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Determine the relation between the prosthesis and splinting of the implant differences in relation to the type of prosthesis and the splinting of the implants: a systematic review and meta-analysis

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Abstract

Background and aim: The aim of present Systematic Review and Meta-analysis was determine the relation between the prosthesis and splinting of the implant differences**.**

Method: From the electronic databases, PubMed, Cochrane Library, Embase, ISI have been used to perform a systematic literature between 2015 and 2020. Therefore, a software program (Endnote X8) has been utilized for managing the electronic titles. Searches were performed with mesh terms. For Data extraction, two reviewers blind and independently extracted data from abstract and full text of studies that included. Moreover, mean differences between two groups (Immediate Loading and Delayed Loading) with 95% confidence interval (CI), fixed effect model and Inverse-variance method and Odds ratio between two groups (Immediate Loading and Delayed Loading) with 95% confidence interval (CI), fixed effect model and Mantel-Haenszel were calculated. Random effects were used to deal with potential heterogeneity and I^2 showed heterogeneity. The Meta analysis and forest plots have been evaluated with the use of a software program available in the market (i.e., Comprehensive Meta-Analysis Stata V16).

Result: A total of 243 potentially relevant titles and abstracts were found during the electronic and manual search. Finally, a total of three publications fulfilled the inclusion criteria required for this systematic review. Mean difference of Crestal bone loss was (MD, -0.29 95% CI -0.54, -0.04. P= 0.02), and Odds ratio of Implant loss was (OR, -1.91 95% CI -3.44, -0.38. P= 0.01) among 3 studies.

Conclusion: The present study shows to implant loss, there was statistically significant difference between immediate loading and delayed loading, and delayed loading is preferred to removable prostheses.

Keywords: splinting, delayed loading, immediate loading, implant, prosthesis

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INTRODUCTION

Implant-retained overdentures represent a treatment option for many patients unable to tolerate conventional dentures (Vere, Bhakta, Patel, 2012). Also implant-supported fixed prostheses implant-supported fixed prostheses allow the restoration of function (Schimmel, et al. 2014). studies showed that both the primary stability of the implant and the absence of micro movements have been identified as key factors when it comes to implant success (ter Gunne, et al. 2016, Su, et al. 2014). From the time of tooth loss to placement implant-supported restorations, it can be traumatic because conventional removable mandibular prostheses are unstable and may compromise a person's quality of life, aesthetics and compromise function. Efforts have also been made to reduce treatment time for implant-supported restorations (Mendes, et al. 2011- Menassa, et al. 2016. Patil, &

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Seow, 2020- Pardal-Peláez, et al. 2020). After initial studies since 1990, the results showed that implant loading protocols could be obtained using immediate and early loading protocols (Esposito, et al. 2016). The results of studies on immediate and delayed loading protocols in edentulous mandibles have reported high success rates, but the effect of variables such as splinting or the number of implants used has not been determined. Also, most of the studies are without control group and their results cannot be cited. Splinting can be an advantage when adjacent implants fail (de Souza Batista, et al. 2019). Type of prosthesis are fixed or removable, Removable prosthesis are often used when patients have missing teeth. Removable prosthesis can include partial dentures or complete dentures and replace either some or all of your teeth, however Fixed prostheses are those that are permanent (Chughtai, et al. 2017, Gamper, et al. 2017).. The aim of present Systematic Review and Meta-analysis was determine the relation between the prosthesis and splinting of the implant differences**.**

METHOD

Search strategy

From the electronic databases, PubMed, Cochrane Library, Embase, ISI have been used to perform a systematic literature between 2015 and 2020. Therefore, a software program (Endnote X8) has been utilized for managing the electronic titles. Searches were performed with mesh terms:

((((“Tooth Loss”[Mesh]) AND “Dental Implants”[Mesh]) AND “Immediate Dental Implant Loading”[Mesh]) AND “Prostheses and Implants”[Mesh]) AND “Splints”[Mesh]. This systematic review has been conducted on the basis of the key consideration of the PRISMA Statement–Preferred Reporting Items for the Systematic Review and Meta-analysis (Moher et al. 2009).

Selection criteria

Inclusion criteria

1. Randomized controlled trials studies, controlled clinical trials, and prospective and retrospective cohort studies.
2. Minimum follow-up of 1 year.
3. in English

Exclusion criteria

1. In vitro studies, case studies, case reports and reviews.
2. Studies without control group
3. Animal studies

Data Extraction and method of analysis

The data have been extracted from the research included with regard to the study, years, study design, Intervention group, control group, sample size, mean/ range of age. The quality of the studies included was assessed using the Cochrane Collaboration’s tool (Higgins et al 2011)The scale scores for low risk was 1 and for High and unclear risk was 0. Scale scores range from 0 to 6. A higher score means higher quality. For Data extraction, two reviewers blind and independently extracted data from abstract and full text of studies that included. Moreover, mean differences between two groups (Immediate Loading and Delayed Loading) with 95% confidence interval (CI), fixed effect model and Inverse-variance method and Odds ratio between two groups (Immediate Loading and Delayed Loading) with 95% confidence interval (CI), fixed effect model and Mantel-Haenszel were calculated. Random effects were used to deal with potential heterogeneity and I^2 showed heterogeneity. The Meta analysis and forest plots have been evaluated with the use of a software program available in the market (i.e., Comprehensive Meta-Analysis Stata V16).

