count)

| **Sex** | | **Saliva Quality** | | |
|---|---|---|---|---|
| Male | Female | Thin | Average | Thick |
| 11 | 9 | 4 | 14 | 2 |

**Table 5** Diet information and frequency of participants

| **Diet information and frequency of participants** | **Sticky diet (Count)** | **Hard diet (Count)** |
|---|---|---|
| Once a week | 11 | 8 |
| 2-3 times a week | 4 | 7 |
| More than 4 times a week | 4 | 4 |
| Never | 1 | 1 |

**Table 6** Participants related to inclusion criteria intraoral examination

| **Ridge size** | **Large** | **Average** | **Small** |
|---|---|---|---|
| Maxillary (Count) | 4 | 14 | 2 |
| Mandibular (Count) | 3 | 15 | 2 |
| Ridge form | U-shaped | V-shaped/ Knife edge | Bulbous/ Undercut |
| Maxillary (Count) | 18 | 2 | 0 |
| Mandibular (Count) | 12 | 8 | 0 |
| Ridge height | Average | Severe resorption/ Flat | |
| Maxillary (Count) | 16 | 4 | |
| Mandibular (Count) | 7 | 13 | |

**Table 7** Acceptability of dentures

| **Patient** | **Stability maxilla** | **Stability mandibular** | **Retention maxilla** | **Retention mandibular** | **Acceptability maxillary denture** | **Acceptability mandibular denture** | **Acceptability denture** |
|---|---|---|---|---|---|---|---|
| 1 | Sufficient | Sufficient | Good | Moderate | Acceptable | Acceptable | Acceptable |
| 2 | Sufficient | Sufficient | Good | Moderate | Acceptable | Acceptable | Acceptable |
| 3 | Sufficient | Sufficient | Good | Minimum | Acceptable | Acceptable | Acceptable |
| 4 | Sufficient | Sufficient | Good | Moderate | Acceptable | Acceptable | Acceptable |
| 5 | Sufficient | Sufficient | Good | Minimum | Acceptable | Acceptable | Acceptable |
| 6 | Sufficient | Some | Moderate | Minimum | Acceptable | Unacceptable | Unacceptable |
| 7 | Sufficient | Some | Good | No | Acceptable | Unacceptable | Unacceptable |
| 8 | Sufficient | Some | Good | No | Acceptable | Unacceptable | Unacceptable |
| 9 | Sufficient | Some | Moderate | No | Acceptable | Unacceptable | Unacceptable |
| 10 | Sufficient | Some | Moderate | No | Acceptable | Unacceptable | Unacceptable |

| Patient | Stability maxilla | Stability mandibular | Retention maxilla | Retention mandibular | Acceptability maxillary denture | Acceptability mandibular denture | Acceptability denture |
|---|---|---|---|---|---|---|---|
| 11 | Sufficient | Some | Good | No | Acceptable | Unacceptable | Unacceptable |
| 12 | Sufficient | Some | Good | Minimum | Acceptable | Unacceptable | Unacceptable |
| 13 | Sufficient | Some | Good | No | Acceptable | Unacceptable | Unacceptable |
| 14 | Sufficient | No | Moderate | No | Acceptable | Unacceptable | Unacceptable |
| 15 | Sufficient | Sufficient | Minimum | Moderate | Unacceptable | Acceptable | Unacceptable |
| 16 | No | No | Good | No | Unacceptable | Unacceptable | Unacceptable |
| 17 | Some | Some | No | No | Unacceptable | Unacceptable | Unacceptable |
| 18 | No | No | No | No | Unacceptable | Unacceptable | Unacceptable |
| 19 | Some | Sufficient | No | No | Unacceptable | Unacceptable | Unacceptable |
| 20 | Sufficient | No | Minimum | No | Unacceptable | Unacceptable | Unacceptable |

| Acceptability of denture | Number of denture |
|---|---|
| Total acceptable maxillary | 14 |
| Total acceptable mandibular | 6 |
| Total unacceptable maxillary | 6 |
| Total unacceptable mandibular | 14 |

**Table 8** Acceptability of denture

| Acceptability of denture | Acceptable denture both maxillary and mandibular | Unacceptable both maxillary and mandibular | Acceptable maxillary denture and unacceptable mandibular denture | Unacceptable maxillary denture and acceptable mandibular denture |
|---|---|---|---|---|
| Number of denture | 5 | 5 | 14 | 1 |

Tables 3 and 6 illustrated the data acquired from the professionally based removable complete denture assessment using the CU-modified criteria.

The criteria for acceptable and unacceptable dentures were classified as retention and stability, in which maxillary dentures will need at least a moderate level of retention and a sufficient level of stability to be acceptable dentures. Mandibular dentures would need at least a minimum retention and sufficient level of stability to be acceptable.

