WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.084
Volume 8, Issue 12, 1501-1513. Review Article ISSN 2277– 7105

COMPARISON BETWEEN SHORT DENTAL IMPLANTS VERSUS STANDARD DENTAL IMPLANTS OF POSTERIOR JAWS: A SYSTEMATIC REVIEW & META-ANALYSIS

Tuqa M. A. Aldawood*[1], Maison Al Qarni[2], Abdulhadi I. A. Alhayek[3], Wejdan D. Muslih[4], Abdulmohsen Mohammed AlFantoukh[5], Raghad Lafi Albeladi[6], Anaan Ibrahim Bushnag[7], Rinad Hamed Baik[8]

[1]General Practitioner, Riyadh Elm University, --- Riyadh, Saudi Arabia.
[2]Department of Dentistry, King Saud University, --- Riyadh, Saudi Arabia.
[3]General Practitioner, Riyadh Elm University, --- Riyadh, Saudi Arabia.
[4]General Practitioner, King Khalid University, --- Riyadh, Saudi Arabia.
[5]General Practitioner, Imam Abdulrahman Bin Faisal, University of Dammam, Dammam, Saudi Arabia.
[6,7,8]Dental Intern, Jeddah, King Abdulaziz University, Saudi Arabia.

Article Received on
19 Sept. 2019,
Revised on 09 Oct. 2019,
Accepted on 29 Oct. 2019,
DOI: 10.20959/wjpr201912-16180

***Corresponding Author**
Tuqa M. A. Aldawood
General Practitioner, Riyadh Elm University, --- Riyadh, Saudi Arabia.

ABSTRACT

Background & Purpose: Short dental implants have been proposed as a less complicated, cheaper and faster opportunity for rehabilitation of atrophic edentulous regions to avoid disadvantages of the surgical strategies together with excessive technical sensitivity and postoperative headaches, but efficacy of short implants still questionable. The Aim of this work is to provide cumulative data about the efficacy and safety of short implants (equal or less than 8 mm) versus standard implants (larger than 8 mm) in posterior maxilla and mandible, to assess survival rate of implants, implant failure and complications rates. ***Methods:*** A systematic search was performed of PubMed, Cochrane library Ovid, Scopus & Google scholar to identify dentistry RCTs, clinical trials, and comparative studies, which studied the outcome of Short implants versus Standard implants of posterior jaws. A meta-analysis was done using fixed and random-effect methods. The primary outcome was survival rate of implant. Secondary outcomes were implant failure and complications rates. We calculated efficacy (favorable outcome), through implant survival rate. We also calculated safety (adverse outcome), through implant failure and complications

rates. ***Results:*** A total of 5 studies were identified involving 623 implants, 312 in the Short implants and 311 in the Standard implants. Regarding outcome measure, meta-analysis study showed, highly significant increase in survival rate, and decrease in failure rate in standard implants compared to short implants ($p < 0.01$), but complications rate shoed non-significant difference ($p > 0.05$). ***Conclusion:*** To conclude, the placement of short tough-floor implants isn't a less efficacious treatment modality as compared to the placement of conventional rough-surface implants for the substitution of lacking enamel in both totally or partially edentulous patients.

KEYWORDS: Dental Implants, edentulous jaws, survival rate, prosthesis failures.

INTRODUCTION

An edentulous posterior jaw is a not unusual dentition disorder in scientific exercise.[1] Implants are often used as a treatment choice for partly or absolutely edentulous patients. The fulfillment is immediately related to the osseointegration system, and the usage of standard implants lets in a larger touch area with the bone tissue, which helps the osseointegration system.[2]

Implant treatment has drastically modified inside the beyond decades from indications for completely edentulous sufferers to unmarried-tooth websites. similarly, implant dimensions in phrases of duration and diameter changed and similarly expanded the spectrum of symptoms.[3]

The posterior areas of the jaws usually have the least top of present bone due to the fact the maxillary sinus expands after enamel loss and the mandibular canal is ≥10 mm.[4]

There are elements which include presence or absence of sufficient bone volume, keratinized mucosa, smoking behavior, periodontal sickness, and systemic situations inclusive of diabetes which can make contributions to the lengthy-term achievement and survival of dental implants.[5]

