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PERIODONTAL HEALTH AND MARGINAL BONE HEIGHT CHANGE AROUND ABUTMENTS IN ZIRCONIA VERSUS COBALT-CHROMIUM BAR RETAINED MANDIBULAR TOOTH SUPPORTED OVERDENTURE: A RANDOMIZED CONTROLLED CLINICAL TRIAL

Iman A. El-Asfahani* *and* Rehab H. Alaswad**

ABSTRACT

Statement of problem: Teeth supporting overdentures are affected by the type of attachment used and its material of fabrication; both influence the periodontal health and the stress transmitted during function. Thus, the selection of attachment material is an important factor for long term success of the prosthesis.

Aim: This study was performed to investigate the effect of the CAD/CAM formed Zirconia bar retained overdenture on periodontal health in terms of Plaque Index (PI), Gingival Index (GI) and Relative attachment level (RAL) in addition to marginal bone height change (MBH change) of the supporting mandibular abutments in comparison to conventionally constructed Cobalt- Chromium bar retained overdenture.

Materials and methods: Twenty patients were randomly selected with completely edentulous maxilla and mandible with only two remaining mandibular canines. Patients were randomly allocated into two groups. Each group received maxillary complete denture and mandibular overdenture retained by bar attachment where group A patients received Zirconia bar retained overdentures while group B patients received Cobalt-Chromium (Co-Cr) bar retained overdenture. The PI, GI, and change in RAL of the abutments were evaluated at loading time (0 month), six, and twelve months follow up visits. Standardized Long cone paralleling technique with periapical x-rays was used to evaluate the MBH change mesial and distal to the abutments as well.

Results: Both groups showed significant increase in all parameters at the end of the study period. However, Group B showed significant increase in the mean values of PI, GI and change in RAL in comparison with group A at six and twelve months follow up visits. On the other hand, insignificant difference in MBH change proximal to the abutments was detected between the two groups although group B showed higher MBH change values than group A.

* Associate Professor, Prosthodontics Department, Faculty of Dentistry Minia University, Egypt.
** Lecturer, Removable Prosthodontics Department, Faculty of Oral and Dental Medicine, Misr International University. Cairo, Egypt.

Conclusion: Within the limitations of this study, the Zirconia bar showed superior results compared to conventional Co-Cr bar on the periodontal health of the abutments concerning PI, GI and change in RAL. However, comparable results were shown regarding the effect on MBH change proximal to the abutment teeth.

KEY WORDS: Zirconia, Cobalt-Chromium, tooth supported overdenture, supporting structures, bar attachment.

INTRODUCTION

Preserving the few compromised remaining teeth in the dental arch can aid in improving the functional performance of any prosthetic appliance. The proprioceptors of these teeth help in determining the amount and direction of forces falling on the prosthesis which in turn help in controlling the biting forces and improving the masticatory efficiency.[1]

Tooth supported overdenture is a concept that can aid in maintenance and survival of the remaining compromised dentition in the oral cavity. Abutment preparation to a periodontally affected teeth improves the crown/root ratio which tends to decrease their mobility. [2, 3] On the other hand, Tooth supported overdenture delays the complete conversion to edentulism and its subsequent bone resorption and impaired mastication. [4] It also provides an economic alternative to implant supported overdenture as it improves retention, stability and support of the denture. [5] Hence, Tooth supported overdenture is considered one of the preventive prosthetic treatment options.

Using attachments with overdentures enhance retention of the prosthesis. They may connect either each tooth separately or splinting teeth by a bar to the overdenture. Bar attachments allow masticatory forces to be distributed among abutment teeth, increase stability and provides positive retention of the prosthesis. [2, 6]

However, bar overdentures may have some problems concerning plaque accumulation around the bar which needs more attention from the patient despite of how meticulous the prosthesis is designed. Bar overdenture also gives the patient confidence to use their anterior teeth resulting in an uncontrolled biting force that has a destructive effect on the bone of the anterior area of maxillary ridge. This was reported in implant overdenture retained by bar and clip attachment causing an effect similar to combination syndrome. [7]

Overdentures with metal bar and copings are still the treatment modality in use in dental practice despite the problems previously mentioned. However, new materials and manufacture techniques were introduced in dental practice to improve the quality and precision to the dental prosthesis.

