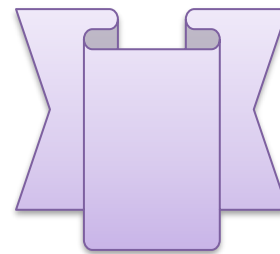
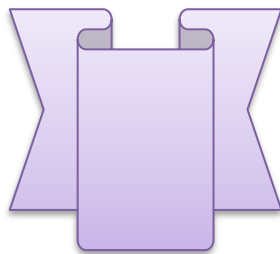
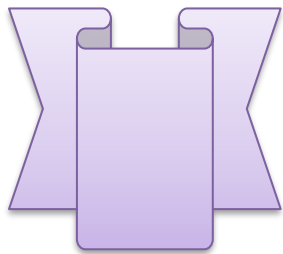
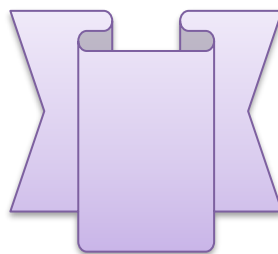
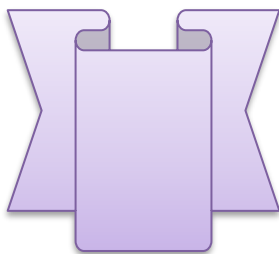
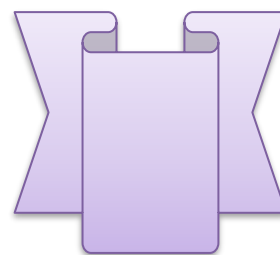
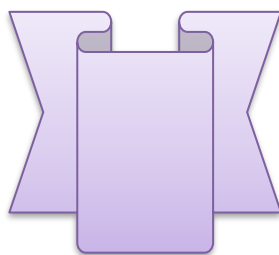
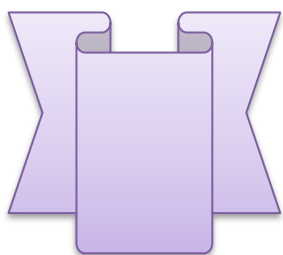


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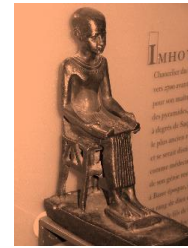


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Original Article

Short Dental Implants versus Standard Dental Implants Placed in The Posterior Jaws

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ABSTRACT

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Background: Recent studies have revealed that the utilization of shorter dental implants generally represents the optimal approach for addressing the majority of instances involving bone loss in the posterior region of the oral cavity. Short implants have superior performance and exhibit a reduced incidence of complications compared to lengthier implants.

Aim of the work: The aim of this study is to conduct a comparative analysis of smaller dental implants and standard dental implants specifically employed in the posterior region of the oral cavity.

Patients and Methods: A research study was conducted at an affiliated dental clinic, focusing on adult patients. The study utilized Biomimetic Ocean implants with internal hex connections manufactured by Avinent Implant System, Spain. Two sizes of implants were used, regular implants measuring 10 mm and short implants measuring 7 mm. The sample size was 60 Patients. A total of 29 standard implants and 17 short implants were put. The methods involved comprehensive ethical considerations, obtaining informed consent from participants, and thorough examinations at multiple time points. Surgical and prosthetic procedures were performed, and clinical examinations, radiographic measurements, and stability assessments were conducted. Statistical analysis was employed to analyze the collected data.

Results: The results indicate that all of the implants in both groups were effective. Following the surgical procedure, it was observed that the Standard Implants Group exhibited a comparatively higher mean initial stability quotient [ISQ] score of 77.1 ± 65 , whereas the Short Implants Group displayed a mean ISQ score of 71.7 ± 81 . This discrepancy in ISQ values between the two groups during the visit is noteworthy. Both groups had comparable mean ISQ values during the subsequent surgical procedure.

Conclusion: The findings of this study indicate that shorter implants demonstrate comparable efficacy and stability to lengthier implants in those experiencing jawbone loss.

Keywords: Implants; Short; Long; Jaw.



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INTRODUCTION

Dentists frequently encounter the issue of posterior edentulism, which refers to the absence of teeth in the posterior regions of both the maxillary and mandibular arches. Removable partial dentures are often met with dissatisfaction due to their inherent discomfort and perceived instability during tongue movement. To address this problem, the use of dental implants capable of securely anchoring a prosthetic tooth has emerged as the most optimal approach. It is recommended that the length of dental implants be a minimum of 10 mm to optimize their long-term efficacy ^[1].

Implants are medical devices that are placed surgically within the jaw in order to improve a person's chewing function or look. Different implant abutment connections, including as external, internal flat-to-flat, and conical ones, can have an impact on how well implant therapy works. The best aesthetic and functional outcomes from implant therapy depend on accurate 3D implant placement. However, implant dentistry problems with regard to aesthetics can result from implant malposition in the aesthetic zone ^[2].

