SUCCESS OF DENTAL IMPLANTS IN PATIENTS WITH BRUXISM: A SYSTEMATIC REVIEW & META ANALYSIS

Review Article

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ABSTRACT

Aim: The aim of this systematic review is to find out a co relation of bruxism as a threat to dental implants and find the success rate of the dental implants in patients with Bruxism. **Materials and Method:** An electronic search was conducted for articles in English listed with PubMedScience Direct, Ebsco host till April, 2018 and final 10 studies were included based on inclusion and exclusion criteria in which the survival rate of dental implants in patients with bruxism was evaluated. **Result:** The mean success rate in patients of dental implants with bruxism is 74.59%. Whereas, the mean success rate in patients of dental implants without bruxism is 92.8%. **Conclusion:** Bruxism is a contributing factor for causing the occurrence of dental implant complications and plays an important role in dental implant failure.

Keyword: Dental Bruxism, Implants, Failure, Systematic Review, Meta-Analysis

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INTRODUCTION:

A promising method for the replacement of the missing teeth in completely and partially edentulous patients is Endosseous Dental Implants [1,2]. Only 66.4% of patients are completely free from any type of reported complications following the restoration of the implant supported fixed prosthesis[3] Complications with the dental implants may include Biological failures (marginal bone loss & peri–implantitis) & Technical failures (superstructure fracture, loosing of retention & screw loosening). [4-8]

Bruxism is one of the major risk factor for dental implant failure, that has always remained a controversial topic [9-11]. Bruxism seems to be mainly regulated centrally, not peripherally. [11]

The Biological damages that may occur to the dental implants may include early and late dental implant failures. In case of early failures, osseointegration was insufficient, the implant is lost before the first prosthetic loading. Late biological failures are characterized by pathological bone loss after full osseointegration was obtained at an earlier stage. [12]

In case of biomechanical complications, one or more components of an implant system failure are fracture of an implant itself, loosening or fracture of connecting screws or abutment screws, loosening or excessive wear of mesostructural components in overdentures and excessive wear or fracture of suprastructural porcelain or acrylic teeth. [13]

The forces responsible for failure of the dental implants are mainly in terms of magnitude, duration, direction, type and frequency. [14] Use as many implants as possible, splint the implants for even distribution of the load, respect the normal time for loading of the prosthesis, flatter the cuspal inclines to lower the lateral forces on the implants, giving hard protective occlusal splint.[15]

Hence there is a need to reach deep to the issue of the effects of bruxism on dental implants and its survival rate by performing a systematic review of the literature.

Materials and Methods:

Source used: An electronic search was conducted for articles in English listed with PubMedScience Direct, Ebsco host till April, 2017. The search methodology was performed using the following keywords : “dental implants”, “bruxism”, “risk factor”, “success”. Review articles and references from different studies were also used to identify the relevant articles.

Selection of Studies :

For the review, first the titles of the search articles were initially screened and relevant articles were obtained. After going through abstracts, relevant articles were included.

From these relevant articles, by using inclusion and exclusion criteria, relevant and suitable articles were isolated for further processing and data extraction.

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INCLUSION CRITERIA:

1. In Vivo sudies were included.
2. Patients undergoing dental implant treatment and having bruxism as a risk factor.
3. Dental implants placed in both maxilla and mandible with a minimum of 1 year follow up.
4. Failures in dental implants that includes Biomechanical and biological failures.

EXCLUSION CRITERIA:

1. Duplicate and irrelevant studies were eliminated.
2. Grafted sites, advanced surgeries for implant placement were not included.
3. Immediate implant placement after extractions were not included in this study.

