

Oral Health Related Quality of Life in Patients Undertaking Implant Treatments: A Review of Literature

Maryam Frazadmoghadam (1)
Tayebe Malek Mohammadi (1)
Mohammad Mohammadi (2)
Reza Goudarzi (3)

(1) Oral and Dental Diseases Research Center and Kerman Social Determinants on Oral Health Research Center and Dept. of Oral Health and Community Dentistry, Kerman Dental School, Kerman University of Medical Sciences, Kerman, Iran.

(2) Oral and Dental Diseases Research Center and Dept. of Periodontics, Kerman Dental School, Kerman University of Medical Sciences, Kerman, Iran.

(3) Health management Research Center and Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran.

Corresponding Author:

Tayebe Malek Mohammadi
Kerman Dental School, Kerman University of Medical Sciences,
Kerman, Iran

Email: t_malekmohammadi@kmu.ac.ir

Abstract

Tooth loss is one of the factors which affects on oral health related quality of life because of impaired aesthetic, speaking, and mastication. Replacement of lost teeth by prosthesis options is indicated for regaining aesthetic, speech, function, and psychological improvement. Fixed partial dentures, removable complete and partial dentures are usual treatment options to regain the function of patients. But, today implant treatments are preferred by patients due to functional and psychological factors. Replacement of teeth by implants has become popular among both patients and clinicians. This paper has reviewed the oral health related quality of life in patients treated with implant supported prostheses.

Key words: Dental implant, Tooth loss, Dental prosthesis, Quality of life

Please cite this article as: Frazadmoghadam M. et al. Oral Health Related Quality of Life in Patients Undertaking Implant Treatments: A Review of Literature. 2018;16(2):346-351. World Family Medicine.
DOI: 10.5742/MEWFM.2018.93283

Introduction

For a more valuable assessment of health status and treatment results, factors related to quality of life must be considered [1]. Tooth decay and periodontal problems are two prevalent oral diseases which do not manifest symptoms in early stages. Therefore, clinical signs of tooth decay and periodontal disease such as number of missed teeth, loose teeth and periodontal pockets are not strongly related to poor oral health related quality of life factors [2]. Tooth decay and periodontal problems, are progressing disease and if left untreated lead to tooth loss. Depending on type and location, missing teeth can influence oral health in terms of mastication, speech and aesthetics [1]. Clinician's consensus is that more preserved teeth result in better mastication [3]. Replacement of missed teeth with prosthesis is among the most complicated dental procedures for regaining function, aesthetics, speech and psychological improvement. Although full crown, bridge and removable dentures are usual treatment options, today, patients' attitudes seem to be changing and many prefer implants due to functional and psychological factors.

Implant treatments have gained popularity among both patients and clinicians [3]. Patient and clinicians opinions are both important regarding the assessment of treatment outcomes. In patients' point of view, psychosocial effects, cost-effectiveness, cost-benefit and quality of life factors are all considered important. Many studies show higher patient satisfaction of implant-based prosthesis when compared to conventional prosthesis [4-6]. This paper has reviewed the quality of life in patients treated with implant based prostheses.

Tooth loss

Regarding oral health related quality of life, tooth loss is a significant influencing factor [7]. Tooth loss mostly appears as a result of tooth decay or periodontal disease. More than 50% of tooth loss is related to tooth decay and periodontal disease accounts for 30-35% of tooth loss [8].

Today advances in oral health, has lead to lower cases of edentulous patients in North America and European countries [9]. Compared to men, women consider aesthetics as a more important factor in oral utility. Nevertheless, considering shortened dental arches, this is not statistically significant. Although aesthetics is more important in women, oral function was known to be equally important in men and women [10]. Fixed tooth-based or implant-based prostheses, removable partial dentures and removable over dentures, are usual recommended treatment options for replacing missing teeth. In the past, tooth loss was little concern to patients and the majority of them easily adapted to usual tooth replacement methods [11]. Due to functional and psychological reasons, today this attitude has changed and many people prefer implant-based treatments [12]. Up to year 2030, the population of USA above 65 will double thus increasing the need for replacing lost teeth [13, 14].