Loss of sufficient bone height in the edentulous posterior areas of mandibula regularly restricts setting endosseous dental implants and gives a project for clinicians due to presence of inferior alveolar nerve.[6]

Diverse strategies to augment the local bone volume had been clinically examined, which

includes only and inlay autologous bone grafts, alveolar nerve transposition, distraction osteogenesis and guided bone regeneration. unfortunately, these strategies are associated with increased postoperative morbidity, higher expenses, and better dangers of complications during the restoration period that often deter patients from looking for implant therapy.[7]

Usually, 5-8mm long implants have been defined as quick implants.[1] Bone grafts and brief dental implants had been proven to be efficient for rehabilitation of atrophic edentulous areas which includes atrophic posterior mandible because of the presence of the inferior alveolar nerve. Short dental implants used as it provides a less complicated, cheaper and faster opportunity for regeneration of atrophic edentulous regions, and to avoid disadvantages of the surgical strategies together with excessive technical sensitivity and postoperative headaches, but efficacy of short implants still questionable.[8]

Aim of the study: The Aim of this work is to provide cumulative data about the efficacy and safety of short implants (equal or less than 8 mm) versus standard implants (more than 8 mm) in posterior maxilla and mandible, to assess survival rate of implants, implant failure and complications rates.

METHODS

This review was carried out using the standard methods mentioned within the Cochrane handbook and in accordance with the (PRISMA) statement guidelines.[9]

Identification of studies

- An initial search carried out throughout the PubMed, Cochrane library Ovid, Scopus & Google scholar using the following keywords: Dental Implants, edentulous jaws, survival rate, prosthesis failures.

- We will consider published, full text studies in English only. Moreover, no attempts were made to locate any unpublished studies nor non-English studies.

Criteria of accepted studies

- **Types of studies**

The review will be restricted to RCTs, clinical trials, and comparative studies, either prospective or retrospective, which studied the outcome of Short implants versus Standard implants of posterior jaws.

- **Types of participants**

Patients with edentulous jaws.

- **Types of outcome measures**

1. Survival rate of implants.
2. Failure rate of implants.
3. Complications rate.

Inclusion criteria

- ✓ English literature.
- ✓ Journal articles.
- ✓ Between 2013 until 2017.
- ✓ Describing treatment of edentulous jaws by either Short implants or Standard implants.
- ✓ Human studies.

Exclusion criteria

- ✓ Articles that considered short implants larger than 8 mm.
- ✓ Irrelevance to our study.

Methods of the review

■ **Locating studies**

Abstracts of articles identified using the above search strategy will be viewed, and articles that appear of fulfill the inclusion criteria will be retrieved in full, when there is a doubt, a second reviewer will assess the article and consensus will be reached.

■ **Data extraction**

Using the following keywords: Dental Implants, edentulous jaws, survival rate, prosthesis failures, data will be independently extracted by two reviewers and cross-checked.

Statistical analysis

Statistical analysis done using MedCalc ver. 18.11.3 (MedCalc, Ostend, Belgium). Data were pooled and risk ratios (RRs) as well as standard mean differences (SMD), were calculated with their 95 per cent confidence intervals (CI). A meta-analysis was performed to calculate direct estimates of each treatment, technique or outcome. According to heterogeneity across trials using the I^2-statistics; a fixed-effect model ($P \geq 0.1$) or random-effects model ($P < 0.1$) was used.

Study selection

We found 150 record; of them 45 unique records identified (duplicate removed) by the database searches; 105 were excluded based on title and abstract review; 45 article are searched for eligibility by full text review; 17 articles cannot be accessed or obtain full text; 10 studies were reviews and case reports; 9 were not describing functional outcome; the desired implant not used in 4 studies leaving 5 studies that met all inclusion criteria (Fig. 1).