RESULTS

According to the research design, 243 potentially important research abstracts and titles have been discovered in our electronic searches. At the first phase of the study selection, 196 research have been with regard to the topics and abstracts. Therefore, we fully assessed the complete full-text papers of the rest 35 studies in the second stage so that we excluded 32 publications due to the lack of the defined inclusion criteria. Then, three papers remained in agreement with our inclusion criteria required (**Fig. 1**). **Table 1** reports the individual studies in this meta-analysis.

Sample size

Therefore, three studies (Randomized controlled trial) have been included. The Number of Patients in immediate loading and delayed loading a total was 194 (110 male, 84 female) with the mean of age, 68.4 years. The number of Immediate Loading and Delayed Loading a total was 145 and 157, respectively. The mean of follow-up was 24 months (**Table 1**).

Bias assessment

According to Cochrane Collaboration’s tool, two studies had a total score of 3/6, one study had a total score of 5/6. This outcome showed moderate risk of bias (**Table 2**).

Implant loss

Odds ratio of Implant loss was (OR, -1.91 95% CI -3.44, -0.38. P= 0.01) among 3 studies. This result showed there was statistically significant difference between immediate loading and delayed loading (p=0.01) and there was no statistically significant difference between studies (p=0.69) (**Fig. 2**).

Crestal bone loss

Mean difference of Crestal bone loss was (MD, -0.29 95% CI -0.54, -0.04. P= 0.02) among one study. This result showed there was statistically significant

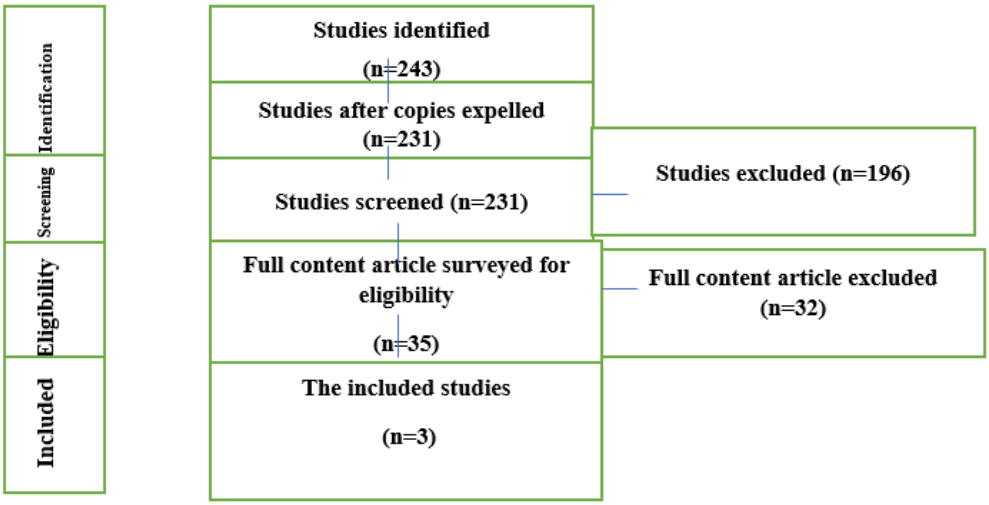

Fig. 1. Study Attrition

Table 1. Studies selected for systematic review and meta-analysis

Study. Year	Design	Number of Patient				Mean/ Range of age (years)		Immediate Loading	Delayed Loading	Follow-up (month)
		DL		IL		DL	IL			
		M	F	M	F					
Kern et al.2018 (15)	RCT	141				69.8		81	77	24
		67		74		70.5	68.8			
		35	32	43	31					
Acham et al.2017 (16)	RCT	21						69	32	48 36
		12		9						
Schincaglia et al.2016 (17)	RCT	32				66.4		66.2	66.6	32 32 12
		15		17						
		10	5	10	7					

Table 2. Risk of bias assessment

study	Random sequence generation	allocation concealment	blinding of participants and personnel	blinding of outcome assessment	incomplete outcome data	selective reporting	Total score
Kern et al.2018 (15)	+	+	-	-	+	-	3
Acham et al.2017 (16)	+	-	-	+	+	-	3
Schincaglia et al.2016 (17)	+	+	+	+	?	+	5

difference between immediate loading and delayed loading (**Fig. 3**).