CAD/CAM technology was introduced in dental practice to produce more precise restorations using biocompatible materials through three main phases including collection of digital data, designing of the prosthesis and finally fabrication of the restoration. Zirconium oxide is one of these materials that has been used by CAD/CAM to produce dental restorations of high precision.[8,9] Their mechanical properties permit their use as a framework and as a fixed restoration in posterior region.[10] They are also suitable for prosthesis retained by implant due to their strength, color, and good response by the mucosa. [8, 11, 12]

Traditionally, Cobalt-Chromium (CO-Cr) was the most commonly used material for bar attachment fabricated by lost wax technique.[13] With the introduction of CAD-CAM technology and tooth colored nonmetal material, the tendency to replace metal becomes so high. Limited studies were performed to investigate the clinical outcome of using Zirconia as bar attachment for implant overdentures. One study showed high patients'

satisfaction with their overdenture retained with Zirconia bar and no differences were shown regarding masticatory performance as compared to Co-Cr bar retained overdenture.[14] Another study compared Zirconia bar with Zirconia telescopic attachment for implant overdenture. The results revealed better results for Zirconia bar in preserving the bone surrounding the implants.[15]

As far as the authors' knowledge there was no enough clinical information has been published regarding the performance of Zirconia as bar material especially for retaining tooth borne overdentures.

Hence, this study was performed to assess the use of Zirconia as a bar material retaining tooth supported mandibular overdentures. The periodontal health and MBH change of the abutment teeth were compared with conventional Co-Cr bar retained mandibular overdentures. The null hypothesis was that no significant difference could be found between zirconia and cobalt-chromium bar in mandibular tooth supported overdenture regarding periodontal health and marginal bone height change around the abutment teeth.

MATERIALS AND METHODS

Patient Selection and Study Design

Twenty male patients with age ranged from 55 to 75 years with mean age 65 years were randomly selected from outpatient clinic of prosthodontics department, Faculty of Dentistry, Minia University to be enrolled in this study according to the following inclusion criteria: Completely edentulous maxillary ridge, the mandibular arch has only two canines remaining with sufficient alveolar bone support as confirmed by periapical radiographs, good periodontal health, and absence of mobility. Adequate inter arch distance of at least 30 mm. Patients were excluded from enrollment if they had any medical, physical, and psychiatric condition that might affect the results and their participation in the study. Written informed consent was signed by each patient after explaining all details about the study.

Clinical and radiographic examination "panoramic radiograph" were performed for all patients before treatment to rule out any pathological condition and to evaluate bone quality and quantity of the edentulous ridges and around the remaining mandibular canines. Endodontic treatment was done to the remaining canines and was evaluated by periapical radiographs. Supra-gingival, sub-gingival scaling and root planning were carried out to the remaining canines to create a healthy environment free of plaque and bacterial toxins.

Patients were randomly allocated in two treatment groups of equal numbers using a website www.Randomizer.org . The allocation was randomly done by a clinician who was blinded to the nature of the study. Group A patients were rehabilitated with maxillary complete denture opposed by mandibular overdenture retained by milled Zirconia bar attachment, while group B patients were rehabilitated with maxillary complete denture opposed by mandibular overdenture retained by casted Co-Cr bar attachment.

Abutments preparation

Abutment teeth were prepared to a dome shaped with a height about 1-2 mm above the free gingival margin. The walls were prepared to a 15-degree taper on the mesial, distal and lingual sides and 30-degree taper on the buccal side ***(fig. 1a)***. The prepared surfaces were treated with topical fluoride gel (Topex 0.4% stannous fluoride. Sultan.USA).