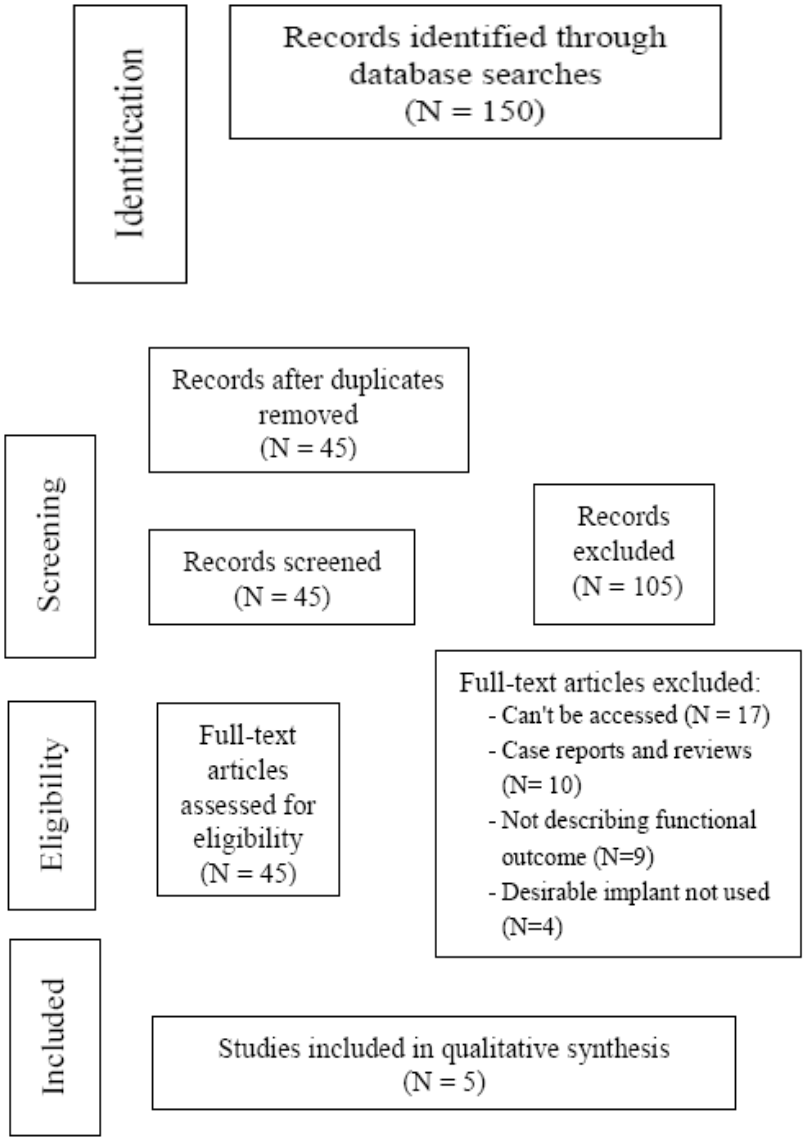

Figure 1: PRISMA flow chart for study selection.

RESULTS

Descriptive analysis of all studies included (Tables 1, 2)

Table 1: Patients and study characteristics.

N	Author	Type of study	Number of implants			Follow up time (average years)
			Total implants	Short implants	Standard implants	
1	***Guljé et al., 2013***	Prospective	208	107	101	1
2	***Esposito et al., 2014***	Prospective	128	60	68	3
3	***Queiroz et al., 2015***	Prospective	90	48	42	0.25
4	***Rossi et al., 2016***	Prospective	60	30	30	5
5	***Pohl et al., 2017***	Prospective	137	67	70	3

#Studies were arranged according to publication year. NM: not mentioned.

Table 2: Summary of efficacy and safety outcome measures in all studies.

N	Author	Efficacy outcome		Safety outcomes			
		Survival rate		Failure rate		Complications rate	
		Short implants	Standard implants	Short implants	Standard implants	Short implants	Standard implants
1	***Guljé et al., 2013***	104	100	3	1	4	7
2	***Esposito et al., 2014***	55	67	5	2	0	0
3	***Queiroz et al., 2015***	42	42	6	0	NM	NM
4	***Rossi et al., 2016***	26	29	4	1	0	0
5	***Pohl et al., 2017***	67	70	0	0	7	2

The included studies published between 2013 and 2017. Regarding the type of included studies, all 5 studies were retrospective.

The total number of implants in all the included studies was 623 implants, with 312 implants in Short implants, and 311 implants in Standard implants, while their average follow up time was (2.5 years).

Outcome measures (Fig. 2, 3, 4)

Regarding efficacy outcome, all 5 studies reported survival rate.

Regarding safety outcomes, all 5 studies reported failure rate and 4 studies reported complications rate.

