Original Article

Chewing activity and patients satisfaction wearing different types of mandibular implants supported overdenture and conventional complete dentures (IN VIVO STUDY)

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ABSTRACT

Mandibular implant-supported overdenture (ISOD) with high retention and patient satisfaction is more preferred than conventional complete denture (CCD). The main objectives were to evaluate chewing efficiency and patients' satisfaction with four fixed implant supported mandibular overdentures and compared with conventional complete dentures. Twenty-five (11 males and 14 females) were recruited. They were recruited into five groups as followings: 5 patients each recruited for conventional complete denture, 5 patients with two pieces implant ball and socket overdenture, 5 patients with implant locator overdenture, 5 patients with single piece implant ball and socket overdenture and 5 patients with innovate implant overdenture by locator system. The results of chewing activity of the walnut and passed through the sieves during four visits revealed of conventional complete denture and different types of implant supported overdenture. The outcome showed that the mean values of the highest level of chewing capacity in two pieces' implant ball and socket then single piece ball and the lowest level of chewing capacity in conventional complete denture were seen. Whereas, the implant locator had almost higher capacity than the innovative implant overdenture, and both of them were very similar especially in the first, second and third visits with passed through the spited walnuts into the sieve, respectively. Between the first and fourth visit regarding the conventional denture and different types of overdentures with improvement of chewing activity for the ISOD although there was improvement of patient satisfaction but it was not significant. The current results exert benefits of treatment of edentulous patients, to better chewing activity, masticatory efficiency and patient satisfaction in edentulous patients.

Keywords: Overdenture, Complete denture, Chewing activity, Patient satisfaction

Introduction

Regardless of other organs, teeth are essential for proper mastication; their removal can be compared to destruction and result in serious issues (Tsolianos et al. 2023). One tooth or the full set of teeth can be lost in an edentulous person (Nordenram et al. 2012). The primary risk factor for edentulous teeth can range from social and economic circumstances (Park, Shin, and Ryu 2023). Edentulous is one of the main issues of elderly patients and causes many problems including, less

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chewing efficiency, less retention of conventional denture as well as speech problem and nutritional problems (Qian et al. 2022).

Edentulousness has several main after effects, such as nutritional and health issues (Qian et al. 2022), speech and sound distortion ((Budală et al. 2023), psychological distress, and facial changes(Colvenkar et al. 2023). However as technology has advanced, dentists are able to address this issue in three ways referred to as implant supported, implant-supported overdentures and full dentures (conventional) (CCD) (Şirin Sarıbal, Ersu, and Canger 2022). CCD is the first edentulous alternative rehabilitation program consisting of many prosthetic teeth positioned on a base. Nevertheless, there are other drawbacks, such as total discontent and inconsistent mastication ability (Compagnoni et al. 2014). Researchers have attempted to solve this issue utilizing many conventional and novel methods such as implant supported overdenture using various attaching techniques (that is ball and socket, implant locator system by single piece and two pieces dental implant (Van der Bilt, 2006;Compagnoni et al. 2014).

More researchers have examined mandibular overdenture implants, which are known for having superior results for stability and retention. Furthermore, a number of studies have demonstrated that implant-supported overdentures in the mandible are a successful treatment option, especially when it comes to patients' happiness, chewing ability, and mastication bite force (Sharma, Nagrath, and Lahori 2017; Komagamine et al. 2022), Implant-supported overdenture helps to increase masticatory biting power, chewing ability, patient satisfaction and consumer pleasure (Sivaramakrishnan and Sridharan 2016). Furthermore, assists in generating improved chewing efficiency and masticatory bite power(Sharma, Nagrath, and Lahori 2017).

After edentulousness, the stabilization of the mandibular denture with two to four conventional implants placed in the interforamenal area was suggested as treatment option, rather than a complete denture (Thomason et al. 2009). The use of implants to support mandibular overdentures had shown improvements in the chewing ability (van der Bilt 2011), greater chewing cycles, improved coordination of the chewing sequence (Jest, Lindquist, and Hedegard 1985). In addition, dental implants seem to provide better oral health related quality of life and patient satisfaction (J. Mark Thomason et al. 2009).