In the field of implant treatment, implants measuring 10 millimeters or greater in length are generally considered the standard size. The reliability of short implants is considered to be inferior to that of long implants due to factors such as greater bone contact and smaller crown-to-implant ratio associated with the latter. However, recent research focusing on the utilization of shorter implants in the posterior region of the oral cavity has demonstrated comparable longevity, equivalent levels of jawbone resorption, and comparable efficacy in supporting dental prostheses when compared to standard-length implants. The definition and implications of short implants are subjects of ongoing discourse, with short implants typically ranging from a minimum length of 6 mm to a maximum length of 10 mm ^[2, 3].

A systematic review and meta-analysis conducted in 2016 compared short implants [equal to or less than 8 mm] versus standard implants [larger than 8 mm] placed in the posterior jaws. The study concluded that short implants are frequently placed in the posterior area to avoid complementary surgical procedures. However, it is important for clinicians to be

aware that short implants with a length of less than 8 mm present a greater risk of failures ^[3].

Another study, a one-year post-loading prospective observational study published in 2021, compared short dental implants [≤ 8.5 mm] versus standard dental implants [≥ 10 mm]. The study concluded that long implants are generally considered more reliable than short implants due to their greater surface area contact with the bone and lower crown-to-implant ratios. However, recent systematic reviews on the use of short implants in the posterior region have concluded that there are no significant differences in terms of survival rate, crestal bone loss, and prosthesis survival rate compared to standard-length implants. While previous research has shown that short implants with a length of less than 8 mm presented a greater risk of failures, recent data have demonstrated that short dental implants can be the preferred treatment in most cases, with high survival rates and lower complications ^[4].

In addition to conventional dental implants, the All-on-4[®] treatment concept has emerged as another approach to dental implantation in the posterior maxilla. This procedure involves placing four implants through the jaw, with a horseshoe-shaped porcelain prosthesis attached to the implants. The All-on-4[®] concept can be performed on the top, bottom, or both jaws ^[3].

It is worth noting that dental implants are covered by Medicaid for recipients in New York State. According to the coverage guidelines, the absence of one maxillary anterior tooth or two mandibular anterior teeth may be considered an esthetic problem that warrants a prosthetic solution ^[5].

While dental implants have become a popular treatment option, there are risks associated with the procedure. Dental malpractice cases related to implants have been reported, with permanent nerve injuries from dental implant surgery being a potential risk. However, these injuries are usually avoidable with proper care. Implant infrastructures have a 30-year life expectancy, and conventional-sized implants are preferred for improved denture stability and retention in the long term ^[6].

This study aimed to compare the performance of smaller dental implants [SDIs] and standard dental implants [LDIs] in the posterior region of the oral cavity.

PATIENTS AND METHODS

A research study was undertaken at the dental clinic affiliated with the institution, focusing on adult patients. The study was quasi experimental design as the recruited participants were not randomly assigned to conditions or orders of conditions. The dental implants utilized in our study were Biomimetic Ocean implants featuring internal hex connections, manufactured by Avinent Implant System located in Santpedor, Spain. These implants were employed for the purpose of treatment. Two distinct sizes of implants were utilized in the study, namely regular implants measuring 10 mm and short implants measuring 5 mm. A total of 29 standard implants and 17 short implants were put.

Ethical considerations: The ethical review process encompasses a thorough evaluation of the study protocol, processes for obtaining informed consent, and practices for handling data, with the aim of ensuring adherence to ethical norms.

Informed consent: In order to ensure ethical standards were met, prior to the commencement of data collection, informed consent was sought from all participants. The participants were presented with a comprehensive elucidation of the study's objectives, methodologies, prospective hazards and advantages, as well as their entitlement to discontinue their involvement at any juncture without facing any adverse consequences. Prior to their involvement in the study, explicit agreement was acquired from all participants, guaranteeing their comprehensive comprehension and voluntary engagement.

Sample size: Sample size was calculated by using MedCalc software Version 22.009 package for biomedical research. The criteria used for sample size calculation were as follows: Two-sided confidence level 95%, Power 80%, Two study groups, ratio is 1:1, and the outcome [survival rate of Short Dental Implants is expected to be 86.7% compared to 95% among Standard Dental Implants according to the results of **Pardo-Zamora et al.** ^[1].

The sample size based on the previously mentioned criteria was found to be 27 participants per group and that number will be increased by [10.0%] to be 30 per group to overcome the dropout rate. A total of 60 participants were included in the study.

They were randomly assigned to one of two groups: a group that received short implants and a group that received long implants: Group 1: consisted of 30 instances that had short implants, and Group 2: consisted of 30 cases that had patients with lengthy implants.

Criteria for Patient Selection: The inclusion criteria for participants in this study consisted of the following: individuals had to be adults of both genders who met the eligibility criteria, which included having missing teeth and a desire to replace them with dental implants. Additionally, participants were required to exhibit good oral hygiene, as indicated by a low plaque index [$\leq 25\%$, 15]. Furthermore, individuals were excluded if they had any health conditions or habits that would impede their ability to receive dental implants. The selection of implants utilized for therapy was contingent upon the extent of accessible bone.

Individuals who were excluded from participation in the study exhibited specific criteria, including the presence of an infection at the site of the implant, prior bone regeneration, the presence of an uncontrolled systemic disease, a daily consumption of more than 10 cigarettes, a history of radiation therapy to the head and neck within the preceding 6 months, or current pregnancy.