Meta-analysis of outcome measures

Data were divided into two groups

1. Short implants
2. Standard implants

(A) Efficacy

Patients who achieved favorable outcomes were pooled to evaluate efficacy by:

Efficacy of a specific technique was measured by

✓ **Relative Risk or Risk Ratio (RR)**

- For survival rate.

Regarding survival rate,

We found 5 studies reported survival rate with total number of implants (N=623).

I^2 (inconsistency) was 58% with non-significant Q test for heterogeneity ($p > 0.05$), so fixed-effects model was chosen to assess efficacy; with overall RR= 1.06.

Meta-analysis study showed that; fixed-effects model showed highly significant increase in survival rate in standard implants compared to short implants ($p = 0.001$).

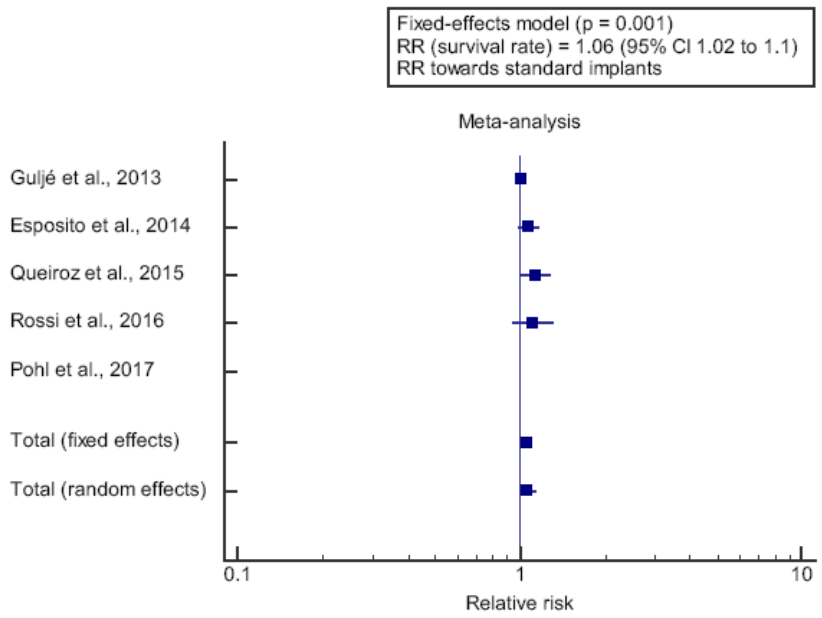

Figure 2: Forest plot of (survival rate) on Short implants vs Standard implants – Risk Ratio.

(B) Safety

Patients who reached serious adverse events (SAEs) – were pooled to evaluate safety by:

Safety of a specific technique was measured by

✓ **Relative Risk or Risk Ratio (RR)**

- For failure rate.
- For complications rate

Regarding failure rate,

We found 5 studies reported failure rate with total number of implants (N=623).

I^2 (inconsistency) was 0% with non-significant Q test for heterogeneity ($p > 0.05$), so fixed-effects model was chosen to assess safety; with overall RR= 0.24.

Meta-analysis study showed that; fixed-effects model showed highly significant decrease in failure rate in standard implants compared to short implants ($p = 0.007$).

