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Evaluation of convential and CAD CAM technology in fabrication of removable partial denture

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Evaluation of Conventional and Computer Aided Design/Computer Aided Manufacturing Technology in Fabrication of Removable Partial Denture

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Abstract

Objective: This study aimed to detect the electromyographic activity (EMG) and patient satisfaction of removable partial dentures framework constructed by different techniques in mandibular Kennedy class I cases. **Patient and methods:** This clinical trial included 10 partially edentulous patients aged between 40 and 50 who were recruited from the outpatient clinic of the Removable Prosthodontics Department, Faculty of Dental Medicine for Girls, Al-Azhar University. All patients had mandibular Kennedy class I, and each patient received three removable partial dentures. The first was a metal framework constructed by the conventional technique, the second and third were acetal resin (Polyoxymethylene) fabricated by thermo injectable and computer-aided designs/computer-aided manufacturing (CAD/CAM) techniques respectively. Evaluation of EMG and patient satisfaction was carried out for each patient at insertion of the partials dentures, and 1 and 3 months after denture use. **Results:** EMG found the highest values in patients with conventionally manufactured partial dentures. At different follow-up times, however, acetal resin partial denture using CAD/CAM technology demonstrated higher patient satisfaction with a significant difference was *P* value less than 0.001 than the others at the follow-up time. **Conclusion:** According to the findings, acetal resin partial dentures designed and fabricated using CAD/CAM technology can be considered a favorable treatment modality for the construction of partial denture framework as a nonmetallic material alternative to the conventional cobalt-chromium one with excellent functional performance and patient satisfaction.

Keywords: Acetal resin, Computer-aided design/computer-aided manufacturing, Electromyographic activity, Partial dentures

1. Introduction

Achieving long-term success in the rehabilitation of partially edentulous arch with removable partial dentures (RPDs) requires the preservation of all the remaining supporting structures. Free-end saddles especially mandibular class I cases continue to be challenging in the field of dental prostheses not only for their biomechanical compatibility, but also given their high failure rate observed in rehabilitative oral treatment [1,2].

Thus, it seems certain to optimize the distribution of functional load among these supporting tissues that enable the RPD to provide good retention and functional stability as well as esthetic appearance and comfort over many years [3].

RPDs have a metal framework, usually composed of nickel-chromium or cobalt-chromium (Co–Cr). Because of its excellent strength, stiffness, heat conductivity, durability, and biocompatibility, metal frameworks have been recommended for application. The metal framework is cheap and reliable, but patients dislike it because of its unsightly metal clasp display, added weight, metallic taste occurrences, and allergic reactions [4,5].

The quest for metal substitutes has drawn more attention from researchers due to rising awareness and desire for aesthetics. Polyoxymethylene (POM)

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is a thermoplastic synthetic polymer and one such substance. The more popular name for it is acetal resin. Due to its high resilience and elasticity modulus, which enable its use in the production of retentive clasps, as well as its superior aesthetics, high strength, elasticity, and lightweight nature, Co–Cr alloy was thought to be a nonmetal denture that demonstrated proper function and condition [6].

To improve accuracy and fit in dental technology, three-dimensional (3D) printing is a novel technique for building RPD frameworks. Its features include automatically determining a recommended path of insertion, instantly eliminating undesired undercuts, and quickly identifying useful undercuts. Due to its time-effectiveness in prosthesis manufacture, it is commonly utilized. The technician may operate in a dust-free and hygienic environment without having to deal with plaster or other debris [7,8].

Electromayographic activity (EMG) is an experimental method that measures muscle activity during function and, in turn, its masticatory effectiveness, which is influenced by a number of variables, including the patient's age and sex, the texture of the food (soft or firm), and mandibular movement. Additionally, it is believed that denture instability, poor retention, and disruption of the mastication process are other determinable elements that may significantly affect the recorded muscle activity, leading to the recognition of EMG as an evaluation tool for applied research and physiotherapy rehabilitation [9].

The purpose of this study was to compare the EMG and patient satisfaction of RPDs framework constructed by different techniques.