The medical practitioners provided a detailed explanation of the treatment protocol to the patients, who afterwards expressed their consent to undergo the prescribed intervention. The individuals documented their agreement in writing and made a commitment to attend all subsequent appointments at the clinic. The study did not encompass individuals who failed to attend their scheduled appointments or adhere to the prescribed treatments.

Methods

Experiments were conducted on multiple instances. The initial examination took place concurrently with the implementation of the interim resolution. Subsequently, a series of tests [including bone density test, calcium blood test, vit D test] were undertaken after a period of three months. A subsequent experiment was conducted upon the installation of the ultimate replacement. Finally, examinations were conducted at the intervals of six and twelve months subsequent to the ultimate replacement. X-ray imaging was conducted intraorally on

three separate occasions: prior to the surgical intervention, immediately following the installation of the dental implant, and at the 12-month mark subsequent to the insertion of the replacement tooth. The study investigated the initial stability quotient [ISQ] at three different time points: immediately after its initial placement [ISQ1], upon insertion of the permanent replacement tooth [ISQ2], and 12 months following the placement of the tooth [ISQ3].

Patients' preparation before surgery: Patients received instructions regarding preoperative oral hygiene practices such as brushing and flossing, and to abstain from eating or drinking for a certain period before the surgery to ensure a clean surgical field.

Surgical Procedure: Initially, a comprehensive gingival examination was conducted on all individuals. The assessment encompassed evaluating the periodontal pocket depth, gingival recession, attachment level of the teeth to the gingiva, and the presence of blood upon probing. The procedure was conducted on six specific locations surrounding each tooth, with the exception of the wisdom teeth. All the procedures for implant placement were performed by the same surgeon within a single room. The medical professionals administered local anesthesia to induce numbness in the targeted region, and thereafter performed the surgical procedure in accordance with the guidelines provided by the implant manufacturer. In cases where sufficient space was available, conventional implants were employed, however shorter implants were utilized when space constraints were present. In certain instances, when encountering minor perforations in the bone subsequent to implantation, a combination of autogenous bone tissue and powdered porcine bone is employed to address these voids. The initial stability quotient [ISQ] was determined prior to the installation of the cover caps. Following a surgical procedure, it is necessary for the patient to adhere to a prescribed regimen of 1 mg Augmentin® [amoxicillin/clavulanic acid] administration, with a frequency of three times per day orally, over the course of one week. In addition, it is recommended that individuals employ a mouth rinse containing zero percent alcohol twice daily. In the event of experiencing pain, individuals have the option to alleviate their discomfort by consuming Norvectan®, a variant of Ibuprofen that contains a dosage of 600 mg three times per day orally. The physician

provided instructions on postoperative oral care and emphasized the importance of maintaining a high level of cleanliness in the oral cavity. The sutures were extracted seven days following the surgical procedure.

Prosthetic Procedure: To facilitate osseointegration of implants in the mandible, a period of 2 months was allocated for their retention within the oral cavity. In the case of upper jaw implants, the duration of the period has been prolonged to three months in order to get an equivalent fusion process. Photographs were captured at a time frame ranging from 8 to 12 weeks subsequent to the insertion of the implant, with the purpose of fabricating a provisional dental prosthesis. A provisional prosthesis was inserted following a two-week period, and subsequently adjusted until achieving optimal gingival aesthetics, while the patient maintained diligent oral hygiene practices. Following a period of four months subsequent to the first installation of the provisional repair, molds were created in order to create the ultimate replacement teeth. Every particular tooth was affixed utilizing a titanium connector for ceramic, zirconia, or a composite blend of both substances. In instances involving the presence of several implants, the utilization of bridges constructed from a monolithic zirconia block or a combination of zirconia and ceramic materials was seen.

Clinical Examinations: At various intervals, the dental professional conducted assessments for plaque accumulation, assessed the depth of periodontal pockets, and examined for signs of gingival bleeding throughout various regions within the oral cavity. These temporal intervals corresponded to the instances when individuals received a provisional restoration, three months subsequent to its first placement, followed by the acquisition of a permanent prosthetic, and finally, at the intervals of six and twelve months thereafter. During each dental appointment, oral hygiene procedures are performed, including teeth cleaning, accompanied by oral care instructions for maintaining optimal oral health. This occurrence would be more likely if a substantial quantity of microorganisms were detected or if there was evidence of gingival hemorrhage.

Radiographic Measurements: Cone-beam computed tomography [CBCT] as special X-ray imaging techniques were employed to assess the extent of bone presence surrounding an implant

at various intervals. Initially, the examination was conducted on the day of the surgical procedure, subsequently with the insertion of the prosthetic tooth, and ultimately, after a duration of 12 months. We conducted an assessment to determine the distance between the implant and the adjacent bone's highest point. The bone level surrounding each implant was assessed at the time of prosthetic tooth placement and again after a period of 12 months. Initially, the baseline for our analysis was established by utilizing the mean value of the measurements. The researchers conducted an analysis on the variations in bone quantity by comparing the mean measurements at various time intervals. In order to mitigate errors and maintain consistency, a specialized instrument was employed to ensure the proper alignment of the teeth in close proximity to the implant. Silicone blocks were employed in the experimental setup, exhibiting the ability to undergo self-curing.