The abutments then were prepared to receive copings with short dowels, parallel standard plastic posts (Uniclip burnout plastic post C 215U. Dentsply Maillefer, Switzerland) of equal size were inserted in the prepared root canal. Putty followed by light rubber base impression (Speedex, putty and light

rubber base. Coltène/Whaledent, Switzerland) was taken in a stock tray while picking up the plastic posts in the impression. The impression was then poured in an improved dental stone and removable dies were prepared.

The wax pattern of the copings was made and attached to the plastic posts inside the root canals. A castable OT bar (Castable Bars OT Bar Multiuse 022OBB. Rhein 83, Bologna) was attached to the copings of both abutments.

Construction of metal copings and bar attachment

The wax pattern was sprued, invested and casted using Co-Cr alloy (Wironit Co-Cr Alloy (BPD), Bego, Germany) with burn out technique, finished and polished. The casted copings and bar were tried in the patient's mouth for proper fit and then finally cemented. ***(Fig. 1b)***

Construction of Zirconia copings and bar attachment

The wax pattern was laser scanned by scanner (Activity 850, Smart optics, Germany) of the CAD /CAM machine . After getting done with the proper design, the copings and bar were milled from the Zirconium blocks (Nacera Z, DOCERAM medical ceramics GmbH, Germany). They were tried in the patients' mouth for accurate fit before finally cemented. ***(Fig. 1c)***

Denture construction

Secondary impression was registered using medium rubber base impression material in a special tray while the copings, bar and retention clip were in the patients mouth to obtain the master casts with a duplicate copings and bar attachment on which the denture was constructed following conventional technique. Direct technique was followed to incorporate the retention clip in the fitting surface of the denture by picking it up in the fitting surface of the denture using cold cured acrylic resin.

Delivery of the dentures were performed with strict oral hygiene instructions given for each patient to maintain optimum health condition for the supporting structures. Patients were recalled for follow up to eliminate any post insertion complaints.

Plaque index (PI), Gingival index (GI), Relative attachment level (RAL) and marginal bone height(MBH) mesial and distal to the abutments were assessed at denture insertion and in predetermined follow up schedule 6 and 12 months after denture insertion.

Clinical and radiographic assessment

A. Clinical assessment: Periodontal health

Plaque Index (PI):

The plaque index was evaluated by running a probe along the cervical margin of the abutment to examine the thickness of the plaque formed according to Silness and Löe [16] at four different sites: mesial, distal, buccal, and lingual to each abutment. The scoring system is as follows: (0) = no plaque is detected, (1) = a thin film of plaque is detected at the free gingiva and adjacent tooth structure, (2) = Moderate soft deposits accumulated in the gingival pocket or tooth structure that can be detected by naked eye, (3) = abundant soft matters accumulated in the gingival pocket and tooth structure.

Gingival Index (GI)

Gingival index of abutments was scored according to Löe and Silness [17]. The scoring system is as follows: (0)=No signs of inflammation in the gingiva and by probing with blunt instrument no bleeding occurs, (1)=Slight inflammation and edema present in the gingiva and by probing with blunt instrument no bleeding occurs. (2)= Signs of inflammation are clearly shown, and bleeding occurs when probing with blunt instrument. (3)=Severe inflammatory signs are manifested with marked edema and redness. The gingiva is ulcerated with tendency to spontaneous bleeding.

Fig. (1) a. Intraoral view of the prepared abutment teeth, b. Metal copings and bar cemented on abutments, c. Zirconia copings and bar cemented on abutments.

Relative Attachment Level (RAL):

Clinical attachment level (CAL) is measured from the cemento-enamel junction till the base of the sulcus when resistance is encountered by the tip of the probe. However, detecting the cemento-enamel junction was difficult due to covering of the abutments by copings so, relative attachment level (RAL) was measured using the margins of copings as a fixed reference point. [18, 19] The measurement was taken along four sites around the abutment: distobuccal, distolingual, mesiobuccal and mesiolingual. The measurement was approximated to the nearest whole mm and the mean of four readings was calculated. Changes in RAL was calculated by subtracting the measured RAL between each two consecutive recall visit.