2. Patient and methods

This study was conducted on ten partially edentulous patients selected from the outpatient clinic of the Removable Prosthodontics Department, Faculty of Dental Medicine for Girls, AL-Azhar University. All patients had mandibular Kennedy class I with second premolar was the last standing tooth bilaterally with opposing full dentate arch, class I jaw relationship.

The selected patients were 40–50 years old medically free from any systemic disorders that might influence the masticatory system, such as neurological disorders; para functional habits such as biting objects, bruxism, and mouth breathing; and the use of medications that could interfere with masticatory force, such as antihistamines and sedatives [10].

All patients accepted this dental treatment and were informed about the steps of this study and signed a written consent with the Research Ethics Committee approval (REC-CL-23-15).

2.1. Sample size calculation

The required sample size was calculated based on the following equation where n = sample size.

$Z\alpha/2 = 1.96$ (the critical value that divides the central 95% of the Z distribution from the 5% in the tail).

$\sigma = 0.06$ the estimate of the standard deviation of the accuracy of fit of the removable partial denture manufactured by the CAD/CAM [11].

E = 5% the margin of error.

Based on the previous calculations, the required sample size was six patients.

2.2. Study grouping

The 30 RPDs were fabricated for 10 patients, each patient received three sets of RPDs:

(a) Co–Cr partial denture fabricated using conventional technique.
(b) POM partial denture designed and fabricated by thermo injectable technique.
(c) CAD/CAM technology was used in the design and fabrication of the POM partial denture.

EMG of both the masseter and temporalis muscles, as well as patient satisfaction, were assessed for each patient while wearing the three sets of RPDs (each independently) at the time of RPD insertion, 1 month, and 3 months later. Between each round of RPDs, a 2-week wash interval was allowed.

2.3. Procedures of partial dentures construction

Upper and lower alginate primary impressions were taken (Hydrogum 5, Zhermack SPA, Italy) and were poured into plaster stone to create study casts that were examined, then the proximal surfaces of the abutment teeth were prepared parallel to the path of insertion to function as guiding planes, and a suitable design with bilateral RPI clasp, lingual plate main connector, and mesial occlusal rests at both abutments was done. For all patients, necessary oral preparations were done in the patient's mouth. For each patient, final impressions were taken using custom-made trays with border molding and green compound (Kerr Compound Green Stick, Orange, CA, USA) and medium body rubber base impression material (Thixoflex M, Zhermack SPA, Italy). To get the master cast for each patient, relief wax was placed over the crest of the ridge and then by using agar–agar reversible hydrocolloid duplicating material (Sheraduble, Shera GmbH and Co. KG, Lemförde, Germany), investment material (Bego, Bremer Herbst GmbH Co, Germany) and duplicating flasks to produce two duplicated master casts for future use [12].

2.4. Conventional technique

One of the previous master casts was used to detect wax pattern design to get the refractory cast. On the refractory cast, the Co–Cr framework was cast in a conventional way (Wiront Pellets Co-64%, Cr-28.65%, Si, Mn, Ctrace Bego, GmbH and Co. KG, Germany) (Fig. 1) [12].

2.5. Fabrication of acetal resin constructed by the thermo injection

A second duplicated master cast was prepared, a wax pattern of the same design was formed on the refractory cast, and this wax pattern was made in a customized muffle. Following the removal of the wax pattern, the acetal resin material or Poly-Oxymethylene (Biodentaplast Cartridges Acetal resin Bredent, GmbH and Co. vKG, Germany) was softened at 260 °C and injected into the mold using a special injection gun. Pressure was applied until the material cooled, then completed and polished (Fig. 2), [13].