Stability Assessment: The strength of the primary implant was assessed immediately after placement using the Osstell ISQ® device, in accordance with the manufacturer's guidelines. The data was collected at three distinct time points: initial implant placement [ISQ1], commencement of the final dental procedure [ISQ2], and 12 months post-implantation [ISQ3]. In order to complete the task, a specialized instrument known as a SmartPeg® was manually affixed to the implant using a torque wrench. According to the manufacturer, the recommended force is 10 N/cm². The SmartPeg was positioned and subsequently, the Osstell Mentor device was utilized to assess the implant from four distinct orientations: anterior, posterior, lateral, and inferior. The machine emitted a persistent auditory signal subsequent to the completion of its reading task, while concurrently displaying the same information on its visual interface. Two measurements were obtained for each implant, each from a different position. One measurement was taken at a 90-degree angle relative to the other, while the second measurement was taken parallel to the ridge. We have identified an intermediary numerical value situated between two other numerical values.

Variables: Our primary areas of interest encompassed the stability of the implant within its designated place, the extent of osseointegration surrounding the implant, and the durability of the implant over time. The success of implants

was determined by their ability to remain in situ and exhibit optimal performance during subsequent follow-up examinations. In instances where implants were either spontaneously dislodged or intentionally extracted subsequent to their insertion, such occurrences were deemed as failed and duly documented. The study incorporated variables like gender, age, implant size, bone type, and prosthesis type.

Statistical Analysis: A t-test is an inferential statistic that compares the average values of two data sets to ascertain whether they come from the same population. We employ t-tests as statistical analysis tests. T-tests come in two varieties: paired samples and independent samples. When two groups are being compared that are not dependent on one another, the independent samples t-test is used, whereas the paired samples t-test is used when the two groups are dependent on one another. The average plus or minus figures correspond to the mean and standard deviation, respectively. A set of numerical data's mean value represents its average, while the standard deviation measures how widely distributed the data are from the mean. The variance, or average of the squared deviations from the mean, is taken as the starting point for calculating the standard deviation. When describing the variability or spread of a set of data, the standard deviation is frequently utilized. During the process of descriptive analysis, the numerical data was presented in the form of mean values accompanied by their corresponding standard deviations, the raw numerical values themselves, and the proportions expressed as percentages. If the p-value was found to be less than 0.05, it indicated statistical significance, implying that the observed results were deemed relevant.

RESULTS

Demographic data

The mean age in the Short Implants Group is significantly greater [52.62 ± 8.46 years] compared to the Standard Implants Group [43.51 ± 11.21 years]. The obtained p-value of 0.008 from the t-test indicates a statistically significant difference in age between the groups. There is a minimal disparity in the gender distribution between each category. The obtained p-value of 0.776 from the χ^2 test suggests that there is a substantial likelihood that the proportion of males and females is equivalent in both groups.

Implant data

The positioning of implants in both the upper and lower jaw is same across all groups, with no discernible variation. The obtained p-value of 0.849 from the chi-square test indicates that there is no significant difference in the distribution of implants across the examined locations. Therefore, it is reasonable to conclude that these areas can be treated as having a similar distribution of implants.

There exists a disparity in the distribution of implants between the anterior and posterior regions. Within the Short Implants Group, a mere fraction of the total implants [7.14%] are situated in the anterior region. Conversely, the Standard Implants Group exhibits a comparatively higher proportion [47.36%] of implants located in the front area. The obtained p-value, which is less than 0.001, as determined by the χ^2 test, indicates a significant disparity in the quantity of implants across different regions.

The allocation of implants, contingent upon their breadth, varies across different cohorts. The Short Implants Group does not own any implants with a size of 3.5 mm². Conversely, the Standard Implants Group has a total of 10 implants, accounting for 26.31% of the group, which are of this particular size. The obtained p-value of 0.001 from the χ^2 test indicates a statistically significant difference in the sizes of implants between the two groups.

Outcome

The mean age of the patients in the Short Implants Group was significantly greater than the mean age of the patients in the Standard Implants Group. There was no statistically significant difference in the gender distribution between the two groups. There was a statistically significant difference in the distribution of implant types between the two groups, with the Short Implants Group having a higher proportion of implants placed in the anterior maxilla and the Standard Implants Group having a higher proportion of implants placed in the posterior maxilla and mandible [table 1].

There was a statistically significant difference in the distribution of implant diameters between the two groups with the Short Implants Group having a lower proportion of implants with a diameter of 3.5 mm and the Standard Implants Group having a higher proportion of implants

with a diameter of 3.5 mm. There was a statistically significant difference in the distribution of restoration types between the two groups, with the Standard Implants Group having a higher proportion of implants restored with single crowns [table 1].

A discernible disparity exists among the groups with regards to the distribution of repair types. The Short Implants Group exhibits a higher prevalence of fixed partial prosthesis [59.52%] in comparison to the Standard Implants Group [39.47%]. The obtained p-value of 0.036 from the χ^2 test indicates a statistically significant difference in the distribution of restoration types among the groups specified in table [1].