Table 8 indicated that 5 participants (25%) had acceptable sets of complete dentures, and 15 (75%) had unacceptable sets of complete dentures. When acceptability of only the maxillary and the mandibular denture was evaluated separately, only 33.33% or ( 5 participants ) had unacceptable both maxillary and mandibular dentures, 9 had an acceptable maxillary denture, and unacceptable mandibular denture (60%) and 1 had an unacceptable maxillary denture and acceptable mandibular denture (6.67%).

Masticatory performance

Patient means of median masticatory performance acquired through the method of linear regression. Subjective and objective measures for evaluating masticatory ability and associating factors of complete denture wearers: A clinical study (Limpuangthip et al., 2020, p. 20), Masticatory performance cut-off value into high or low was 3.6 mm.

Acceptable denture group means of median masticatory performance was 4.46 mm.

**Table 9** Median and diameter of acceptable denture group

| | Mean | Std. Deviation | N |
|---|---|---|---|
| Median of Acceptable denture group | 4.46 | 1.06 | 5 |
| Diameter | 2.70 | 1.69 | 12 |

Unacceptable denture group means median masticatory performance was 4.72 mm.

**Table 10** Median and diameter of unacceptable denture group

| | Mean | Std.Deviation | N |
|---|---|---|---|
| Median of Unacceptable denture group | 4.72 | 0.78 | 15 |
| Diameter | 2.70 | 1.69 | 12 |

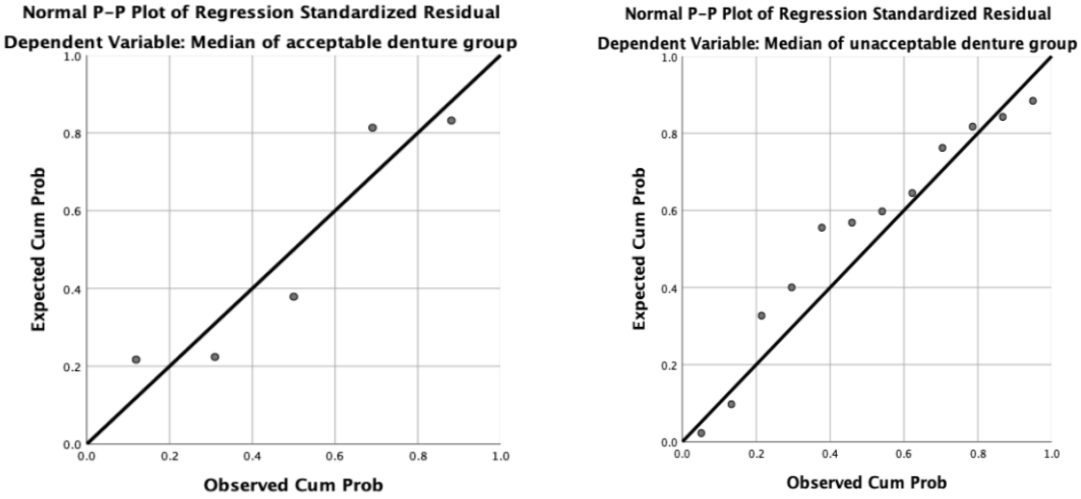


**Figure 1** Linear regression graph of the acceptable group of dentures (Left) and Linear regression graph of the unacceptable group of dentures (Right)