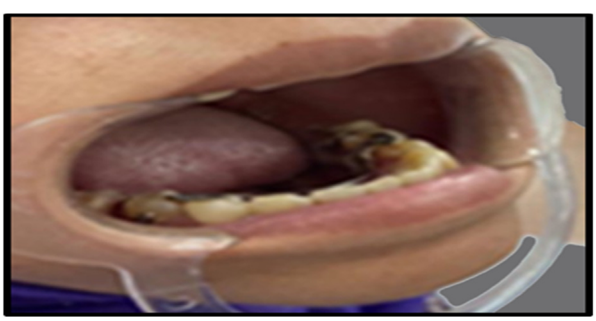

Fig. 1. Delivery of cobalt-chromium removable partial dentures.

Fig. 2. Acetal resin framework fabricated by thermo injectable technique.

2.6. Fabrication of acetal resin constructed by three dimensional printing CAD/CAM

The last duplicated master cast was secured to the scanner table and scanned with a desktop structured-light 3D scanner (Kavo scanner pro, Kavo Dental, Germany). RPD design planning was done by the CAD software (Exocad GmbH, Hesse, Germany). The 3D model for the RPD framework was generated by a standard triangulation language, and the lateral view was selected to observe the model from the side. The RPD path of insertion was determined by anteriorly tilting the 3D model in the sagittal plane. The model view was then switched to the top view, rendering the whole model's undercut sections invisible. The complete undercut regions were highlighted by using the select all visible order followed by inverse select (Fig. 3). After that, all of the selected areas were eliminated and replaced with flat, undercut-free sections, except a few tiny, desired undercut portions that were left in place to help retain the clasp on the buccal surface of the abutment teeth. At this point, the cast was prepared to draw the chosen design right onto the model. Digital preliminary surveying was done using the auto surveying function and the design of the outline was done on the virtual model then were exported the 3D model as a standard triangulation language file format. The design of a class I mandibular RPD with a stress-releasing approach was chosen. All necessary components for support, retention, bracing, reciprocation, and connection were included in the design.

2.7. Three-dimensional printing of the framework

Using of 3D printer (Mogassam 3D printer constructed in Netherlands) to make resin printed patterns by 3D Smart Print Try-in Castable resin (Smart Dent, São Paulo, Brazil) then were allowed to

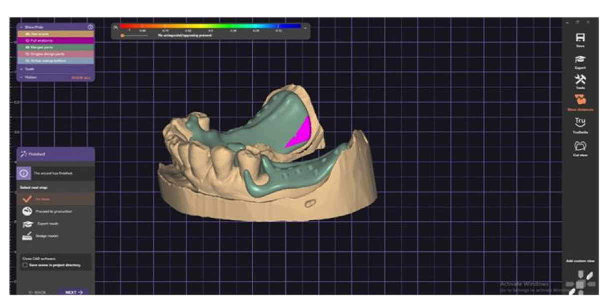

Fig. 3. Three dimensional virtual designs on the virtual cast.

be hung for a short period on the platform, they were removed from the platform using a putty knife. Then were rinsed in 99% isopropyl ethyl alcohol by agitation and brushing. The rinsing protocol was a twice application, the first one was for 3 min followed by another rinsing in another clean bath for 2 min according to manufacturer instructions, the 3D printed materials were postcured in a ultraviolet curing unit, after removal of support structures except for the area at the crest of the ridge then polishing by carbide disc followed by finishing using abrazo-gum acryl kit.

The printed resin pattern of the digital RPD was then invested and cast into the acetal resin framework using the thermo press technique, acetal resin try-in of the framework was performed to check the fit and accuracy (Fig. 4) [14].

2.8. Prosthetic procedures for all frameworks

Intraoral trials were conducted on all three frameworks to assess stability and retention, face bow (Bio-Art Quibamentos Deontological gicos tda Brazil) transfer helped to transfer the relationship between the maxilla and T.M.J. to the articulator. On the framework, trial dentures with record blocks were made, and the maxillomandibular relationship was registered.

For mounting the mandibular cast, a centric interocclusal record was used. Acrylic teeth (Acrostone Plus teeth, Acrostone, Egypt) were arranged to fabricate the occlusal units. To ensure appropriate function, aesthetics, and phonetics, intraoral trials of the frameworks with acrylic teeth were conducted. Heat-cure acrylic resin (Sofa-dental Praha, Holland) was used to process and pack the acrylic denture base. Every patient received their RPD along with advice on proper oral hygiene, occlusal correction, and postinsertion care.