During the six-month duration of the visit to the Short Implants Group, a total of 42 implants were examined. Out of all the implants, only one failed to function, resulting in a success percentage of 96.5%. During the 6-12-month follow-up examination, a total of 39 implants were observed, and none of them exhibited any signs of failure. Consequently, the success rate and cumulative success rate for these implants were both recorded as 100%.

During the 6-month visit in the Standard Implants Group, a total of 38 implants were monitored, and it was found that none of them experienced failure. This outcome resulted in a 100% success rate [SR] and cumulative success rate [CSR]. During the 6-12-month visit, a total of 38 implants were monitored, and no instances of implant failure were documented, leading to a 100% success rate [SR] and cumulative success rate [CSR] [table 2].

Prior to the commencement of the loading process, the Short Implants Group consisted of 85 observations, exhibiting a mean Marginal Bone Resorption [MBR] value of 0.45 ± 0.54 . Conversely, the Standard Implants Group comprised 38 observations, displaying a marginally higher mean MBR value of 0.58 ± 0.54 . The obtained p-value of 0.157 suggests that there is insufficient evidence to support the presence of a significant difference in mean basal metabolic rate [MBR] between the two groups prior to loading.

During the 6-month follow-up examination, the Short Implants Group consisted of a total of 83 observations. The mean MBR [measurement] was calculated to be 0.52, with a range of 0.43.

In contrast, the Standard Implants Group consisted of a total of 38 observations. The mean MBR observed was 0.74, with a range of 0.68. The obtained p-value of 0.032 indicates a statistically significant difference in mean basal metabolic rate [MBR] between the groups at the specified time point, suggesting that this difference is unlikely to have occurred by chance.

During the 12-month visit, the Short Implants Group conducted an examination of 81 cases, wherein the average marginal bone resorption [MBR] was determined to be 0.53 ± 0.044 . In the meanwhile, the Standard Implants Group conducted a study encompassing 37 instances, wherein they identified a mean MBR value of 0.77 ± 0.67 . The obtained p-value of 0.010 indicates a statistically significant difference in mean basal metabolic rate [MBR] between the groups at the end of the 2-year period [table 3].

The Standard Implants Group initially consisted of 42 observations, with an average Implant Stability Quotient [ISQ] value of 75. The ISQ values varied within a range of 5 ± 48 . In contrast, the Short Implants Group consisted of 38 observations, with an average ISQ value of 70.2 ± 10.2 . The obtained p-value of 0.016 indicates a statistically significant difference in ISQ values between the two groups at the commencement of the investigation.

During subsequent postoperative checkups, the Standard Implants Group had a higher mean Implant Stability Quotient [ISQ] of 77.1 ± 65 , in contrast to the Short Implants Group which had a mean ISQ of 71.7 ± 81 . The obtained p-value of 0.009 provides substantial statistical evidence to support the presence of a significant difference in ISQ values between the two groups during this particular visit.

In the context of the second surgical procedure, it was observed that both groups exhibited comparable mean ISQ values. The Standard Implants Group exhibited an average ISQ score of 78.4, with a range of 2.9. Similarly, the Short Implants Group displayed a score of 78.4, with a range of 4.1. The obtained p-value of 0.979 indicates that there is no statistically significant difference in ISQ values between the two groups during the visit under consideration.

During the ISQ6 study, the Standard Implants Group exhibited an average Implant Stability Quotient [ISQ] of 76.3, with a range of 6.3. In contrast, the Short Implants Group had an average ISQ of 77.6, with a range of 6.6. The p-value of 0.172 suggests that there is no statistically significant difference in ISQ values across the groups, both at the current visit and at the 12-month visit, as indicated in table [4].

Table [1]: Patients and implant characteristics

| Characteristics | | Short Implants Group [n = 30 pt and n = 42 ix] | Standard Implants Group [n = 30 pt and n = 38 ix] | p-Value |
|-----------------------------------|---------------------|---|--|---------------------------|
| Patients [n = 60] | | | | |
| Age [years] | Mean \pm SD | 52. 62 \pm 8.46 | 43.51 \pm 11.21 | 0.008 [t-test] |
| Gender: n [%] | Males | 19 [45.23] | 18 [47.36] | 0.776 [χ^2] |
| | Females | 23 [54.76] | 20 [52.63] | |
| Implants [n = 80] | | | | |
| Maxilla/Mandible: n [%] | Maxilla | 25 [59.52] | 24 [63.15] | 0.849 [χ^2] |
| | Mandible | 17 [40.47] | 14 [36.84] | |
| Anterior/Posterior: n [%] | Anterior | 3 [7.14] | 18 [47.36] | <0.001 [χ^2] |
| | Posterior | 39 [92.85] | 20 [52.63] | |
| Diameter: n [%] | 3.5 mm ² | 0 [0.00] | 10 [26.31] | 0.001 [χ^2] |
| | 4.0 mm ² | 18 [42.85] | 16 [42.1] | |
| | 4.5 mm ² | 10 [23.80] | 5 [13.15] | |
| | 5.0 mm ² | 14 [33.33] | 7 [18.42] | |
| Type of restoration: n [%] | | | | |
| Single crowns | | 17 [40.47] | 23 [60.53] | 0.036 [χ^2] |
| Fixed partial prosthesis | | 25 [59.52] | 15 [39.47] | |