Chewing and mastication are two of the most significant bodily processes that help break down food and facilitate swallowing. Foods are mixed with saliva, sent to the occlusal region of the mouth, and then swallowed to complete the multi-processed process of mastication (van der Bilt 2011). Chewing helps to maintain the body's composition by replenishing the nutrients lost via eating. The initial stage is called mastication, which entails biophysical and physiological processes as well as the rhythmic separation and apposition of the jaws. Even though there is little information on the effects of chewing at different phases of the digestive process, it has been determined that even a 25% chewing efficiency is sufficient for full food digestion. However, patients just swallow huge food particles rather than making up for a lack of teeth by chewing longer or with more strokes. The mandibular implant overdenture facilitates improved masticatory biting force and chewing efficiency by reducing denture motions and improving stability, support, and retention. Depending on the age and kind of food, the masticatory performance is reduced to one-fourth to one-seventh of the performance of dentate people. Therefore, it takes seven times as many masticatory cycles for denture users to decrease food to half of its original size (Sposetti et al. 1986; Koc, Dogan, and Bek 2010).

The examination of chewing is carried out by using a variety of protocols including objective technique such as biting force, comminution of meals, and electromyography and/or subjective protocols including through questionnaire or interview (degree of satisfaction) (Verma et al.

2017). Other study was conducted with the chewing efficiency evaluated in a series of chewing tests. The patient was asked to chew 6 g of peanuts with 40 chewing strokes throughout each test, being careful not to swallow any pieces. After that, the patient was instructed to spit the remaining pieces into a dish that had a specific sieve covering it. The patients were then instructed to take off their dentures in a bowl. The food particles that adhered to the dentures were removed using water and gathered in the identical bowl. The patients were instructed to rinse their mouths with water in the similar dish after the particles that remained in their oral cavities were collected. Following a meticulous collection of all the chewed particles in a sieve, the petridish was placed in an incubator set to 37°C for 48 hours. The petridish containing the chewed material was placed on the vibration table and the maximum vibration amplitude was set for 60 seconds. The clusters were separated in a vibrator, and the petridish was used to distribute the particles with the smallest sizes separately (Sharma, Nagrath, and Lahori 2017). Mohammed and Hasan (2021) was used a sieve system to measure the chewing activity of patients with two different types of partial dentures as cobalt chromium and flexible partial dentures. A sieve used as a sheet of woven wire, ten mesh, A4 size, 2mm porous,0.6 wire, stainless steel, was adapted into a ten-mesh sieve by welding it into a stainless-steel ring.

Patient satisfaction is an important to the prosthesis to improve retention, stability, and consequently functional aspects of complete mandibular dentures is using osseointegrated implants and the subsequent installation of overdenture (J.M. Thomason et al. 2004).

Hauck et al. (2021) was studied on the mandibular overdenture with patient satisfaction measured by questionnaires and assessment of prosthesis and implant satisfaction. The quality of life with implant prosthesis was included of 10 questionnaire served as the primary tool for comparing patient satisfaction among the overdenture groups under research and as an assessment tool for implants on prosthesis. Patients' contentment with their implants or prostheses was evaluated, and depending on the question, they were categorized as "satisfied," "normal" (nothing changed), or "dissatisfied," or "yes" and "no." The questionnaire questioned about oral pain, speaking and chewing difficulties, oral hygiene difficulties, prosthesis satisfaction, aesthetic satisfaction, communication difficulties, and difficulty in daily activities. The oral rehabilitation technique most commonly utilized with edentulous individuals is the mucosa-supported complete denture. Although most patients receiving traditional complete dentures for rehabilitation are pleased with their outcomes, a sizable percentage express dissatisfaction with functions, retention, and appearance, especially in relation to the mandibular arch (Hyland et al. 2009; Critchlow and Ellis 2010).

Thomason et al. (2004) studied patient satisfaction by assessing 60 edentulous patients treated with mandibular implant overdentures and conventional complete dentures opposing conventional maxillary dentures after 6 months' delivery (aged from 65 to 75 years). They were randomly recruited to either an overdenture supported by two implants with ball-shaped retentive attachment and/or a mandibular conventional denture. Patients ranked their general preference and satisfaction through assessing their capability to chew specific foods products. Both treatment groups stated they were more satisfied with their new prostheses after 6 months. General satisfaction ratings were higher in the implant group than in the conventional denture group. The implant group also rated comfort, stability and ability to chew significantly higher. Significantly higher scores were also recorded by the implant group for their ability to chew certain hard foods.

This study was used the conventional implants (Implantswiss and Monoimplant Switzerland) with locator system and ball sockets either two pieces or single piece implant, mini implants can be used to support

mandibular overdentures as well. The use of new innovative implant system (NTS Italy) was used to support overdenture and compare with the conventional implant system for elderly patients, it was a specific characteristic by opening the apical ends of the implant to provide primary stability. The advantages of this procedure include implant placement in narrow ridge sites, minimally invasive surgery, and immediate loading of the implants (Cho et al. 2007; LaBarre, Ahlstrom, and Noble 2008).