2.9. Evaluation of electromyographic activity

Each patient was informed to wear one RPD and then recalled after 1 month, and 3 months

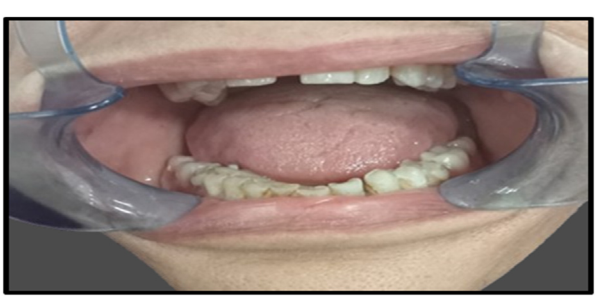

Fig. 4. Delivery of three dimensional printed removable partial denture.

to measure the EMG for each patient in their related group. After that, the patient was left without a denture for 2 weeks (wash-out period) and then got the other RPDs by the same periods, EMG recordings were made with the help of a neurophysiologist and computer electromyography (Nemus 2).

To remove dead skin and clean the skin of dirt and sweating, conductive paste and special washing were used resulting in high impedance, which improves electrode signal conduction. Each patient had their muscles tested (with both soft and hard food). These four muscles (Right and left temporalis, right and left masseter) were tested each time, and make distinct comparisons between each for every partial denture.

Patients were instructed to sit up straight and place their heads in a relaxed position parallel to the floor before beginning the EMG test for muscle efficiency. The patients chewed on both hard (carrot) and soft (banana) food during the EMG test. The patient's muscular efficiency was recorded while the carrot and banana were sliced into 1 mm thick pieces. The banana was also chopped into small pieces for the patient to chew on. Three contact points for each muscle on the right and left sides, two recording electrodes and one reference electrode were utilized to record the masseter and temporalis muscles' efficiency [15].

2.10. Patient satisfaction

A scoring system was used to assess the overall level of satisfaction with each follow-up visit, accounting for factors such as appearance, comfort, stability, taste, discomfort, and chewing efficiency [16]. Additionally, the patient's questionnaire was used to analyze each test as stated by the WHO, ‘Health is not only the absence of infirmity and disease but also a state of physical, mental and social well-being’.

Various tools exist to evaluate patient satisfaction; the most common tool used for that purpose is the visual analog scale. Retention, chewing ability, and aesthetics seem to be the most critical factors affecting RPD acceptance and should be included in any tool used to measure patient satisfaction, each response was noted and depending on how happy, dissatisfied, or well satisfied they were.

2.11. Statistical analysis

Data were collected, revised, coded and entered to the Statistical Package for Social Science (IBM Corp., NY, USA) version 23. The quantitative data with parametric distribution were presented as mean, standard deviations and ranges [16].

Two-way analysis of variance was used to assess the effect of time and method of treatment on the studied parameters followed by post hoc analysis using the Bonferroni test when significant.

The confidence interval was set to 95% and the margin of error accepted was set to 5%. So, significant level was as P value less than 0.05.

3. Results

The values of masseter muscle with hard and soft foods were significantly increased in the three groups after one month from insertion and then decreased after 3 months at P value less than 0.001. Acetal resin RPDs fabricated by CAD/CAM (group (III) consistently showed the highest values with soft foods while Co–Cr (group I) consistently exhibited higher values with hard foods Table 1).

Values were significantly increased in the three groups after one month from insertion and then decreased after three months at P value less than 0.001. Acetal resin RPDs fabricated by CAD/CAM (group (III) consistently showed the highest values with soft foods while Co–Cr (group I) consistently exhibited higher values with hard foods (Table 2).

3.1. Assessment of patient satisfaction

The result of (Table 3) shows that acetal resin RPDs constructed by CAD/CAM technique show the highest values than the other groups with statistically significant values ($P < 0.05$).

