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Influence of Systemic Diseases on the Dental Implants Success Rate: Review Article.

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ABSTRACT

It is still debatable whether certain systemic diseases affect the succes regarding osseointegration of dental implants. Therefore, we searched Pubmed in order to summarize so far published data. We might conclude that smoking, previous data upon periodontal disease, diabetes and head and neck irradiation probably pose an increased risk for dental implant success. Furthermore, data regarding cardiovascular diseases, alcohol intake, osteoporosis, and chemotherapy with regard to the dental implant success rate are still controversial and require further studies.

Keywords: systemic diseases, dental implants.

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INTRODUCTION

There have been lot of speculation whether certain systemic diseases such as smoking, alcohol intake, previous anamnestic data regarding periodontal disease, diabetes mellitus, osteoporosis, cardiovascular diseases, chemotherapy and head and neck irradiation might negatively influence dental implant treatment outcome. Data regarding this topic are still somewhat controversial [1]. The aim of this article is to review publications from the Pubmed with regard to the influence of systemic diseases on implant success

MATERIALS AND METHODS

We have performed search of Pubmed regarding the correlation of systemic diseases and dental implants. We aimed to asses whether smoking, previous data upon periodontal disease, alcohol intake, cardiovascular diseases, diabetes, osteoporosis, head and neck irradiation and chemotherapy affect dental implant succes/failure.

RESULTS

Table 1: List of conditions/diseases that affect/do not affect dental implant success rate.

CONDITIONS/DISEASES	AFFECT DENTAL IMPLANT SUCCES RATE	DO NOT AFFECT DENTAL IMPLANT SUCCES RATE
PREVIOUS PERIODONTAL DISEASE	European Academy for Periodontology, Heitz-Mayfield et al., Renvert et al., Ferreira et al.	De Souza et al.
SMOKING	European Academy for Periodontology, Lee et al., Holahan et al., Heitz-Mayfield et al, Alsaadi et al., Alissa and Oliver, van Steenberghe et al.	Sverzut et al. Carr et al. Renvert et al. Alsaadi et al, Zupnik et al. Pennarocha et al., De Souza et al.
ALCOHOL INTAKE	Aliss and Oliver	De Souza et al.
DIABETES MELLITUS	European Academy for Periodontology, Bornstein et al., Michaeli et al., Alsaadi et al., Mombelli and Cionca, Ferreira et al., van Steenberghe et al., Zupnik et al., Jung et al.	Carr te al., De Souza et al.
CARDIOVASCULAR DISEASES	Khadivi et al., Renvert et al.	Carr et al., De Souza et al.
HEAD AND NECK IRRADIATION	Carr et al., van Steenberghe et al., Yerit et al.	De Souza et al., Schepers et al.
OSTEOPOROSIS	Alsaadi et al.	Dvorak et al., Carr et al.
CHEMOTHERAPY	Van Steenberghe et al.	Carr et al., Kovacs et al.

DISCUSSION

Sometimes it is very difficult to predict whether placement of dental implants will be succesful, especially in patients who have known risk factors such as certain systemic diseases. Absolute contraindications for implant placement are well known, however relative contraindications such as certain systemic diseases might pose an increased risk for failure after dental implant placement.

Hwang and Wang [2] reported absolute contraindications for implant placement such as recent myocardial infarction and cerebrovascular incident, artificial valve placement, immunosuppression, clotting disorders, active treatment of malignancies, substance abuse, psychiatric disorders and intravenous bisphosphonate therapy. Heitz-Mayfield et al. [3] reported that there was a significant correlation between insufficient oral health status, previous anamnestic data upon periodontal disease and smoking with development of peri-implant disease. However, Carr et al. [4] as well as Alsaadi et al. [5] concluded that smoking and systemic diseases had no influence of implant osseointegration during the period of two years after implant placement. Carr et al. [4] reported that hypertension, ischemic cardiac disease, coagulation disorders, peptic ulcer, thyroid disease, rheumatoid arthritis, asthma, diabetes, Crohn's disease, chemotherapy, smoking and medication intake did not influence successful outcome of implant therapy, unlike therapeutic irradiation. Another study performed by Alsaadi et al. [6] showed that osteoporosis, Crohn's diseases and smoking were significantly correlated with early implant failure. It is possible that medication used for the treatment of Crohn's diseases might influence wound healing.