The aim of this study was to evaluate and compare the chewing efficiency of edentulous patients with complete dentures and after receiving implant-supported overdentures as well as satisfaction levels of patients with different types of implant supported mandibular overdentures with conventional complete dentures.

Materials and Methods

This study included twenty-five completely edentulous patients, the selected patients were aged from 45 to 65 years old and 13 of them were females and 12 were males. The patients were selected based on the special inclusion criteria such as the age which ranged between 45-65 years, normal skeletal Class I relation, no severe undercuts, no history of systemic diseases, no previous trauma, and no bone grafting required (Ali and Hasan 2020). Exclusion criteria were Patients with systemic conditions and xerostomia, patient suffering from psychological problem, parafunctional habits, bony undercut present in the edentulous area (Mohammed and Hasan 2021)).

Conventional complete dentures were fabricated for five patients, twenty ISOD were fabricated for four implant groups, and the patients were worn each set of dentures with the maxillary complete denture and mandibular conventional or overdentures, this study were used conventional two pieces implant (ImplantSwiss), single piece implant (MonoImplant) Switzerland and newly innovative implant (NTS) Italy.

The current study was performed for comparison between the chewing activity and patient's satisfaction following different types of mandibular ISOD and conventional complete denture with two implant attachment systems; locator attachment and ball sockets attachment **(Figure 1 and 2)**.

Figure 1. Implant locator attachment system

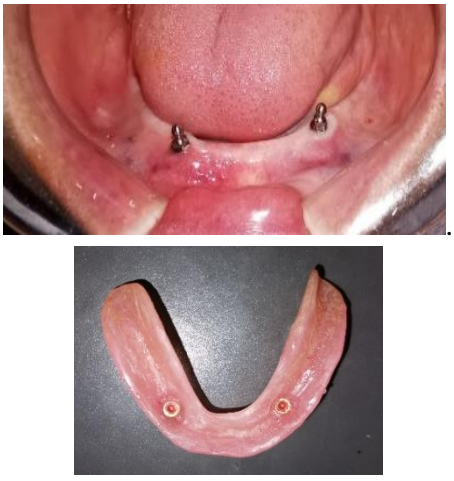

Figure 2. Ball and Socket

Experimental study design

The patients were divided into 5 study groups. The first group; the patients were treated by conventional mandibular complete dentures. The second group; the patients were worn implant supported dentures supported by 2 conventional two pieces implant with locator attachment. While the third group; the patients were worn ISOD with 2 conventional two pieces implant

with ball and socket attachments, the patients in fourth group; were worn ISOD supported by 2 single piece compressive implant with ball and socket attachment and finally the fifth group; the patients were worn ISOD by 2 newly innovative implants with locator attachment system (Fig. 3).

Figure 3. Innovative new design implant

Chewing activity test

A sieve system (Gunne. 1983: Ohara et al..2003; Ahmed el al. 2013) was utilized in this study to measure the chewing activity of patients with complete dentures and overdentures.

The study measured the chewing activity amount of chewed walnut particles which passed through into the sieve after chewing, in this study, a sieve system was used to measure the chewing activity of patients with conventional complete dentures and overdenture patients. A sheet of woven wire, 10 mesh, A4 size, 2mm hole, 0.6 wire, heavy stainless steel, was converted into a mesh sieve by soldering it in to a stainless-steel ring as shown in (Figure.4).

Figure 4. Mesh sheet sieve.

The assessment of chewing activity was performed in four separate time intervals for each patient 48 hours, 3, 6 and 12 months after insertion of the dentures, respectively.

The procedure was recommended by certain researchers, the chewing activity assessed by the sieve system to evaluate the patients chewing activity with bilateral balanced and lingualized occlusion of complete dentures (Ali and Hasan 2020).The sieve system used to assess the chewing activity for patients with maxillary complete denture and mandibular flexible partial dentures with chromium cobalt (Mohammed and Hasan 2021) .