4. Discussion

Conventional methods of RPD fabrication have a long history and have been widely practiced. However, they may be associated with certain limitations, such as lab procedures, potential errors in manual fabrication steps, and the need for multiple patient visits for adjustments and fittings. The risk of developing a metal allergy and poor aesthetics as a result of metal exposure led to the quest for alternative materials [17].

More than 40 years ago, the possibility of using polyacetal resin as the base material for dentures was raised, mainly because of its improved aesthetics, which allowed the clasp to more closely match the color of the abutment tooth. Although acetal has higher long-term stability as a co-polymer,

Table 1. Electromayographic activity of masseter muscles during clenching, soft food, and hard food at different time.

Masseter	Cobalt chromium $N = 10$	Acetal resin by thermo injection $N = 10$	Acetal resin by cad cam $N = 10$	P value	Effect size
Masseter hard					
At insertion					
Right Mean ± SD	446.00 ± 24.58^{A}	397.50 ± 32.99^{B}	414.97 ± 6.51^{B}	<0.001	0.436
Left Mean ± SD	449.97 ± 6.51^{A}	395.5 ± 32.99^{B}	416.11 ± 24.58^{B}	<0.001	0.492
Average Mean ± SD	447.99 ± 13.32^{A}	396.50 ± 23.03^{C}	415.54 ± 13.32^{B}	<0.001	0.630
After 1 month					
Right Mean ± SD	497.10 ± 6.23^{A}	$481.70 \pm 31.98^{A,B}$	465.80 ± 8.55^{B}	0.005	0.324
Left Mean ± SD	518.5 ± 41.57^{A}	464.6 ± 31.53^{B}	496.4 ± 10.12^{B}	0.002	0.366
Average Mean ± SD	507.80 ± 22.61^{A}	473.15 ± 31.76^{B}	481.10 ± 9.18^{B}	0.006	0.313
After 3 months					
Right Mean ± SD	484.63 ± 5.15^{A}	$471.96 \pm 22.81^{A,B}$	462.98 ± 22.23^{B}	0.048	0.202
Left Mean ± SD	501.37 ± 5.37^{A}	459.57 ± 17.73^{B}	487.07 ± 30.71^{B}	<0.001	0.438
Average Mean ± SD	493.00 ± 1.10^{A}	465.77 ± 19.20^{B}	475.03 ± 26.42^{B}	0.011	0.285
Masseter soft					
At insertion					
Right Mean ± SD	90.31 ± 5.68^{C}	80.36 ± 10.03^{B}	101.01 ± 5.33^{A}	<0.001	0.595
Left Mean ± SD	92.43 ± 10.64^{B}	81.14 ± 12.90^{C}	102.54 ± 7.31^{A}	<0.001	0.433
Average Mean ± SD	91.37 ± 8.00^{B}	80.75 ± 11.46^{B}	101.78 ± 5.55^{A}	<0.001	0.521
After 1 month					
Right Mean ± SD	110.70 ± 7.70^{C}	131.00 ± 0.82^{B}	160.20 ± 16.22^{A}	<0.001	0.810
Left Mean ± SD	138.30 ± 35.89^{B}	132.10 ± 5.61^{B}	166.90 ± 22.83^{A}	0.009	0.294
Average Mean ± SD	124.50 ± 14.54^{B}	131.55 ± 3.09^{B}	163.55 ± 19.42^{A}	<0.001	0.617
After 3 months					
Right Mean ± SD	105.60 ± 13.51^{C}	128.70 ± 23.09^{B}	150.94 ± 20.92^{A}	<0.001	0.497
Left Mean ± SD	128.85 ± 35.65^{B}	125.70 ± 0.95^{B}	149.62 ± 8.41^{A}	0.036	0.218
Average Mean ± SD	117.23 ± 12.22^{B}	127.20 ± 11.84^{B}	150.28 ± 14.44^{A}	<0.001	0.562

Different superscript capital letter indicate significant difference between groups.
P value greater than 0.05: nonsignificant; P value less than 0.05: significant; P value less than 0.01: highly significance.