Table [2]: One Year Life Table Analysis of Standard and Short Implants

| Time [mo.] | Short Implants Group [n = 30 pt and n = 42 ix] | | | | Standard Implants Group [n = 30 pt and n = 38 ix] | | | |
|------------|--|---------|--------|---------|---|---------|--------|---------|
| | No. | Failure | SR [%] | CSR [%] | No. | Failure | SR [%] | CSR [%] |
| 0-6 | 42 | 1 | 96.5 | 96.5 | 38 | 0 | 100 | 100 |
| 6-12 | 39 | 0 | 100 | 96.5 | 38 | 0 | 100 | 100 |

SR: Significant Risk, CSR: Clinical Study Report

Table [3]: Comparison of MBR at Various Visits [Mean \SD]

| Time [y] | Short Implants Group [n = 30 pt and n = 42 ix] | | Standard Implants Group [n = 30 pt and n = 38 ix] | | P Value |
|-----------------------|--|-------------|---|-------------|---------------|
| | No. | MBR | No. | MBR | |
| Before loading | 85 | 0.45 ± 0.54 | 38 | 0.58 ± 0.54 | 0.157 |
| 6 months | 83 | 0.52 ± 0.43 | 38 | 0.74 ± 0.68 | 0.032* |
| 12 months | 81 | 0.53 ± 0.44 | 37 | 0.77 ± 0.67 | 0.010* |

MBEIR: Master Boot Record, SD mean standard deviation

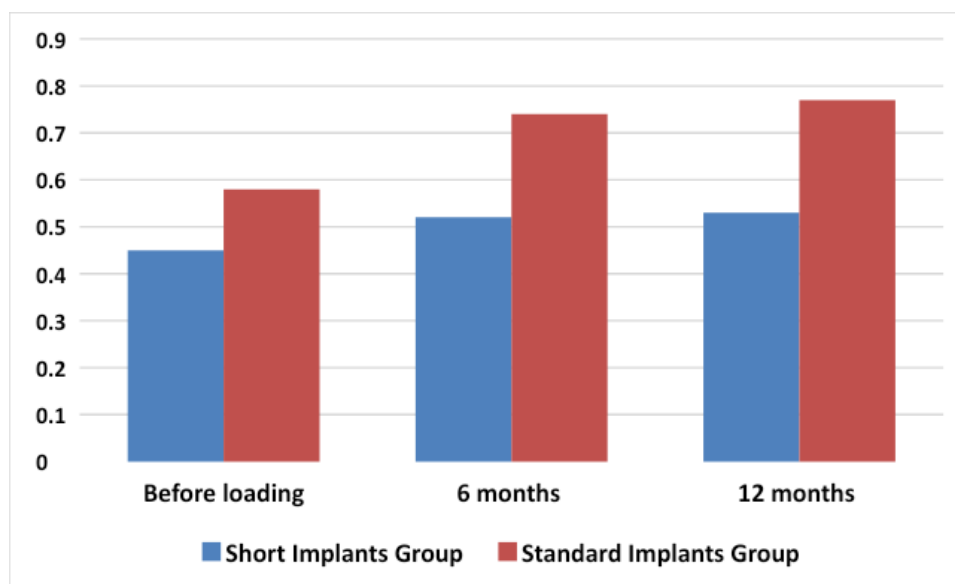


Figure [1]: Comparison of MBR at Various Visits [Mean \SD]

Table [4]: Comparison of ISQ Values of Standard and Short Implants at Various Visits [Mean ± SD]

| Implant Type | No. | ISQp | ISQs | ISQ6 | ISQ12 |
|-----------------|-----|---------------|---------------|------------|------------|
| Standard | 42 | 75.5 ± 4.8 | 77.1 ± 6.5 | 78.4 ± 2.9 | 76.3 ± 6.3 |
| Short | 38 | 70.2 ± 10.2 | 71.7 ± 8.1 | 78.4 ± 4.1 | 77.6 ± 6.6 |
| P value | | 0.016* | 0.009* | 0.979 | 0.172 |

ISQ 12 means the ISQ value measured 12 months after the implant was placed. ISQ 6 means the ISQ value measured 6 months after the implant was placed. ISQp stands for ISQ primer, which is the ISQ value measured right after the implant was placed. ISQs refers to ISQ secondary, which is the ISQ value measured before the implant was loaded.



Figure [2]: Comparison of ISQ Values of Standard and Short Implants at Various Visits

DISCUSSION

The results found that the mean age of patients in the Short Implants Group was significantly higher than that of the Standard Implants Group. There was no statistically significant difference in gender distribution between the two groups. Furthermore, study observed a significant difference in implant types with a higher proportion of implants placed in the anterior maxilla for the Short Implants Group and a higher proportion of implants placed in the posterior maxilla and mandible for the Standard Implants Group. Additionally, we identified a significant difference in implant diameters, with the Short Implants Group having a lower proportion of implants with a diameter of 3.5 mm and the Standard Implants Group having a higher proportion. These findings align with the results of a similar study conducted by **Pardo-Zamora et al.** [1] that compared short and standard dental implants in a one-year post-loading prospective observational study. This study supports the association between age, implant types, implant diameters, and restoration types in the comparison of short and standard dental implants.