During the chewing activity test, the patients were seated on a dental chair with their head unsupported, and three portions of walnut, each of (3g) was weighed using an electrical balance with an accuracy of 0.01g (Figure.5). The patients were asked to chew each portion of the walnuts for 15 seconds and then spit them on a plastic disposable bowel covered with an absorbent paper without swallowing the walnuts, the chewed walnuts were left to dry for 48 hours in a room temperature of 23±2 ^{0}C. The spited walnuts were weighed on the electrical scale, then the spitted walnuts were put into the ten-mesh sieve, the sieve has been shaken enough till all the small particles of the walnuts that could pass through the sieve mesh. The remaining amount of the walnuts was weighed on the electrical scale again, the amount of walnuts that remained were also recorded. The difference between passed and remained

walnuts provided the idea of chewing activity (Ahmed et al., 2013)

Figure 5. Electrical balance used to measure the walnuts.

Evaluation and questionnaire of implant/prosthetic satisfaction

The primary tool used to compare patient satisfaction between the groups under study those with overdentures and those with traditional complete dentures were sets of five questionnaires with percentage responses about social functioning with overdentures and conventional complete denture after six months (Perea et al. 2015) as shown in **Table 1**.

Patient satisfaction was evaluated 6 months after treatment, all patients were asked about certain questions on the prosthesis to determine the level of satisfaction on the conventional dentures and different types of ISOD with different types of attachment system.

The procedure was recommended by Thomason et al. (2004) who studied the patient satisfaction by assessing 60 edentulous patients treated with mandibular implant overdentures and conventional complete dentures opposing conventional maxillary dentures after 6 months' delivery. Patients ranked their general preference and satisfaction through assessing their capability to chew specific foods products. (Both treatment groups stated they were more satisfied with their new prostheses after 6 months).

The level of patient satisfaction was taking into consideration that has been confirmed and use as a tool for assessing prosthesis on the implants in earlier research (Perea et al. 2015). Implant/prosthetic satisfaction was assessed and the patients were classified as

1= totally agree, 2= agree, 3= no opinion, 4= disagree, 5= totally disagree.

Table 1. Answers in percentage with respect to social functioning with complete denture and overdentures.

1= totally agree 2= agree 3= no opinion 4= disagree 5= totally disagree	CD	ISOD 2 pcs Ball&socket	ISOD 2 pcs locator	ISOD Single piece Ball&socket	ISOD Innovate locator
With the denture I now wear I feel comfortable visiting my family	1	1	1	1	2
With the denture I now wear I feel comfortable entertaining friends in my home	4	2	2	1	2
With the denture I now wear I feel comfortable visiting friends	2	1	2	2	3
With the denture I now wear I feel comfortable at parties	3	1	2	1	4
With the denture I now wear I feel comfortable	4	3	1	2	2

when eating in a restaurant					

Statistical analysis

The data of the study was statistically analyzed using Post Hoc Duncan test to compare the means of each group using SPSS (Special package for social sciences, (SPSS Inc., Chicago,IL, USA) was used. The level of significance was set at (0.05).

Results and Discussion

The results of chewing activity of the walnut and passed through the sieves during four visits of conventional complete denture and different types of ISOD are shown in **Table 2**.

Table 2. The results of passed walnut particles through the sieves during four visits of different ISOD and conventional complete dentures.

Factors/Passed through sieve	No of participants	1st visit	2nd visit	3rd visit	4th visit
Conventional CD	5	0.54 g	0.56 g	0.62 g	0.78 g
ISOD with two pieces ball and socket	5	0.8 g	1.18 g	1.34 g	1.7 g
ISOD with two pieces locator	5	0.54 g	0.62 g	1.0 g	1.34 g
ISOD with single piece ball and socket	5	0.62 g	0.86 g	1.14 g	1.42 g
ISOD with innovate implant and locator	5	0.60 g	0.72 g	0.92 g	1.16 g
Significance		0.420	0.103	0.066	0.072

Means for groups in homogeneous subsets are displayed.

Ist visit= 48 hours, , 2nd visit=1 month, 3rd visit= 6 month and 4th=12 months

a. Uses Harmonic Mean Sample Size = 5.000.

The highest level of chewing capacity in two pieces implant ball and socket then single piece ball and the lowest level of chewing activity in conventional complete denture were detected. Whereas the implant locator had almost higher capacity than the innovative implant overdenture, and both of them were very similar especially in the first, second and third visits with 1g and 0.9g for the amount of passed through the spited walnuts into the sieve, respectively. There were also no significant differences between the types of implant overdentures. The second and third visit also showed no significant differences between the mean values of the types of overdenture since they were all near to each other. However, at the fourth visit all types of overdentures were measuring the passed through the sieve of amount walnut particles, the mean values of implant supported overdentures and conventional complete dentures were 1.40g and 0.78g, respectively. The results of paired t-test revealed that there was no significant result in their mean values of chewing activities for both mandibular conventional complete denture and implant supported overdentures during the first visit. During the 2nd, 3rd and 4rth visit the p-value for the quantity of the walnuts that delivered through the sieve were (0.42, 0.103, 0.066, 0.072) g, respectively which shows that there is no significant differences between different types of overdentures and conventional complete denture as seen in **Table 2**, despite clear improvement in chewing activity.