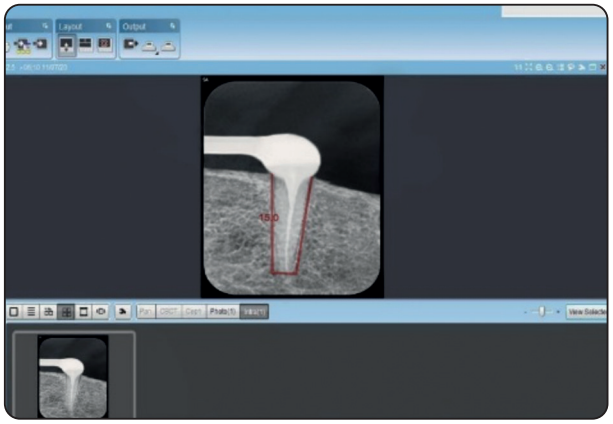

Fig. (2) Measuring marginal bone height proximal to the abutments

B. Radiographic assessment: MBH changes proximal to abutments

Marginal bone height (MBH) mesial and distal of abutments were radiographically assessed using serial standardized radiographs following long cone technique.[20] In order to provide a reproducible position of the film in relation to the abutment, an acrylic template *(Acrostone special tray material, Acrostone Dental Factory, England)* was constructed for each patient to hold the The Rinn XCP periapical film holder bite block *(Rinn Corporation, XCP instruments for extension cone paralleling technique, U.S.A)* in a fixed position. The film holder bite block was connected to the plastic aiming ring of the paralleling system which was attached at the end of long cone of the X-ray machine *(Fona XDC , Fona, Assago, Italy)* to standardize the distance and angulation between the film and the source of exposure. Exposure was standardized using the same x-ray machine at 8 milliamperes and 70 kilovolts for 0.6 seconds. The films were then digitized by scanning and then interpreted by using a software computer program *(Planmeca Romexis Viewer, Finland)* which can measure the bone height mesial and distal to the abutment. (***Fig. 2***) The readings were recorded by one examiner at two different times and the mean of the two trials was calculated. The MBH change was calculated by subtracting the measured MBH between each two consecutive radiographs.

Clinical and radiographic data of this study were obtained at denture insertion visit, 6- and 12-months post insertion to be tabulated and statistically analyzed.

Statistical analysis

Statistical analysis was carried out by Minitab software (Minitab 17.0, Pennsylvania, USA). Data was presented as Mean ± standard deviation (SD). Data normality was checked by using the Shapiro-Wilk and Kolmogorov-Smirnov tests. Changes in MBH proximal to the abutments (marginal bone loss) and RAL data were normally distributed. Two-way analysis of variance (ANOVA) was used to study the effect of time on them with in each group. Tukey's post-hoc test was used for pair –wise comparison between different time periods when ANOVA test was significant. The independent variable t-test was used to compare between the two groups.

The PI and GI data were non-parametric and were analyzed by using the Kruskal-Wallis test to study the effect of time on them within each group. Dunn post hoc was done to make pairwise comparisons between different time periods when Kruskal-Wallis test was significant. Mann-Whitney U tests was used for comparison between groups. The level of significance was set at $P \leq 0.05$.

RESULTS

Clinical outcome: Periodontal health

Plaque Index (PI)

Table 1 shows calculated means of PI scores of the two groups at denture insertion and at each recall appointment and their significant level as well as the comparison between the two groups.

Increase in the means of PI scores was detected throughout all recall visits for both groups. Statistically significant increase in mean PI scores was revealed after 6 months of denture insertion for both groups. Statistically significant increase in mean PI score was detected between 6 and twelve months follow up periods for group B (Co-Cr bar). However, statistically insignificant increase in the mean PI score was shown between 6 and twelve months follow up periods for group A (Zirconia bar).

Comparison between groups revealed statistical insignificant difference between mean PI score at denture insertion and 6 months recall visits. On the other hand, group B showed statistically significant increase in mean PI score than Group A at 12 months recall visit.