Keywords: Dental Implants, Bruxism, Success, Meta-Analysis, Systematic Review

Fig 1: FLOW CHART FOR SEARCH STRATERGY

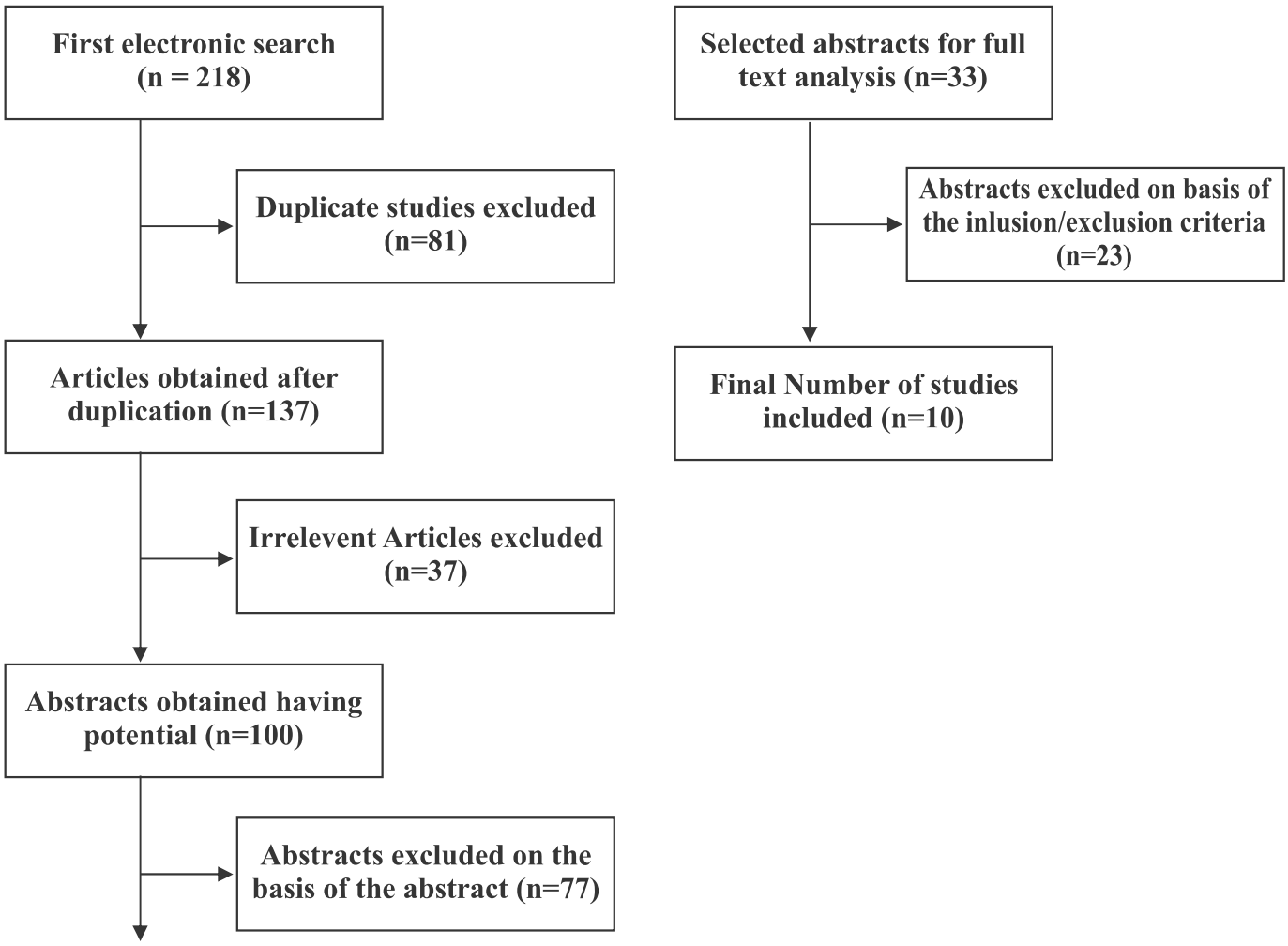

Table-1 : EVIDENCE LEVEL OF SELECTED ARTICLES

NO.	AUTHOR	YEAR	STUDY DESIGN	EVIDENCE LEVEL
1	Roland Glauser et al [16]	2001	PS – In Vivo	2
2	De Boever et al [17]	2006	PS – In Vivo	2
3	Richard Kinsel et al [18]	2009	RS – In Vivo	2
4	Ting-Jen-Ji et al [19]	2012	RS – In Vivo	2
5	Panos et al [7]	2012	PS – In Vivo	2
6	Francesco et al [20]	2013	PS – In Vivo	1
7	Ramos et al [21]	2015	SR – In Vivo	1
8	B.R. Chrcanovic et al [22]	2016	PS – In Vivo	2
9	Bruno Ramos et al [23]	2016	RS – In Vivo	2
10	Aekaterini et al [24]	2017	RS – In Vivo	2