**Table 11** Weight of peanut particle size summary

| | 250 µm | 500 µm | 1.00 mm | 1.40 mm | 2.00 mm | 2.80 mm | 3.15 mm | 3.35 mm | 3.55 mm | 4.00 mm | 4.75 mm | 5.6 mm | sum | 50% of sum | median peanut particle size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.0215 | 0.0869 | 0.1064 | 0.2159 | 0.0373 | 0.0748 | 0.0352 | 0.1230 | 0.1192 | 0.5161 | 0.0757 | 0.4779 | 1.8684 | 0.9342 | 1.0697 |
| 2 | 0.0035 | 0.0038 | 0.0028 | 0.0082 | 0.0836 | 0.0218 | 0.0626 | 0.0623 | 0.0816 | 0.6867 | 0.0000 | 1.3639 | 2.3808 | 1.1904 | 1.3639 |
| 3 | 0.0000 | 0.0722 | 0.0580 | 0.1519 | 0.3848 | 0.1427 | 0.1672 | 0.0240 | 0.2840 | 0.2968 | 0.1005 | 0.3661 | 2.0482 | 1.0241 | 1.0474 |
| 4 | 0.0344 | 0.1128 | 0.1199 | 0.1907 | 0.3073 | 0.1250 | 0.0569 | 0.1302 | 0.3762 | 0.5272 | 0.3087 | 0.1193 | 2.4086 | 1.2043 | 1.3314 |
| 5 | 0.0017 | 0.0019 | 0.0031 | 0.0098 | 0.0359 | 0.0091 | 0.0000 | 0.0269 | 0.1002 | 0.0695 | 0.0000 | 1.6913 | 1.9494 | 0.9747 | 1.6913 |
| 6 | 0.0000 | 0.0056 | 0.0107 | 0.0553 | 0.1690 | 0.1745 | 0.0814 | 0.0491 | 0.1403 | 0.4314 | 0.1978 | 0.7470 | 2.0621 | 1.03105 | 1.3762 |
| 7 | 0.0000 | 0.0000 | 0.0078 | 0.0492 | 0.1415 | 0.0620 | 0.1293 | 0.0432 | 0.1887 | 0.3351 | 0.2282 | 1.0760 | 2.2610 | 1.1305 | 1.3042 |
| 8 | 0.0000 | 0.0000 | 0.0000 | 0.0051 | 0.0000 | 0.0071 | 0.0000 | 0.0285 | 0.0990 | 0.0000 | 0.1178 | 2.4753 | 2.7328 | 1.3664 | 2.4753 |
| 9 | 0.0009 | 0.0111 | 0.0148 | 0.0348 | 0.0730 | 0.0409 | 0.0298 | 0.0383 | 0.0637 | 0.1854 | 0.4125 | 1.5766 | 2.4809 | 1.24045 | 1.5766 |
| 10 | 0.0020 | 0.0089 | 0.0090 | 0.0168 | 0.0807 | 0.0419 | 0.0191 | 0.0405 | 0.0273 | 0.1990 | 0.1459 | 0.7773 | 1.3664 | 0.6832 | 0.7773 |
| 11 | 0.0025 | 0.0217 | 0.0314 | 0.1250 | 0.1765 | 0.1158 | 0.0711 | 0.1512 | 0.1650 | 0.4295 | 0.5630 | 0.8887 | 2.7389 | 1.36945 | 1.4517 |
| 12 | 0.0012 | 0.0106 | 0.0255 | 0.1019 | 0.3646 | 0.0118 | 0.1097 | 0.1747 | 0.5278 | 0.7004 | 0.4900 | 0.3472 | 2.8654 | 1.4327 | 1.5376 |
| 13 | 0.0073 | 0.0295 | 0.0395 | 0.0792 | 0.1030 | 0.1187 | 0.0389 | 0.0272 | 0.0690 | 0.4123 | 0.0622 | 1.4054 | 2.3922 | 1.1961 | 1.4054 |
| 14 | 0.0042 | 0.0127 | 0.0277 | 0.0612 | 0.2259 | 0.0942 | 0.0820 | 0.0823 | 0.2738 | 0.3217 | 0.8184 | 0.0700 | 2.0741 | 1.03705 | 1.2101 |
| 15 | 0.0296 | 0.0998 | 0.0991 | 0.2356 | 0.3744 | 0.1624 | 0.1388 | 0.0891 | 0.1517 | 0.4303 | 0.2170 | 0.0860 | 2.0842 | 1.0421 | 1.1129 |
| 16 | 0.0000 | 0.0148 | 0.0243 | 0.0751 | 0.2790 | 0.0950 | 0.0330 | 0.1251 | 0.3018 | 0.4981 | 0.3720 | 0.4056 | 2.2238 | 1.1119 | 1.2757 |

| | 250 µm | 500 µm | 1.00 mm | 1.40 mm | 2.00 mm | 2.80 mm | 3.15 mm | 3.35 mm | 3.55 mm | 4.00 mm | 4.75 mm | 5.6 mm | sum | 50% of sum | median peanut particle size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 17 | 0.0010 | 0.0014 | 0.0051 | 0.0324 | 0.1239 | 0.0208 | 0.1102 | 0.0468 | 0.2488 | 0.3237 | 0.4450 | 0.7241 | 2.0822 | 1.0411 | 1.1691 |
| 18 | 0.0000 | 0.0000 | 0.0080 | 0.0334 | 0.1420 | 0.0569 | 0.0302 | 0.0593 | 0.1490 | 0.3274 | 0.3394 | 1.1336 | 2.2792 | 1.1396 | 1.4730 |
| 19 | 0.0191 | 0.0530 | 0.0615 | 0.1357 | 0.2501 | 0.2680 | 0.0690 | 0.1105 | 0.2366 | 0.4783 | 0.1523 | 0.5942 | 2.4283 | 1.21415 | 1.2248 |
| 20 | 0.0009 | 0.0072 | 0.0114 | 0.0678 | 0.1157 | 0.1158 | 0.0442 | 0.0327 | 0.0712 | 0.3934 | 0.2181 | 1.1267 | 2.2051 | 1.10255 | 1.1267 |

The result is in table 10. They have indicated that unacceptability denture wearers, there is no significant difference on masticatory performance. Therefore results coincide with the null hypothesis.