Van Steenberghe et al. [7] evaluated the influence of hypertension, osteoporosis, thyroid disease, chemotherapy, diabetes, Crohn's disease and smoking on the successful implant placement. The same authors [7] concluded that smoking, chemotherapy, irradiation therapy and limited amount of bone volumen correlated with earlier failure of dental implants. On the contrary the results of Alissa and Oliver [8] showed significant correlation between smoking and alcohol intake with regard to the implant failure which was also confirmed by Sverzut et al. [9]. Relatively new conclusions from the European Association for Periodontology [10] suggest that peri-implant infections most probably arise in patient who smoke, who had previous history of periodontal disease and whose oral hygiene measures are insufficient. The same authors [10] concluded that main factors related to the peri-implant disease were inadequate oral hygiene, previous data upon periodontal disease, smoking and diabetes mellitus. It is well known how smoking negatively influences osseointegration. Nicotine strengthens thrombocyte integration, decreases microvascular level of prostacyclines and inhibits functioning of fibroblasts, erythrocytes and macrophages. Besides carbon monoxide from the smoke binds more easily to the haemoglobin in comparison to the oxygen which results in oxygen deprivation within tissues. The polymorphonuclear leukocytes become insufficient resulting in the impaired wound healing and infection. Turkylmaz [11] reported that implant placement is not contraindicated in patients with moderate and good controlled diabetes mellitus. Porter and van Fraunhofer [12] concluded that older age and systemic diseases are more frequently connected with implant failure. This was confirmed by Jung et al. [13] as their results showed that older persons together with ones suffering from diabetes mellitus had more implant failures in comparison to the younger ones without diabetes. On the contrary, Meijer et al. [14] could not find significant differences in implant failure between younger [average age 46] and older [average age 68 years] participants.

It has been speculated that diabetic patients are more prone to the infection due to the impaired chemotactic and phagocytic function of the polymorphonuclear leukocytes. Furthermore, increased level of sugar in the gingival sulcular fluid as well as increased C-reactive protein levels might lead to the loss of periodontal tissues together with altered immune response. It is also possible that disturbances of small blood vessels and

osteoporosis as a result of diabetes might influence implant success. Mallado-Valero et al. [15] concluded that chronic hyperglycemia leads to the chronic inflammation which may increase bone resorption as hyperglycemia leads to the impaired osteoblast formation as well as changes of the response of parathyroid hormone. Bornstein et al. [16] as well as Mombelli and Cionca [17] confirmed significant association between diabetes mellitus and implant failure.

Khadivi et al. [18] reported that cardiovascular diseases did affect dental implant success rate which was also confirmed by Renvert et al. [19].

Renvert et al. [19] reported significant association between peri-implant disease and previous anamnestic data regarding periodontal disease as well as cardiovascular diseases, however there was no association with regard to the smoking status and peri-implant disease. Dvorak et al. [20] could not confirm significant association between osteoporosis and peri-implant disease in adult female population. Lee et al. [21] reported that implant placement in persons older than 70 years is safe if they have controlled systemic diseases. Pennarocha et al. [22] could not confirm causal relationship between implant failure and age, smoking and oral hygiene. On the contrary Ferreira et al. [23] showed that in persons suffering from periodontal disease, diabetes and with poor oral hygiene, increased incidence of the peri-implant disease is seen. Zupnik et al. [24] reported that smoking was not associated with implant failure, however, diabetes was strongly correlated with implant failure. De Souza et al. [25] concluded that previous anamnestic data upon periodontal disease, cardiovascular diseases, diabetes mellitus, hyper/hypothyroid disease, osteoporosis, kidney diseases, alcohol intake, smoking, irradiation, menopause and hormone replacement therapy do not contribute to the additional bone resorption around implants.

Irradiation therapy to the head and neck area might lead to the obliteration of the small blood vessels which might influence implant osseointegration. The results of study [26] showed that implant success was seen in 97% patients after irradiation therapy in comparison to the healthy persons whose implant success was 100%. However, the results of the other study [27] showed that irradiation therapy of 50 Gy significantly decreases implant survival in the mandible.

There are scarce data regarding influence of chemotherapy on implant success. In 30 patients who undergone chemotherapy, 106 implants were inserted and no significant differences in implant success between patients who underwent chemotherapy and the healthy ones could be found [28].