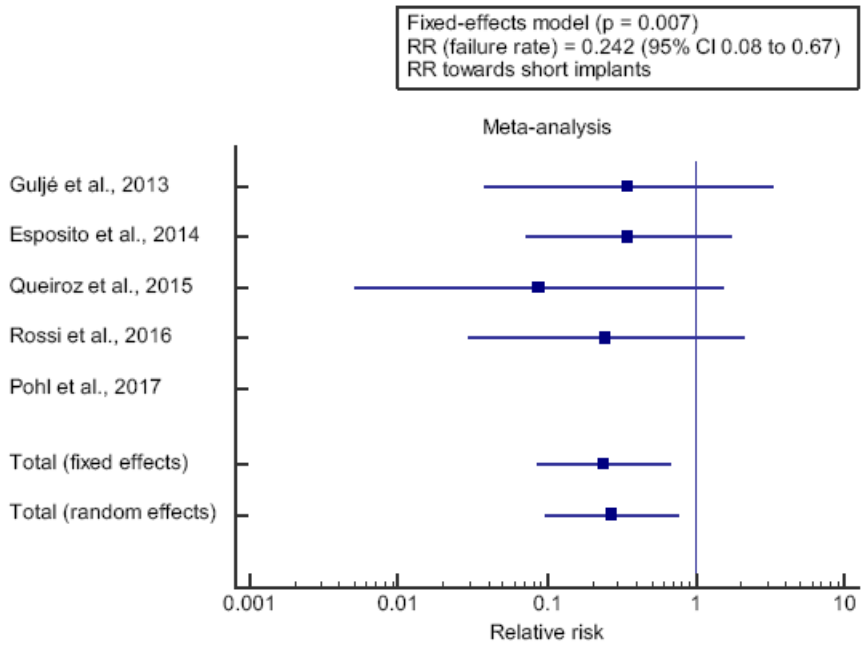

Figure 3: Forest plot of (failure rate) on Short implants vs Standard implants – Risk Ratio.

Regarding complications rate,

We found 4 studies reported complications rate with total number of implants (N=533).

Random and fixed-effects models showed, non-significant difference in complications rate between the 2 types of implants ($p > 0.05$).

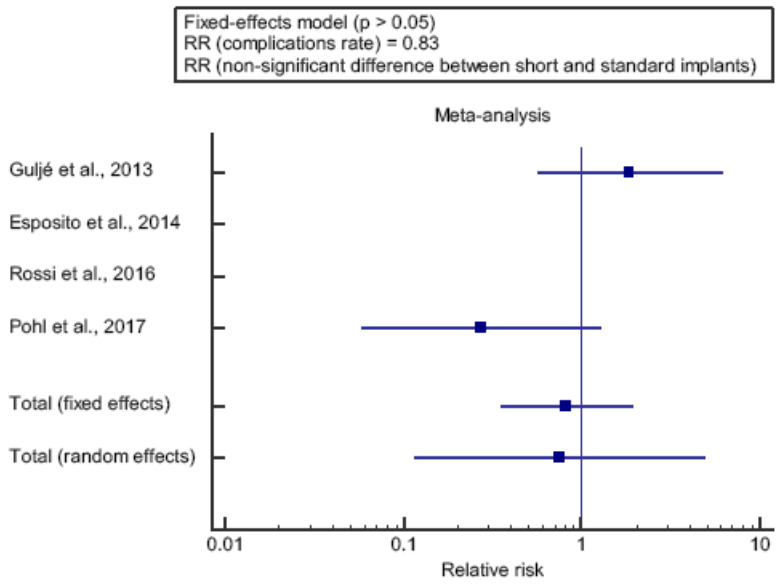

Figure 4: Forest plot of (complications rate) on Short implants vs Standard implants – Risk Ratio.

DISCUSSION

The Aim of this work is to provide cumulative data about the efficacy and safety of short implants (equal or less than 8 mm) versus standard implants (larger than 8 mm) placed in posterior regions of maxilla and mandible, evaluating survival rate of implants, implant failure and complications rates.

We found 150 record; of them 45 unique records identified (duplicate removed) by the database searches; 105 were excluded based on title and abstract review; 45 article are searched for eligibility by full text review; 17 articles cannot be accessed or obtain full text; 10 studies were reviews and case reports; 9 were not describing functional outcome; the desired implant not used in 4 studies leaving 5 studies that met all inclusion criteria.

The included studies published between 2013 and 2017. Regarding the type of included studies, all 5 studies were retrospective.

The total number of implants in all the included studies was 623 implants, with 312 implants in Short implants, and 311 implants in Standard implants, while their average follow up time was (2.5 years) which came in disagreement with ***Javed and Romanos et.al 2015***.[10]

Javed and Romanos 2015 reported that, in all research, observe-up periods and cumulative survival quotes ranged between 5 and 15 years and 80.5 and 100%, respectively.

Data were divided into two groups (Short implants and Standard implants). Regarding efficacy Patients who achieved favorable outcomes were pooled to evaluate efficacy by: Relative Risk or Risk Ratio (RR).

Regarding survival rate, we found 5 studies reported survival rate with total number of implants (N=623).

I2 (inconsistency) was 58% with non-significant Q test for heterogeneity ($p > 0.05$), so fixed-effects model was chosen to assess efficacy; with overall RR= 1.06.