Gingival Index (GI)

Table 2 shows calculated means of GI scores of the two groups at denture insertion and at each recall appointment and their significant level as well as the comparison between the two groups.

Increase in the means of GI scores was detected throughout all recall visits for both groups. Statistically significant increase in mean GI scores was revealed after 6 months of denture insertion for both groups. Statistically significant increase in mean GI score was detected between 6 and twelve months follow up periods for group B (Co-Cr bar). However, statistically insignificant increase in the mean GI score was shown between 6 and twelve months follow up periods for group A (Zirconia bar).

Comparison between groups revealed statistical insignificant difference between mean GI score at denture insertion and 6 months recall visits. On the other hand, group B showed statistically significant increase in mean GI score than Group A at 12 months recall visit.

Relative Attachment Level (RAL)

Table 3 shows the changes in calculated means of RAL of the two groups between each two consecutive measures and at the end of the study period, their significant level as well as the comparison between the two groups.

An increase in the mean change of RAL values was detected throughout all follow up periods for both groups. This increase was statistically significant at the end of the study period (P< 0.05). The increase was insignificant between 6-12 months and 0- 12 months follow up for group A

TABLE (1) Mean, Standard deviation, values and results of Kruskal-Wallis test for the PI of each group and the Mann-Whitney U tests for comparison between the two groups

Follow-up visits	Group A (Zirconia bar) Mean ±SD	Group B (Co-Cr bar) Mean ±SD	Mann-Whitney U p- value
Denture insertion (0 months)	0.00 ± 0.00[b]	0.00 ± 0.00[c]	1
6 months	0.69 ± 0.51[a]	0.76± 0.42[b]	0.461
12 months	0.72 ± 0.38[a]	0.95 ± 0.58[a]	0.032*
Kruskal-Wallis p-value	0.026*	0.007*	

SD: standard deviation **** : significant at P ≤ 0.05***

Means with different letters within each column are statistically significantly different according to Wilcoxon post hoc test

TABLE (2) Mean, Standard deviation, values and results of Kruskal-Wallis test for the GI of each group and the Mann-Whitney U tests for comparison between the two groups

Follow-up visits	Group A (Zirconia bar) Mean ±SD	Group B (Co-Cr) Mean ±SD	Mann-Whitney U p- value
Denture insertion (0 months)	0.24 ± 0.19[b]	0.34 ± 0.20[c]	0.520
6 months	0.78 ± 0.61[a]	0.87 ± 0.59[b]	0.142
12 months	0.81 ± 0.54[a]	1.25 ± 0.88[a]	0.001*
Kruskal-Wallis p-value	0.002*	0.000*	

SD: standard deviation **** : significant at P ≤ 0.05***

Means with different letters within each column are statistically significantly different according to Wilcoxon post hoc test

TABLE (3) Mean, Standard deviation, values and results of repeated measures ANOVA test for the mean change of RAL of each group and the independent variable t-test for comparison between the two groups

Follow-up periods	Group A (Zirconia bar) Mean ± SD (mm)	Group B (Co-Cr bar) Mean ± SD (mm)	Independent T-test p- value
0-6 m	0.29 ± 0.15[b]	0.21 ± 0.19[c]	0.339
6-12 m	0.36 ± 0.25[a]	0.52 ± 0.40[b]	0.013*
0-12 m	0.67 ± 0.21[a]	0.73 ± 0.35[a]	0.000*
ANOVA p-value	0.000*	0.000*	

SD: standard deviation **** : significant at P ≤ 0.05*** ***m:months***

Means with different letters within each column are statistically significantly different according to Tukey's test

(Zirconia bar). Comparing the two groups revealed statistically insignificant difference between mean change of RAL values after 6 months follow up visits. However, Group B (Co-Cr bar) showed significant increase (P< 0.05) in mean changes of RAL values than group A (Zirconia bar) at 6-12 m and after 12 months follow up visit.