Gómez-de Diego et al. [1] on the basis of the literature review concluded that cardiac diseases, diabetes or controlled metabolic disorders do not seem to be contraindication for the placement of dental implants. Tobacco addiction, head and neck radiotherapy and treatment of osteoporosis with bisphosphonates are correlated to a higher loss of dental implants. Our results are partially in concordance with the results of Gómez-de Diego et al. [1]

On the basis of the searched literature we might conclude that smoking, previous data upon periodontal disease, diabetes and head and neck irradiation probably pose an increased risk for dental implant success. Furthermore, data regarding cardiovascular diseases, alcohol intake, osteoporosis and chemotherapy still controversial and require further studies.

REFERENCES

- [1] Gómez-de Diego R, Mang-de la Rosa M, Romero-Pérez MJ, Cutando-Soriano A, López-Valverde-Centeno A. *Med Oral Patol Oral Cir Bucal* 2014 Mar 8. [Epub ahead of print]
- [2] Hwang D, Wang HL. *Implant Dent* 2006;15:353-60.
- [3] Heitz-Mayfield LJ. *J Clin Periodontol* 2008;35:292-304.
- [4] Carr AB. *J Evid Based Dent Pract* 2012;12:217-9.
- [5] Alsaadi G, Quirynen M, Komárek A, van Steenberghe D. *Clin Oral Implants Res* 2008;19:670-6.
- [6] Alsaadi G, Quirynen M, Komárek A, van Steenberghe D. *J Clin Periodontol* 2007;34:610-7
- [7] van Steenberghe D, Jacobs R, Desnyder M, Maffei G, Quirynen M. *Clin Oral Implants Res* 2002;13:617-22.
- [8] Alissa R, Oliver RJ. *J Oral Implantol* 2012;38(1):51-61.
- [9] Sverzut AT, Stabile GA, de Moraes M, Mazzonetto R, Moreira RW. *J Oral Maxillofac Surg* 2008;66:1004-9.
- [10] Lindhe J, Meyle J. *J Clin Periodontol* 2008;35:282-5.
- [11] Turkyilmaz I. *Implant Dent* 2010;19:323-9.
- [12] Porter JA, von Fraunhofer JA. *Gen Dent* 2005;53:423-32.
- [13] Jung HY, Kim YG, Jin MU, Cho JH, Lee JM. *J Adv Prosthodont* 2013; 5: 51-7.
- [14] Meijer HJ, Batenburg RH, Raghoobar GM. *Int J Oral Maxillofac Implants* 2001; 16: 522-6.
- [15] Mellado-Valero A, Ferrer-García JC, Calvo-Catalá J, Labaig-Rueda C. *Med Oral Patol Oral Cir Bucal* 2010;15:e52-7.
- [16] Bornstein MM, Cionca N, Mombelli A. *Int J Oral Maxillofac Implants* 2009;24 Suppl:12-27.
- [17] Mombelli A, Cionca N. *Clin Oral Implants Res* 2006; 17:97-103.
- [18] Khadivi V, Anderson J, Zarb GA. *J Prosthet Dent* 1999;81:533-6.
- [19] Renvert S, Aghazadeh A, Hallström H, Persson GR *Clin Oral Implants Res* 2013. doi: 10.1111/clr.12208.
- [20] Dvorak G, Arnhart C, Heuberger S, Huber CD, Watzek G, Gruber R. *J Clin Periodontol* 2011;38:950-5.
- [21] Lee HJ, Kim YK, Park JY, Kim SG, Kim MJ, Yun PY. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2010;110:442-6.
- [22] Pennarocha M. *Med Oral* 2002; 7: 144-55.
- [23] Ferreira SD, Silva GL, Cortelli JR, Costa JE, Costa FO. *J Clin Periodontol* 2006;33:929-35.
- [24] Zupnik J, Kim SW, Ravens D, Karimbux N, Guze K. *J Periodontol* 2011; 82: 1390-95.
- [25] de Souza JG, Neto AR, Filho GS, Dalago HR, de Souza Júnior JM, Bianchini MA. *Quintessence Int.* 2013 ;44:415-24.



- [26] Schepers RH, Slagter AP, Kaanders JH, van den Hoogen FJ, Merx MA. *Int J Oral Maxillofac Surg* 2006;35:803–8.
- [27] Yerit KC, Posch M, Seemann M, Hainich S, Dortbudak O, Turhani D, Ozyuvaci H, Watzinger F, Ewers R. *Clin Oral Implants Res* 2006;17:337–44.
- [28] Kovacs AF. *Int J Oral Maxillofac Surg* 2001;30:144–7.