Table-2: VARIABLES OF INTEREST IN SELECTED ARTICLES

Sr No.	Author	Year	Study Design	Events /Total: Bruxers (B) Versus Non Bruxers (NB)	Prosthesis Type - (Screw Retained / Cement Retained)	Opposing Dentition	Follow Up Period	Outcome (Failure%)
1.	Roland Glauser et al in 2001 [16]	2001	PS – In Vivo	P: 9/22 Versus 13/105	Not Mentioned	Natural & Artificial	1 Year	Failure 41%- B 12.38% -NB
2.	Boever et al in 2006 [17]	2006	PS – In Vivo	P: 17/43 Versus 29/126	Screw & Cement Retained	Natural & Artificial	40 – 144 months	Failure 39.5%-B 23.01%-NB
3.	Richard Kinsel et al in 2009 [18]	2009	RS – In Vivo	P: 59/312 Versus 35/686 I: 15/43 Versus 29/126	Cement Retained	Natural	5 Years	Failure 18.91%-B 5.10%-NB
4.	Ting Jen Ji et al in 2012 [19]	2012	RS – In Vivo	P:17/58 Versus 11/239	Not Mentioned	Natural and Artificial	2-10 Years	Failure 29.13%-B 4.60%-NB

5.	**Panos et al in 2012 [7]**	**2012**	**PS In Vivo**	**P: 10/74 Versus 0/123 ; I : 4/4 Versus 0/10**	**Screw Retained**	**Natural**	**2-4 Years**	**Failure 13.51%-B 0%-NB**
6.	Francesco et al in 2013 [20]	2013	PS – In Vivo	I : 10/24 Versus 2/170	Cement Retained	Artificial	2-10 Years	Failure 41.6%-B 1.17%-NB
7.	Ramos et al [21]	2015	SR – In Vivo	P: 49/760 Versus 109/2989	Not Mentioned	Natural & Artificial	3 – 6.2 Years	Failure 6.4%-B 3.64%-NB
8.	**B.R. Chrcanovic et al [22]**	**2016**	**PS – In Vivo**	**P : 24/185 Versus 155/3304**	**Not Mentioned**	**Not Mentioned**	**1 – 10 Years**	**Failure 12.97%-B 4.69%-NB**
9.	Bruno Ramos et al [23]	2016	RS – In Vivo	P : 69/427 Versus 347/6681	Not Mentioned	Not Mentioned	20 Years	Failure 16.15%-B 5.19%-NB
10.	Aekaterini Mikeli et al [24]	2017	RS – In Vivo	I: 24/69 Versus 10/75	Cement Retained	Artificial	14 Years	Failure 34.78%-B 13.3%-NB

P = Prosthesis, I = Individuals, B- Bruxers & NB – Non Bruxers

TABLE –3: MEAN SUCCESS RATE IN PATIENTS OF DENTAL IMPLANTS WITH BRUXISM

Sr. No.	Author	Mean Success Rate in Patients of Dental Implants with Bruxism	Mean Success Rate in Patients of Dental Implants without Bruxism
1.	Roland Glauser et al [16]	59	87.62
2.	Boever et al in 2006 [17]	60.5	76.9
3.	Richard Kinsel et al in 2009 [18]	81.03	94.9
4.	Ting Jen Ji et al in 2012 [19]	70.87	95.4
5.	Panos et al in 2012 [7]	86.49	100
6.	Francesco et al in 2013 [20]	58.4	98.83
7.	Ramos et al [21]	93.6	96.36
8.	B.R. Chrcanovic et al [22]	87.03	95.3
9.	Bruno Ramos et al [23]	83.85	94.81
10.	Aekaterini Mikeli et al [24]	65.22	86.7
Mean of Success Rate		**74.59%**	**92.6%**