Table 2. Electromayographic activity of temporalis muscles during clenching, soft food, and hard food at different time.

At insertion					
Right Mean ± SD	220.31 ± 21.42	209.60 ± 33.89^{C}	218.94 ± 13.63^{B}	0.573	0.040
Left Mean ± SD	225.09 ± 25.66	213.85 ± 29.20	222.63 ± 41.49	0.726	0.026
Average Mean ± SD	222.70 ± 23.54	211.73 ± 31.55	220.79 ± 27.56	0.645	0.032
After 1 month					
Right Mean ± SD	317.40 ± 18.15^{A}	291.30 ± 35.28^{B}	252.60 ± 3.10^{C}	<0.001	0.599
Left Mean ± SD	311.20 ± 24.03^{A}	250.60 ± 31.53^{C}	270.80 ± 23.29^{B}	0.001	0.625
Average Mean ± SD	314.30 ± 21.09^{A}	270.95 ± 33.41^{B}	261.70 ± 13.20^{B}	<0.001	0. 611
After 3 months					
Right Mean ± SD	280.33 ± 7.03^{A}	240.40 ± 27.64^{B}	245.34 ± 6.73^{B}	<0.001	0.760
Left Mean ± SD	308.23 ± 5.12^{A}	240.58 ± 23.41^{B}	260.37 ± 20.58^{B}	<0.001	0. 721
Average Mean ± SD	294.28 ± 6.08^{A}	240.49 ± 25.53^{B}	252.86 ± 13.66^{B}	<0.001	0. 754
Temporarlis Soft					
At insertion					
Right Mean ± SD	94.63 ± 0.67^{B}	103.34 ± 3.22^{A}	105.27 ± 5.12^{A}	<0.001	0.659
Left Mean ± SD	90.18 ± 0.48	100.25 ± 7.28	101.68 ± 1.60	<0.001	0.610
Average Mean ± SD	92.40 ± 0.44^{B}	101.80 ± 5.25^{A}	103.48 ± 3.21^{A}	<0.001	0.675
After 1 month					
Right Mean ± SD	110.80 ± 3.43^{C}	153.90 ± 1.66^{B}	185.10 ± 6.23^{A}	<0.001	0.983
Left Mean ± SD	123.50 ± 5.06^{C}	158.50 ± 4.65^{B}	248.90 ± 7.78^{A}	<0.001	0.980
Average Mean ± SD	117.15 ± 2.94^{C}	156.20 ± 2.03^{B}	217.00 ± 5.60^{A}	<0.001	0.992
After 3 months					
Right Mean ± SD	105.31 ± 5.35^{C}	170.42 ± 4.35^{A}	152.52 ± 4.78^{B}	<0.001	0.973
Left Mean ± SD	108.06 ± 2.90^{C}	174.35 ± 18.15^{A}	156.88 ± 3.13^{B}	<0.001	0.883
Average Mean ± SD	106.69 ± 4.12^{C}	172.39 ± 11.24^{A}	154.70 ± 3.93^{B}	<0.001	0.942

Different superscript capital letter indicate significant differences between groups *P* value greater than 0.05: nonsignificant; *P* value less than 0.05: significant; *P* value less than 0.01: highly significant.

Table 3. Comparison of mean values of cobalt-chromium removable partial dentures, Acetal resin by thermo injection removable partial dentures and Acetal resin by computer-aided design/computer-aided manufacturing regarding patients' satisfaction after the follow-up periods.