Meta-analysis study showed that; fixed-effects model showed highly significant increase in survival rate in standard implants compared to short implants ($p = 0.001$) which came in agreement with ***Winkler, Morris, and Ochi 2000***[11] and disagreement with ***Thoma, Cha, Jung 2017.***[12]

Winkler, Morris, and Ochi 2000 reported that, the consequences suggest that: shorter implants had statistically lower survival rates as compared with longer implants.

Thoma, Cha, and Jung 2017 reported that furthermore, longer term studies have tested that short implants show off implant survival quotes and biological results similar to those of long implants.

Regarding failure rate; we found 5 studies reported failure rate with total number of implants (N=623).

I^2 (inconsistency) was 0% with non-significant Q test for heterogeneity ($p > 0.05$), so fixed-effects model was chosen to assess safety; with overall RR= 0.24.

Meta-analysis study showed that; fixed-effects model showed highly significant decrease in failure rate in standard implants compared to short implants ($p = 0.007$) which came in agreement with ***Telleman et al. 2011***[13] and disagreement with ***Sun et al. 2011.***[14]

Telleman et al. 2011 reported that, the cumulative anticipated failure rate of studies done inside the maxilla was 0.010 implants/12 months, in comparison with 0.003 discovered inside the studies in the mandible. For research that still included smokers, the failure rate became 0.008 in comparison with 0.004 discovered in studies that excluded smokers. surface topography and augmentation system have been no longer sources of heterogeneity.

Sun et al. 2011 reported that there has been no statistically good-sized difference among the failure rates of short dental implants and fashionable implants or among those positioned in a single stage and those positioned in tiers (multivariate analysis).

Regarding complications rate; we found 4 studies reported complications rate with total number of implants (N=533).

Random and fixed-effects models showed, non-significant difference in complications rate between the 2 types of implants ($p > 0.05$) which came in agreement with ***Lemos et al. 2016***[2] and disagreement with ***Alqutaibi and Altaib 2016.***[15]

Lemos et al. 2016 reported that, the outcomes confirmed that there has been no significant distinction of implants survival (P=0.24; RR:1.35; CI: 0.82 to 2.22), marginal bone loss (P=0.06; MD: - 0.20; CI: - 0.41 to 0.00), complications (P=0.08; RR:0.54; CI: 0.27 to 1.09) and prosthesis disasters (P=0.92; RR:0.96; CI: 0.44 to 2.09).

Alqutaibi and Altaib 2016 as compared with the long implant group, the quick implant institution had appreciably fewer complications (RR: 0.58; 95% CI: 0.37, 0.90; p = 0.02).

CONCLUSION

To conclude, the placement of short tough-floor implants isn't a less efficacious treatment modality as compared to the placement of conventional rough-surface implants for the substitution of lacking enamel in both totally or partially edentulous patients.

ACKNOWLEDGMENTS

Conflict of interest

None.

Authorship

All the listed authors contributed significantly to conception and design of study, acquisition, analysis and interpretation of data and drafting of manuscript, to justify authorship.

Funding

Self-funding.