Table 3 shows the results of the questions related on the patient's satisfaction with their dentures 6 months following the treatment. The table shows the highest level of satisfaction in a single piece implant ball and socket then two pieces implant ball and socket

similar to the implant locator for patient satisfaction after that locator attachment on innovative implant and the lowest level of patient satisfaction with conventional complete denture.

Table 3. Show the results of consumer satisfaction of different dental implants overdenture and conventional complete denture

Treatment	No of participants	Consumer satisfaction
Conventional CD	*5*	2.80
Two pieces ball and socket	*5*	1.60
Two pieces locator	*5*	1.60
Single piece ball and socket	*5*	1.40
Innovate implant	*5*	2.60
Significance		0.061

Means for groups in homogeneous subsets are displayed
a. Uses Harmonic Mean Sample Size = *5*.000; **1= totally agree, 2= agree, 3= no opinion, 4= disagree, *5*= totally disagree**

The patient's satisfaction after receiving the implant retained overdenture was higher than that of complete denture. After treatment most of the patients of conventional complete denture stated that ''they did not feel comfortable when eating in restaurants while some patients of complete denture did not feel comfortable when going to parties". In certain cases of conventional dentures, ''patients complained about pain caused by the mandibular denture before treatment whereas after treatment the patients had similar complaints".

The patient satisfaction scores in this study with mandibular two implant-supported overdentures were found to be higher than patients-wearing conventional dentures. The mean score for conventional dentures was 2.8 which indicated the higher levels of dissatisfaction with the complete dentures and the mean for implant-retained overdenture was 1.6 which indicated more satisfaction toward implant-retained overdenture. For general satisfaction indicated that complete dentures were functionally inferior to implant-retained overdentures. As for implant-supported overdenture which was way higher than conventional dentures.

This study was performed in an effort to get the patients' chewing activity for various treatment modalities. The patients received their conventional complete dentures and ISODs. When choosing patients, age and gender were selected to the study, male patients had superior neuromuscular coordination than female patients when it comes to their chewing activity.

The patients who attended the Prosthodontics Department, College of Dentistry, Hawler Medical University and approved the study's protocol and completed the consent form from all patients were included in this study.

The patients' chewing activity in all groups were approximately similar when using the walnuts and passing through the sieve during the first visit. The particle sizes of the chewed walnuts with the two pieces implant with ball and socket were the highest level of chewing capacity in two pieces implant ball and socket then single piece ball and socket due to the attachment forces and may be the patients easily adapted on this type of attachments. The lowest level of chewing activity in conventional complete denture were seen due to the lack of retention and stability of this type of treatment. Whereas the implant locator had almost higher capacity than the innovative implant overdenture due to the fact that the locator attachment slightly difficult to use for certain patients. However, at the fourth visit all types of overdentures were measured the passed through the sieve of amount walnut particles, the mean values of ISOD and CCD were 1.40g and 0.78g, respectively. These results may due to the capacity of chewing activity in different attachment system.

There were almost similar to the single piece implant with ball attachment and they were regular, while the particle sizes of the chewed walnuts were different sizes and irregular, certain particles were very large in CCD and locator attachments. This might due to a new experience or accommodation with new denture in first visit. This was important to note even though there was no significant

difference between the overdentures attachments during the first visit.

The ISOD might suggest that the ball and socket attachments on the dentures provided more support, stability and retention when biting walnuts, as opposed to the patients of CCD who complained of pain and difficulties when chewing the hard food because of motions. While the implant locator system less capability than ball and sockets, the reason for this was that the attachments with the two-piece locator implant and the innovative implant for mandibular overdentures had reduced retentive force than the single and two pieces implant with ball and sockets. They might also be due to variations in the parallelism of the implants, which have an impact on the stability and retention of the dentures. The power of the patients' chewing was focused precisely on the canine region on the lower arch attachments when they used their overdentures.

However, when the patients chewed, there was a sliding force (lateral force) between the occlusion of the maxillary and mandibular posterior teeth because both the upper and lower posterior teeth in bilateral balanced occlusion in dentures were of anatomic denture teeth, whereas this lateral force during chewing was uncontrolled in conventional complete dentures. This is because the attachments prevented denture movements during chewing.