Satisfaction	Cobalt-chromium		Acetal resin by thermo injection		Acetal resin by CAD/CAM		Test value	P value	Significance
	Mean	SD	Mean	SD	Mean	SD			
Patient comfort	3.70	0.48^{B}	3.80	0.42^{B}	4.70	0.48^{A}	15.257	0.000	HS
Esthetic	1.70	0.48^{C}	3.80	0.42^{B}	4.40	0.52^{A}	23.896	0.000	HS
Chewing efficiency	3.70	0.48^{B}	4.40	0.52^{A}	4.70	0.48^{A}	12.693	0.000	HS
General satisfaction	3.40	0.52^{B}	4.40	0.52^{A}	4.70	0.48^{A}	16.062	0.000	HS

P value greater than 0.05: nonsignificant; *P* value less than 0.05: significant; *P* value less than 0.01: highly significant•: Kruskal–Wallis test.

it nevertheless has strong short-term mechanical qualities as a homopolymer. It is highly flexible, incredibly strong, and resistant to shattering. Due to these qualities, it is the perfect material for implant abutments, temporary bridges, occlusal splints, single-pressed unilateral partial denture frames, and pre-formed clasps for partial dentures [18].

A few studies found that the use of CAD/CAM technology improves the accuracy of the RPD framework due to the high mechanical and physical properties of the 3D printed wax and minimal laboratory procedures [13]. These studies also found that the technique was related to the use of 3D printed pattern, which had high mechanical and physical properties resulting in a more accurate fit.

The RPDs constructed using a 3D printed framework cost about the same as those constructed using a conventional approach. It should be mentioned that patient satisfaction with RPDs using CAD/CAM technology is higher than with conventional techniques, and that 3D printing technology is significantly less expensive than other rapidly prototyping techniques [13].

The prosthesis made with CAD/CAM technology adheres tightly to the tissue, improving its stability, retention, and equal load transfer. This leads to less irritation with the oral mucosa and increases patient comfort when chewing food [19,20].

Physical impressions were used to create the master cast for the 3D printed denture in this study as an accurate scan of the retromolar pads and hamular notch is a challenging task. Additionally, as compared to analog impressions, digital scans may contain flaws such as significant variances in soft-tissue reproduction and issues with broad arches.

Consequently, patients requiring class I and class II RPDs must have special attention given to their edentulous regions [21].

In this study, the masticatory function was recorded using EMG as the test technique. This is because it offered a simple, safe, and noninvasive technique that made it possible to measure muscle function objectively [22].

The masseter and temporalis muscles, which are the largest and strongest muscles involved in mandibular movement and are easily accessible when surface electrode recording is being done, the electrodes were positioned on the most contractile areas of the masseter and temporalis muscles [23,24].

This study demonstrated that when chewing hard food, the masseter and temporalis muscles had more EMG activity than when eating soft food. This result may be due to that harder food consistency which necessitated higher levels of muscular activity since harder food requires more power to be crushed [23].

During the chewing process the masseter plays the most active role. Also, a difference between the right and left of the masseter muscles was noted since the patients may prefer one side over the other during chewing, this difference was observed in the majority of cases [25].

The finding of the present study revealed that acetal resin RPDs constructed by CAD/CAM technique recorded the highest statistical significant values than the other groups this could be related to patient satisfaction with RPDs due to the chewing skills, superior fit, comfort, color of the denture base (The quality and functionality of the denture), tooth shape and set-up of the teeth on the denture [26].

This result agreed with other studies which concluded that acetal resin RPDs fabricated using CAD/CAM technology is a favorable treatment for partially edentulous patients showing Patient satisfaction and abutment survival than the conventional Co–Cr RPD [16], on other hand some studies mention that acetal resin is not a definite treatment RPD because of their properties and lack of scientific evidence due to their variance from accepted RPD design components such as rests [27].

4.1. Conclusion

The limitations of this study, include the small sample size and short follow-up period.

The following conclusion was drawn during the construction of RPD framework, acetal resin is frequently an alternative to metal. As a nonmetal partial denture, Acetal resin RPD constructed using the CAD/CAM process demonstrated better masticatory function, denture adaptability, and patient satisfaction.

4.2. Recommendation

Regarding the finding of the current study, RPD manufactured by CAD/CAM technique were deemed advantageous. Yet further studies with variant materials and techniques are thus required to validate the partial dentures fabricated by CAD/CAM technique.

Ethics information

Research Ethics Committee approval (REC-CL-23-15).

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Biographical information

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Conflict of interest

There are no conflicts of interest.

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