Radiographic outcome: MBH changes proximal to abutments

There was no statistically significant difference between both mesial and distal marginal bone height changes around abutments in each group in all follow up periods (p>0.05) after being tested by Paired t-test. Accordingly, the mean of both mesial and distal marginal bone height changes was calculated and used for studying the changes in marginal bone height in each group at every follow up interval.

Table 4 shows the changes in the calculated means of MBH proximal to abutments for both groups between each two consecutive measures and at the end of the study period, their levels of significance as well as comparison between the two groups.

A statistically significant increase in the means of marginal bone loss was detected throughout the whole study period for both groups. Comparing bone loss in the two groups revealed statistically insignificant difference in the marginal bone loss of the two groups at all study intervals and throughout the whole study period. However, the results revealed higher means of bone loss in group B than group A.

TABLE (4) Means, Standard deviation, values of ANOVA test for mean changes of MBH of each group and independent variable t-test for comparison between the two groups

Follow-up periods	Group A (Zirconia bar) Mean ± SD (mm)	Group B (Co-Cr bar) Mean ± SD (mm)	Independent T-test p- value
0-6 m	0.046 ± 0.034[c]	0.051 ± 0.025[c]	0.237
6-12 m	0.081 ± 0.041[b]	0.093 ± 0.047[b]	0.098
0-12 m	0.127 ± 0.052[a]	0.144 ± 0.036[a]	0.386
ANOVA p-value	0.000*	0.006*	

SD: standard deviation **** : significant at P ≤ 0.05*** ***m:months***

Means with different letters within each column are statistically significantly different according to Tukey's test

DISCUSSION

Overdenture supported by natural teeth is considered as one of the old concepts of preventive treatment modality that can help to maintain the bone of the supporting area by retaining the few remaining natural teeth. [20, 21] In addition, the proprioception of the remaining teeth can improve the masticatory efficiency as it is responsible for the tactile sensation and the amount of forces exerted during mastication. [22]

One of the most commonly used mechanism of retention in overdenture is the bar attachment which enhance stability and retention of the denture. However, tooth supported overdentures particularly retained with bar system are claimed to affect the periodontal condition of the abutment teeth. If they are not planned and maintained carefully, will lead to stagnation of food, plaque accumulation, gingival inflammation, pocket formation, change in gingival attachment and bone loss. [21]

Hence, this randomized controlled clinical trial was carried out to assess clinically and radiographically a new bar material like zirconia on the supporting structure in an attempt to minimize the drawbacks of the overdentures by its mechanical and physical properties which have good response by the tissues.

All denture construction procedures were carried out following the same technique for both groups to rule out any effect of different procedures. Females were not included in this trial as they prone to bone resorption due to hormonal influence. [7, 23]

Strict oral hygiene measures were performed before denture insertion and through the follow up visits. Patients were also educated and motivated for maintaining the denture and oral hygiene. This was necessary to exclude the effect of bad oral hygiene habits on the periodontal health of the abutments and therefore facilitating the correlation of any changes to the type of bar material used.

The increase in plaque and gingival index was evident in both groups which could be attributed to the introduction of the overdenture which is considered as a potential source of gingival irritation and also its nature deprives the tissues from the normal massage and cleaning by the tongue and cheek which make the abutments prone to plaque accumulation.[21] This could also be blamed by the presence of the bar connecting the abutments and the copings margin despite of the cautious procedure to provide a correct smooth margins. However, clinically the inflammatory signs were mild and responded to the oral and denture hygiene measures.

On the other hand, Zirconia bar group showed significantly lower PI and GI than CO-Cr group at the end of the study period. This may be correlated to properties of the Zirconia material which provides smooth surface that make the bacteria less likely to adhere to it compared to the surface roughness of CO-Cr and its hydrophobic characteristic and high charged surface that make the bacteria attracted to it as explained by Elsayed et al; 2012, [24] whose results suggested that Zirconia copings could help in maintaining oral hygiene measures better than Co-Cr copings. This was supported by previous studies where Zirconia copings showed lower inflammatory findings around implant and natural teeth as well as healthy gingival tissues. [25, 26] Other studies showed that Zirconia has less tendency to bacterial colonization than other materials being under investigation. [24, 27]