Due to the dentures' inability to fully chew food particles in balanced occlusion, the walnuts that were chewed on the initial visit were of varying sizes when paired with a normal complete denture. However, when comparing the overdentures on the second, third, and fourth visits, the number of walnuts that went through the sieve did not change statistically. This suggests that with time, patients' capacity to adjust the dentures with various attachment types will improve more than that of traditional full dentures with an ISOD, hence improving their chewing activity, patients will chew food more easily, their masticatory muscles will function in a regular manner, and they will be able to apply more power to the food when they chew to satisfied level of control over their dentures. From the outcomes it can be detected that there was a significant difference in the amount of walnuts that the patients spit during the third and fourth visits. This suggests that, in comparison to patients wearing conventional dentures, the patients with overdentures may have spit more walnuts after chewing. This may due to their occluding accommodation, patients had more control over their overdentures after a month of insertion.

The study's findings showed that, while at varying rates, dentures both regular denture types and overdentures improve chewing skills. Comparing overdentures to regular dentures, the ability to chew is increased faster with greater force.

The present study's findings regarding the chewing activity were in line with the research conducted by Sharma, Nagrath, and Lahori (2017), which revealed a considerable increase in chewing activity for implant-retained overdentures compared to traditional dentures. Compared to a regular denture, the ISOD's particle size dropped to 76.34%. The findings of another study conducted by Soni et al. (2020) are also supported by the results of this investigation. They concluded that, for a full denture, the difference in biting power and chewing efficiency for an overdenture supported by implants was statistically non-significant.

Edentulism was linked to alterations in a patient's anatomy, physiology, and psychology. Poor quality of life is frequently accompanied by oral findings such as impaired chewing activity, lack of stability, and retention in full dentures. An implant overdenture was said to preserve bone, improve masticatory force and ability, boost stability and retention, and result in noticeably better patient satisfaction. The methods used to describe chewing activity were clearly diverse.

Furthermore, in this research was discovered that patients wearing mandibular two implant-supported overdentures had greater patient satisfaction levels than those wearing traditional denture. In line with earlier research (van der Bilt et al. 1993; Shastry et al.

2016) the scores showed that full dentures were functionally inferior. That was patients scored higher for the ISOD than for traditional complete dentures. Since the majority of the traditional full denture group was mucosa-supported, increased pressure from the denture on the underlying mucosa was to be expected, which may cause pain.

This suggests that patients' perceptions of pain from their mandibular denture whether they have a low or high mandible were unaffected by the treatment option they choose. One explanation might be that the five treatment techniques' improvements in mandibular denture stability and retention were adequate and to less discomfort resulting from friction or pressure on the underlying mucosa.

The study also showed no significant difference between the five groups in the patients' assessment for satisfaction during visiting the patients to the parties and restaurants with friends caused by some problems of mandibular denture, but the highest level of satisfaction with single piece ball and socket implant overdenture the mean value as (1.4) which may due to the patient accommodation with this type of attachment. The two pieces ball and socket implant overdenture and two pieces locator implant overdenture mean value were (1.6) due to the more retentive forces and well adapted for the patient, and after that the innovate implant overdenture mean value were (2.6) means no opinion and less agreement with this type of implant attachment system may be due to the new type of implant system which cause of loosening of the attachment system. Finally, the conventional complete denture mean value were (2.8) thi was less satisfied with their dentures associated with the CCD with high movement when compare with ISOD due to the lack of retention and stability during function and less capability for chewing of hard food.

Table 3 shows that after treatment most of the patients of ISOD were highly agree with dentures, nevertheless; patients of CCD less satisfied with dentures due to discomfort and pain under their mandibular dentures compared with overdenture treatments due to the fact that no supports on their implants and less retention and stability exist. They are distributed over the total patient group, which was unexpected since the CCD in the group were mainly mucosal-supported, meaning that more pressure from the denture on the underlying mucosa, possibly leading to pain and discomfort is to be expected.

Conclusion

From the current study, it can be concluded that after implant-supported and mandibular implants provision promoted the oral efficacy measures. It was clearly noticed that the food was more efficiently chewed, and the patients were more satisfied. Thus, the present outcome of the study confirms that the benefits of implant treatment, and patients need awareness to that oral function which can be better with mandibular overdentures implant treatment. Hence, the mandibular overdenture rehabilitation improved activity of chewing, and satisfaction in edentulous patients. The oral function was improved with implant supported overdenture and consequently led to better satisfaction.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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