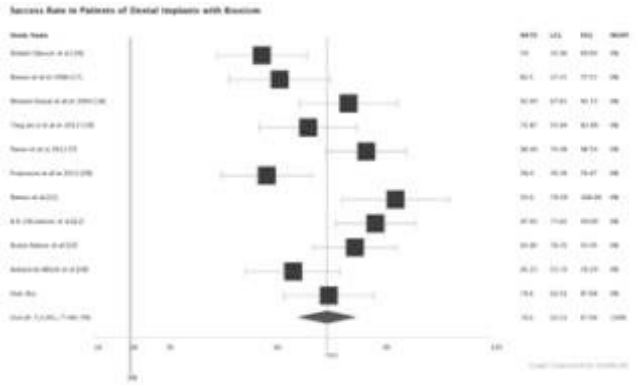

Fig 2: Success Rate in Patients with Dental Implants with Bruxism

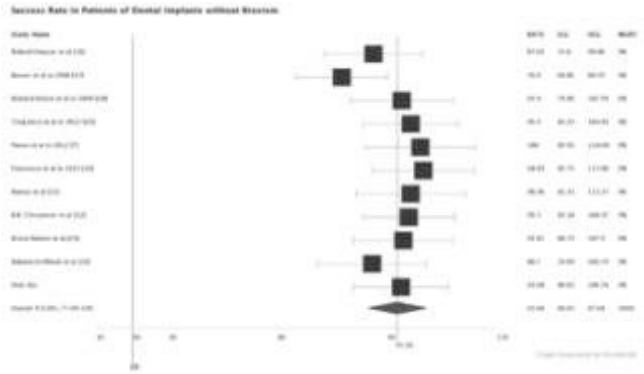

Fig 3: Success Rate in Patients with Dental Implants without Bruxism

Discussion

Bruxism and Dental Implants failure have a statistical significance in this meta-analysis.

In contrast to non bruxers, the bruxers have a high failure rate. Ten studies have been included, out of which seven studies are based on number of prosthesis & rest three studies are based on number of prosthesis as well as individuals/patients. Based on number of prosthesis – non bruxers have a total of 14253 prosthesis out of which 699 failed. Whereas bruxers have 1881 prosthesis out of which 254 faced a failure. Based on number of individuals/patients, 352 individuals were included & 140 out of them have a history of bruxism. 53

individuals out of them faced a failure.

Out of the ten studies included, failure rate was individually calculated (Table 2) which included Bruxers and Non Bruxers as different groups. The mean success rate was calculated, which turned out to be 74.59% for patients having dental implants with bruxism & 92.6% for patients having dental implants without bruxism.

Figure 2, shows the forest plot chart for bruxers. Estimate value for this group was 74.60, with p value 0.001 indicating a high significance value ($p<0.005$). The heterogenecity is ($I=86.74\%$). The group shows a mean success rate of 92.68%.

Figure 3, shows the forest plot chart for the nonbruxer group. Estimate value was 92.68, with p value 0.032 indicating a highly significance value ($p<0.005$). The heterogenecity is ($I=89.10\%$). This group shows a mean success ratio of 92.68%.

Figure 2 & 3 when compared, shows that in contrast to nonbruxers the bruxers exhibit a higher failure rate, suggesting that bruxism is a prime factor for failure in patients with dental implants. Some studies included also suggested a high failure rate in maxilla then in mandible [16] Failure rate was also seen high in Implant supported fixed partial dentures.

Conclusion:

This systematic review & meta-analysis was performed to evaluate the relationship of bruxism and dental implant failure.

The mean success rate in patients of dental implants with bruxism is 74.59%.

Whereas, the mean success rate in patients of dental implants without bruxism is 92.8%.

In contrast to nonbruxers, prostheses in bruxers had a higher failure rate. It suggests that bruxism is a contributing factor of causing the occurrence of dental implant complications and plays an important role in dental implant failure. Researchers should use several evaluation methods to justify bruxism instead of incomplete diagnosis. The units of measurements for future studies should be unified as the sample size may be the main shortage when units were based on the number of patients.

However, the systematic review & meta-analysis performed here shows a significant value & positive causal relationship of dental bruxism as risk factor for patients having dental bruxism.

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