The change in RAL was adopted in this study instead of CAL due to the difficulty in determination of the CEJ as the abutments were covered by copings. Measurements were carried out from the coping margin to the base of the sulcus. Monitoring the change in RAL is important to suggest any periodontal disease, the depth of measurement depends on the degree of inflammation which leads to gaining or loosing connective tissue attachment

to the surface of the root. [28] Increase in mean change of RAL in both groups was evident through the study periods. That suggests apical migration of the base of the sulcus due to inflammatory changes. Functional movement of the denture may also cause impingement of the gingival tissues contributing to the change in RAL. A 42-month longitudinal study reported a change of CAL of canine abutments of overdenture to be greater in the mandible than in the maxilla as a result of rotation of the overdenture around the abutment teeth in buccolingual direction. [29]

However, the changes in RAL were minimal and within the normal reported range (0.5mm to 3 mm) of probing depth.[30]Zirconia bar group showed significantly less change in the RLA at the end of the study period suggesting minimal inflammation induced due to less affinity of microbial adherence to its surface and in turn less plaque accumulation. This was in consistence to the gingival and plaque indices reported in this study giving the upper hand for the Zirconia bar group regarding the periodontal health of abutments as compared to Co-Cr bar group.

After teeth extraction, the process of bone resorption becomes unavoidable due to several factors that cause bone loss of the edentulous ridge. However, the mechanism itself is not well recognized. [31-33] Retaining teeth or roots in the anterior region of mandibular arch as overdenture abutments may be considered as a valuable procedure in preserving bone in this region which shows higher rate of bone loss when compared to posterior region and the maxillary ridge. Canines are the most common teeth used as overdenture abutment owing to their long roots and their position in the dental arch which allow them to survive more. [31, 34, 35]

A 6-year study assessed bone loss in the anterior area of the mandible in patients wearing complete denture and implant overdenture using orthopantograms. The results showed 3.01 mm bone loss in the mandibular midpoint for patient wearing complete denture and 0.71 mm for patients wearing overdentures. [35] Another study of 5 years duration using cephalometric radiographs showed a vertical bone loss about 0.6 mm in the anterior region of the mandible in patients using tooth supported overdentures while in complete denture wearer a 5.2 mm was registered. [36]

Using bar attachment in retaining overdentures allows distribution of masticatory forces among the abutment teeth with minimum torqueing force owing to its near position to the edentulous ridge. Moreover, it provides splinting mechanism of these abutments. [37, 38]

The results of this study revealed a significant change in marginal bone height proximal to the abutment teeth for both groups at the end of the study period irrespective to the type of bar material used. This could be due to the tendency of the denture to rotate tissue ward as allowed by the compressibility of the mucosa, the rotation occurs around a fulcrum axis created by the bar placing torqueing forces on the abutment teeth. [39] However, the change in the marginal bone height was small and not reaching a destructive level where the marginal bone loss was 0.127 mm in Zirconia group and 0.144 mm in the Co-Cr group. The slight bone loss could be attributed to the use of resilient bar attachment that allow rotation of the denture around the bar by the sleeve that in turn provides a stress breaking effect. [21] However, insignificant difference in the change of marginal bone height was recorded between both groups although the amount of marginal bone loss in Zirconia bar group was apparently less this could suggest that there is no difference between the groups in term of stresses delivered to the abutment. Accordingly, the null hypothesis regarding the periodontal health of the abutment was rejected. On the other hand, the null hypothesis regarding the marginal bone height changes around the abutments was accepted.

CONCLUSION

Within the limitation of this study that includes the short follow up period and exclusion of females, it could be concluded that the Zirconia as a bar material could have an advantage over Co-Cr regarding the periodontal health of abutment teeth in terms of PI,GI and RAL. However, no difference was observed between the two bar types regarding the effect on marginal bone height proximal to the abutment teeth as stresses delivered from both was comparable.

Longer follow up period and inclusion of females in future studies are recommended to reach more reliable results.

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