### 4.2 Discussion

**Table 12** Acceptable and unacceptable denture according to CU - modified Kapur

| Denture quality criteria According to CU - modified Kapur | Patient distribution (n%) | Median peanut particle size (95%CI) * mean |
|---|---|---|
| Acceptable denture (Upper and Lower combined) | 25% (5) | 4.46 mm * |
| Unacceptable denture (Upper and Lower combined) | 75% (15) | 4.72 mm * |

Significant association at *p < 0.05.

This study showed that participants might not be satisfied with their stability and retention even in acceptable denture wearers. Based on the CU-modified Kapur criteria, retention and stability are the factors that affect the quality of the denture. However, these physical properties of dentures are caused by multiple factors.

For example, it could be noted that the most unacceptable retention and stability of dentures were frequently found in patients with a flat or knife-edge residual ridge, especially in the mandibular arch (Atwood & Coy, 1971; Tallgren, 2003) or even different anatomical limitations in each patient.

A previous study by Wafa'a R. Al-Magaleh (Alfano & Leupold, 2001) mentioned that in case of severe resorption stability and retention can be accomplished by proper border molding of the flanges and final impression technique using red stick compound and teeth arrangement within the neutral zone.

Another study by Yu-Ri Heo has shown that in the anterior regions, the height of the contour was at the midpoint and had a convex, shelf-like shape. The first premolar region was slightly convex. In the posterior regions, the height of the contour gradually moved downward to take on a flat shape (Heo, Kim, Son, & Chung, 2016)

As suggested by study Yu Ri Heo (Heo et al., 2016), the shapes of polished surfaces could be utilized for designing lingual shapes for edentulous trays needed for taking a preliminary impression for lower complete dentures. Furthermore, these findings could be used as a reference when taking impressions of patients' polished surfaces, which will help gain more stability.

Polished surfaces are essential in denture retention, stability, esthetics, and phonetics. The success of a denture may depend on the proper treatment of these surfaces. (Starcke, 1970)

The occlusal scheme was not taken into account in this study due to the limited number of volunteers who could participate within the given amount of time. Further categorizing patients based on the occlusal scheme to compare the retention, stability, acceptability, and masticatory efficiency might result in a biased comparison. However, a previous study showed that the occlusal scheme does affect the masticatory performance of edentulous patients. It has been concluded that edentulous patients prefer anatomic occlusal schemes to non-anatomic teeth. (Sabir et al., 2019)

Furthermore, lingualized occlusion compared to bilateral balanced occlusion does not confer long-term masticatory performance and satisfaction to edentulous patients (Sabir et al., 2019).

In this study, the patients were asked to chew the peanuts for 3 rounds. The last portion was used as a part of data collection. Masticatory performance from both groups also showed differences in peanut particle

size; which acceptable group showed more fine peanut particle size after each round of practice. Indicating the potential to achieve desired masticatory performance might need some accustomed to that activity.

Nonetheless, our study demonstrated that there were no statistical differences in both effects on masticatory performance. However, acceptable stability and retention still affect and will be one of the most important keys to success in treatment for removable complete denture patients. Therefore, the goal of treatment will be having the most retention and stability reasonably achievable in each case.

Based on the CU-modified Kapur criteria, Both retention and stability are essential qualities. Dentures should possess sufficient stability in order to avoid oral impacts. At least moderate retention is required for the maxillary denture, whereas only a minimum level is needed for the mandibular denture. Hence, a mandibular denture with slight retention but Sufficient stability may not require replacement or an implant-supported overdenture, especially when the patient is satisfied. (Limpuangthip et al., 2018)

In this research, acceptance of dentures might be considered low because of the previously mentioned factors and the operator's limited experience during the complete denture fabrication procedure since undergraduate dental students fabricated the dentures.

As for the disclaimer, the information on this study was done and collected data between May to October 2022 with the limitations of time, the pandemic situation, and flooding recently. This caused the number of participants to be reduced significantly. Also, most patients who use removable complete dentures could not participate in this research because of many circumstances such as age, schedule, Etc. This caused a drop in the confidence interval level. Therefore, further data collection and discussion are necessary to draw better conclusions.

## 5. Conclusion

Within the limitations of this clinical study, we can be concluded as follows:

1) The Acceptability of dentures does affect masticatory performance, even Though they are not statistically significant.

2) Masticatory performance can be satisfied even in low masticatory performance

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