This study has demonstrated that the utilization of short dental implants does not have any significant effect on survival rates, little bone loss, or primary/secondary stability of the implant as compared to longer implants at a one-year follow-up period. The outcomes we observe align consistently with those reported in

other research [7-9]. In the report on the agreement presented at the 6th ITI Conference in 2018, **Jung et al.** [7] provided a comprehensive account indicating that the survival rates for both types of inserts exhibited similarity over durations ranging from 1 to 5 years.

In a study conducted by **de Souza et al.** [8], it was determined that the survival rate, minimal bone loss, prosthetic failures, and surgical complications for short implants were comparable to those for long implants in posterior single crowns over a one-year follow-up period. Similarly, **Anitua et al.** [9] observed a survival rate of 93.3% for short implants after a 15-year follow-up.

This study examines the efficacy of utilizing short inserts with a certain design and surface type, which yield results comparable to those obtained from standard-length inserts. The statistical characteristics of the patients and the distribution of inserts did not reveal statistically significant differences between the two groups. The survival rate of the inserts below consideration was found to be 100% in both groups, which aligns with the results obtained in several previous studies [9, 10].

However, it has been determined by other researchers that shorter inserts have a poorer survival rate compared to inserts of standard length [11, 12]. The variation observed in the writing can be attributed to several factors, including the placement and density of the implant, the type of prosthesis and its connection, loading

protocols, implant design and surface characteristics, among others. The surface characteristics of dental implants play a crucial role in the success of short implants. Implants with moderately rough surfaces have been found to have higher success rates, primarily due to increased contact area between the implant and bone tissue. This enhanced contact leads to greater resistance against the forces exerted on the implant during functional loading [13].

Regarding soundness, radiofrequency ablation [RFA] has been extensively employed in both experimental and clinical investigations in recent decades. These studies have consistently demonstrated a strong correlation between the achieved implant stability quotient [ISQ] values and the level of rigidity at the interface between the implant and the bone [14]. The ISQ values associated with a particular pattern can be seen as an indicator of successful embedding. In line with this, **Bischof et al.** [15] established that an ISQ value of ≥ 54 can be used as a threshold for determining successful outcomes. Other developers have recommended values range from an ISQ of 49 to an ISQ of 60.

During our analysis, the Standard Inserts Group consisted of 42 observations, yielding a mean Implant Stability Quotient [ISQ] of 75.5 ± 4.8 . Conversely, the Brief Inserts Group had 38 observations, resulting in a slightly lower mean ISQ of 70.2 ± 10.2 . The p-value of 0.016 indicates a statistically significant difference in ISQ values between the two groups under consideration.

In subsequent visits, the group of patients using Standard Inserts Bunch demonstrated a higher mean implant stability quotient [ISQ] of 77.1 ± 6.5 at the post-surgery stage, in comparison to the group using Brief Inserts Gather, which had a mean ISQ of 71.7 ± 8.1 . The obtained p-value of 0.009 indicates a statistically significant difference in ISQ values between the two groups during this particular visit.

During the ISQs [Immediate Surgical Quality] assessment, both groups demonstrated similar and high ISQ values, indicating a comparable level of severity. The Standard Inserts Gather exhibited a mean Inquisitiveness Score [ISQ] of 78.4 ± 2.9 , whereas the Brief Inserts Gather displayed a mean ISQ of 78.4 ± 4.1 . The p-value of 0.979 indicates that there is no statistically significant difference in ISQ

scores between the two groups at this particular visit.

At the 6-month follow-up assessment [ISQ6], the Standard Inserts Bunch demonstrated an ISQ value of 76.3 ± 6.3 , while the Brief Inserts Bunch exhibited a value of 77.6 ± 6.6 . The obtained p-value of 0.172 suggests that there is no statistically significant difference in ISQ values between the groups at this particular visit. The values obtained in this study are comparable to those reported in previous studies conducted by **Zix J et al.** [16] [52.5 ± 7.9] and **Ostman et al.** [17] [ranging from 62.6 ± 0.0 to 67.4 ± 8.6]. Essential solidness is slowly superseded by auxiliary soundness at the implant–bone contact and remains consistent four weeks following surgery.

Conclusion: This study discovered that, when considering clinical treatment criteria, shorter dental implants can be just as effective as standard-length implants in treating atrophic alveolar ridges. This is demonstrated by comparable rates of implant survival and oral health outcomes.