DISCUSSION

The present systematic review and Meta-analysis findings shows, there was statistically significant difference of Implant loss and Crestal bone loss between immediate loading and delayed loading. Overall, no splinted implants were studied by using ball-type or LOCATOR attachments. As for the splinting of implants in a removable prosthesis, the Dolder bar was used. To comparison of implant loss with or without splinting, it is noteworthy that when implants are not splinted, delayed loading is preferable (Kern, et al 2018, Acham, et al. 2017, Elsyad, Al-Mahdy, & Fouad, 2012, Elsyad, Elsaih, & Khairallah, 2014). The cause can be considered more losses occurred with immediate loading. Therefore, studies showed in implant splinting using bars or fixed prostheses, there were no differences in implant loss (Alfadda, 2014, Jokstad, & Alkumru, 2014). Result showed only one RCT between 2015 to 2020 reported bone losses, observed there was statistically significant difference between immediate loading and delayed loading, considering, the placement of the implants in a single phase did not seem to affect either the implant or

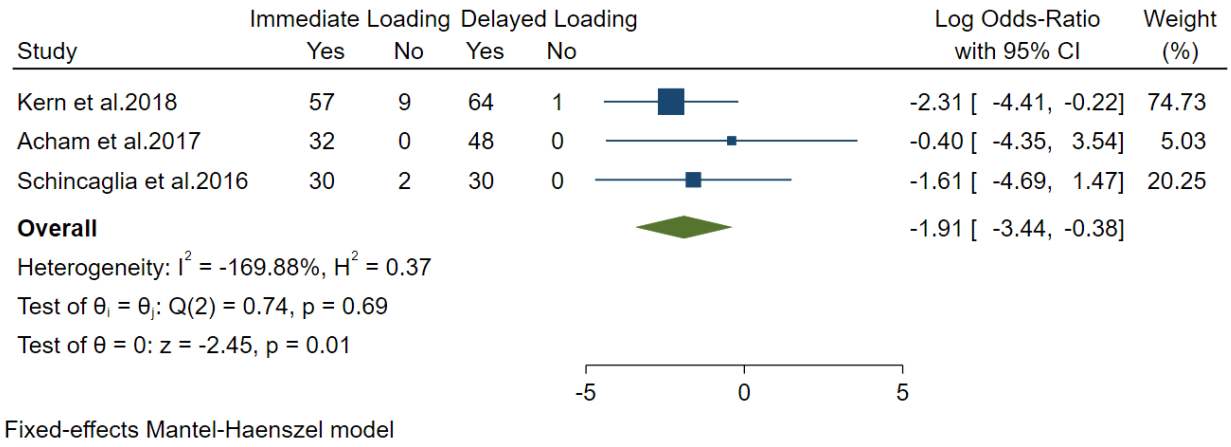

Fig. 2. Implant loss outcomes between immediate loading and delayed loading

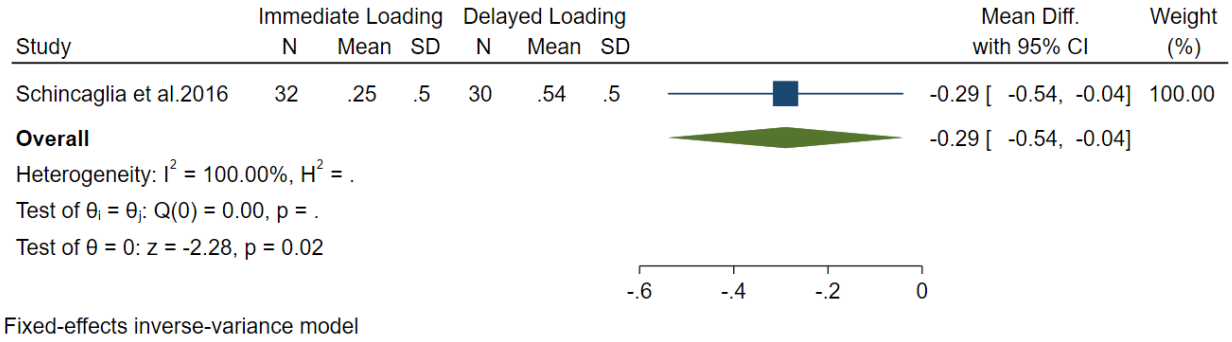

Fig. 3. Crestal bone loss outcomes between immediate loading and delayed loading

the crestal bone loss. Studies showed to comparison between fixed and removable prostheses, early losses so that the result was 1.63 (0.43, 6.13) in the fixed prosthesis and 3.28 (1.25, 8.63) in the removable prosthesis. In both situations, delayed loading was preferred, and no differences were found between either types of prosthesis in terms of early implant loss. Overall, delayed loading is favored for removable prostheses (Higgins et al. 2011, Jokstad, & Alkumru, 2014). According to the findings, relation to the type of prosthesis and the splinting of the implants, more RCT studies with high sample size and long-follow-up period are needed.

CONCLUSION

The present study shows to implant loss, there was statistically significant difference between immediate loading and delayed loading, and delayed loading is preferred to removable prostheses. It is hoped that the results of the present study can help to assessed relation to the type of prosthesis and the splinting of the implants.

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