REFERENCES

1. Chen, S.; Ou, Q.; Wang, Y.; Lin, X. Short Implants (5-8 Mm) Versus Long Implants (≥10 Mm) with Augmentation in Atrophic Posterior Jaws: A Meta-Analysis of Randomized Controlled Trials. J Oral Rehabil 2019, joor.12860. https://doi.org/10.1111/joor.12860.
2. Lemos, C. A. A.; Ferro-Alves, M. L.; Okamoto, R.; Mendonça, M. R.; Pellizzer, E. P. Short Dental Implants versus Standard Dental Implants Placed in the Posterior Jaws: A Systematic Review and Meta-Analysis. Journal of Dentistry, 2016; 47: 8–17. https://doi.org/10.1016/j.jdent.2016.01.005.
3. Thoma, D. S.; Haas, R.; Sporniak-Tutak, K.; Garcia, A.; Taylor, T. D.; Hämmerle, C. H. F. Randomized Controlled Multicentre Study Comparing Short Dental Implants (6 Mm) versus Longer Dental Implants (11–15 Mm) in Combination with Sinus Floor Elevation Procedures: 5-Year Data. J Clin Periodontol, 2018; 45(12): 1465–1474. https://doi.org/10.1111/jcpe.13025.
4. Misch, C. E.; Steigenga, J.; Barboza, E.; Misch-Dietsh, F.; Cianciola, L. J.; Kazor, C. Short Dental Implants in Posterior Partial Edentulism: A Multicenter Retrospective 6-Year Case Series Study. Journal of Periodontology, 2006; 77(8): 1340–1347. https://doi.org/10.1902/jop.2006.050402.
5. Papaspyridakos, P.; Souza, A.; Vazouras, K.; Gholami, H.; Pagni, S.; Weber, H. Survival Rates of Short Dental Implants (≤6 Mm) Compared with Implants Longer than 6 Mm in Posterior Jaw Areas: A Meta-analysis. Clin Oral Impl Res., 2018; 29(S16): 8–20. https://doi.org/10.1111/clr.13289.
6. Dursun, E.; Keceli, H. G.; Uysal, S.; Güngör, H.; Muhtarogullari, M.; Tözüm, T. F. Management of Limited Vertical Bone Height in the Posterior Mandible: Short Dental Implants Versus Nerve Lateralization With Standard Length Implants. Journal of Craniofacial Surgery, 2016; 27(3): 578–585. https://doi.org/10.1097/SCS.0000000000002459.
7. Pieri, F.; Forlivesi, C.; Caselli, E.; Corinaldesi, G. Short Implants (6 Mm) vs. Vertical Bone Augmentation and Standard-Length Implants (≥9 Mm) in Atrophic Posterior Mandibles: A 5-Year Retrospective Study. International Journal of Oral and Maxillofacial Surgery, 2017; 46(12): 1607–1614. https://doi.org/10.1016/j.ijom.2017.07.005.
8. Geramy, A.; Rokn, A.; Keshtkar, A.; Monzavi, A.; Hashemi, H. M.; Bitaraf, T. Comparison of Short and Standard Implants in the Posterior Mandible: A 3D Analysis Using Finite Element Method. J Dent (Tehran), 2018; 15(2): 130–136.
9. Liberati, A.; Altman, D.; Tetzlaff, J.; Mulrow, C.; Gøtzsche, P.; Ioannidis, J.; Clarke, M.;

Devereaux, P.; Kleijnen, J.; Moher, D. The PRISMA Statement for Reporting Systematic Reviews and Meta-Analyses of Studies That Evaluate Healthcare Interventions. Bmj, 2009; 339.

10. Javed, F.; Romanos, G. E. Role of Implant Diameter on Long-Term Survival of Dental Implants Placed in Posterior Maxilla: A Systematic Review. Clin Oral Invest, 2015; 19(1): 1–10. https://doi.org/10.1007/s00784-014-1333-z.
11. Winkler, S.; Morris, H. F.; Ochi, S. Implant Survival to 36 Months as Related to Length and Diameter. Annals of Periodontology, 2000; 5(1): 22–31. https://doi.org/10.1902/annals.2000.5.1.22.
12. Thoma, D. S.; Cha, J.-K.; Jung, U.-W. Treatment Concepts for the Posterior Maxilla and Mandible: Short Implants versus Long Implants in Augmented Bone. J Periodontal Implant Sci., 2017; 47(1): 2. https://doi.org/10.5051/jpis.2017.47.1.2.
13. Telleman, G.; Raghoebar, G. M.; Vissink, A.; den Hartog, L.; Huddleston Slater, J. J. R.; Meijer, H. J.
14. A Systematic Review of the Prognosis of Short (<10 Mm) Dental Implants Placed in the Partially Edentulous Patient: Systematic Review of Short Dental Implants. Journal of Clinical Periodontology, 2011; 38(7): 667–676. https://doi.org/10.1111/j.1600-051X.2011.01736.x.
15. Sun, H. L.; Huang, C.; Wu, Y. R.; Shi, B. Failure Rates of Short (≤ 10 Mm) Dental Implants and Factors Influencing Their Failure: A Systematic Review. Int J Oral Maxillofac Implants, 2011; 26(4): 816–825.
16. Alqutaibi, A. Y.; Altaib, F. Short Dental Implant Is Considered as a Reliable Treatment Option for Patients with Atrophic Posterior Maxilla. Journal of Evidence Based Dental Practice, 2016; 16(3): 173–175. https://doi.org/10.1016/j.jebdp.2016.07.003.