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REFERENCES

1. Pardo-Zamora G, Ortiz-Ruiz AJ, Camacho-Alonso F, Martínez-Marco JF, Molina-González JM, Piqué-Clusella N, Vicente-Hernández A. Short Dental Implants [≤ 8.5 mm] versus Standard Dental Implants [≥ 10 mm]: A One-Year Post-Loading Prospective Observational Study. *Int J Environ Res Public Health*. 2021 May 26;18[11]:5683. doi: 10.3390/ijerph18115683.
2. Esfahrood ZR, Ahmadi L, Karami E, Asghari S. Short dental implants in the posterior maxilla: a review of the literature. *J Korean Assoc Oral Maxillofac Surg*. 2017 Apr;43[2]: 70-76. doi: 10.5125/jkaoms.2017.43.2.70.
3. Lemos CA, Ferro-Alves ML, Okamoto R, Mendonça MR, Pellizzer EP. Short dental implants versus standard dental implants placed in the posterior jaws: A systematic review and meta-analysis. *J Dent*. 2016 Apr; 47:8-17. doi: 10.1016/j.jdent.2016.01.005.
4. Sorrentino R, Di Mauro MI, Leone R, Ruggiero G, Annunziata M, Zarone F. Implant–Prosthetic Rehabilitation of Maxillary Lateral Incisor Agensis with Narrow

- Diameter Implants and Metal–Ceramic vs. All-Ceramic Single Crowns: A 16-Year Prospective Clinical Study. *Appl Sci.* 2023 Jan 11;13[2]:964. doi: 10.3390/app13020964.
6. Do TA, Le HS, Shen YW, Huang HL, Fuh LJ. Risk Factors related to Late Failure of Dental Implant-A Systematic Review of Recent Studies. *Int J Environ Res Public Health.* 2020 Jun 2;17[11]:3931. doi: 10.3390/ijerph17113931.
 7. Jung RE, Al-Nawas B, Araujo M, Avila-Ortiz G, Barter S, Brodala N, *et al.* Group 1 ITI Consensus Report: The influence of implant length and design and medications on clinical and patient-reported outcomes. *Clin Oral Implants Res.* 2018 Oct;29 Suppl 16:69-77. doi: 10.1111/clr.13342.
 8. Tolentino da Rosa de Souza P, Binhame Albini Martini M, Reis Azevedo-Alanis L. Do short implants have similar survival rates compared to standard implants in posterior single crown?: A systematic review and meta-analysis. *Clin Implant Dent Relat Res.* 2018 Oct;20[5]:890-901. doi: 10.1111/cid.12634.
 9. Anitua E, Alkhraisat MH. 15-year follow-up of short dental implants placed in the partially edentulous patient: Mandible Vs maxilla. *Ann Anat.* 2019 Mar;222:88-93. doi: 10.1016/j.aanat.2018.11.003.
 10. Ravidà A, Barootchi S, Askar H, Suárez-López Del Amo F, Tavelli L, Wang HL. Long-Term Effectiveness of Extra-Short [≤ 6 mm] Dental Implants: A Systematic Review. *Int J Oral Maxillofac Implants.* 2019 Jan/Feb; 34[1]:68-84. doi: 10.11607/jomi.6893.
 11. Balevi B. In selected sites, short, rough-surfaced dental implants are as successful as long dental implants: a critical summary of Pommer B, Frantal S, Willer J, Posch M, Watzek G, Tepper G. Impact of dental implant length on early failure rates: a meta-analysis of observational studies. *J Clin Periodontol* 2011;38[9]:856-863. *J Am Dent Assoc.* 2013 Feb;144[2]:195-6. doi: 10.14219/jada.archive.2013.0099.
 12. Queiroz TP, Aguiar SC, Margonar R, de Souza Faloni AP, Gruber R, Luvizuto ER. Clinical study on survival rate of short implants placed in the posterior mandibular region: resonance frequency analysis. *Clin Oral Implants Res.* 2015 Sep;26[9]:1036-42. doi: 10.1111/clr.12394.
 13. Albrektsson T, Wennerberg A. Oral implant surfaces: Part 1--review focusing on topographic and chemical properties of different surfaces and in vivo responses to them. *Int J Prosthodont.* 2004 Sep-Oct;17[5]: 536-43. PMID: 15543910.
 14. Feng SW, Lin CT, Chang WJ, Lee SY, Cheng CH, Huang HM. Influence of simulated bone quality and cortical bone thickness on implant stability detection using resonance frequency and damping factor analysis. *Int J Oral Maxillofac Implants.* 2014; 29[1]:105-12. doi: 10.11607/jomi.3181.
 15. Bischof M, Nedir R, Szmukler-Moncler S, Bernard JP, Samson J. Implant stability measurement of delayed and immediately loaded implants during healing. *Clin Oral Implants Res.* 2004 Oct;15[5]:529-39. doi: 10.1111/j.1600-0501.2004.01042.x.
 16. Zix J, Kessler-Liechti G, Mericske-Stern R. Stability measurements of 1-stage implants in the maxilla by means of resonance frequency analysis: a pilot study. *Int J Oral Maxillofac Implants.* 2005 Sep-Oct;20[5]:747-52. PMID: 16274149.
 17. Ostman PO, Hellman M, Wendelhag I, Sennerby L. Resonance frequency analysis measurements of implants at placement surgery. *Int J Prosthodont.* 2006 Jan-Feb; 19[1]:77-83; discussion 84. PMID: 16479765.



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