Implant

Implant is an alloplastic, biocompatible material for replacing teeth. It increases retention and stability of dentures. Also it will avoid the cut of adjacent teeth in cases of partial dentures [12,15]. Prevention of bone loss and increased aesthetics especially in anterior parts of the oral cavity are other advantages of implant based treatment options [16 , 17]. Many studies have assessed the utility of various replacement methods for lost teeth. Although results show higher utility of implant-based replacement methods, cost of such treatments has remained a huge impediment to their demand [4,18,19]. Dental implantology is a popular treatment option which has shown high success [20]. Available studies about dental implants have mostly investigated implant clinical success, titanium surface and surgical and prosthetic procedures. Recently dentistry and especially implant dentistry has focused on patient centered treatments in which patients' needs and success of treatments are assessed [21]. More than four decades has passed since the first published paper about titanium dental implants [22] but a low percentage of them have emphasized on patient-centered implant treatment results [23]. Most studies have revealed that implant treatment in cases of partial and full edentulous patients increases quality of life and in the long term, is considered a more cost-effective treatment compared to other tooth replacing options [6,24,25,26]. Evaluation of patient's utility values for the methods of teeth replacement showed that implant supported prosthesis was the best method for replacement of lost teeth [27].

Quality of life

Four basic parameters are described to evaluate dental treatment results. Biological and physiological parameters are health of oral structures, mastication, nutrition, and aesthetics. Longevity and survival rate parameters include

tooth, restorations and implant; psychological parameters include satisfaction, self-esteem, body image and quality of life and economic parameters include direct and indirect costs. Most research has focused on the first two parameters whereas little focus has been placed upon psychological outcomes of treatment [28]. Oral health related quality of life (OHRQOL) is an important patient centered endpoint which needs to be considered when evaluating professional interventions and treatment results. In the general population, number of teeth has the most significant effect on patients' OHRQOL [29]. WHO defines health as complete social, psychological and physical well-being and not only the absence of disease [30]. Quality of life is the perception of one's situation in life based on individual cultural values.

Quality of life and its relationship to goals, expectancies, standards and anxiety is considered a valuable parameter in patient's oral health evaluation [31]. Subjective evaluation of OHRQOL, reflects patients comfort while eating, sleeping and participating in social activities, self-esteem and satisfaction with oral health [32]. OHRQOL will evaluate both positive and negative domains of health perceptions [33,34].

Single tooth implant

Due to following reasons, single tooth implants are suitable treatment options:

- 1) They avoid the cut of adjacent teeth.
- 2) They are ideal treatments for spaced dentitions.
- 3) They have high prognosis and require little maintenance.
- 4) Preserves the height and width of alveolar ridge [12].

Fixture survival, limited bone loss and minor prosthetic problems are contributing factors to implants' clinical success [35]. In a systematic review carried out in 2007, Jung et al, revealed that single crown supporting implants show a survival rate of 96.8%. Also single crowns which were supported by implants gained a survival rate of 94.5% after 5 years. Likewise the survival rate of metal-ceramic crowns (95.4%), was significantly higher than full ceramic crowns (91.2%) [36]. In another research, single crown supporting implants' survival rate was 97.2% after 5 years and 95.2% after 10 years [37]. These two Meta-analysis studies show a high survival rate for single crown supporting implants. Another Meta-analysis, reported a 5 year survival of 93.8% for conventional tooth supported FDPs and 94.5% for implant supported single crowns. After 10 years this was reported to be 89.2% and 89.4% respectively [38]. In a case control study carried out by Raes et al, quality of life of people in need of implant-based single tooth replacement was assessed in a group with healed bone and a group with fresh socket. At base line there was no significant difference in quality of life factors. After a year, in the healed bone group, all seven domains of OHIP-14 improved significantly whereas in the fresh socket group, only three of seven domains of OHIP-14 improved. According to OHIP-14 score, people in need of single tooth replacement had limited oral health related problems, although OHIP score was not significantly different between the two groups [39]. Regarding quality

of life in people treated with endodontic procedures and implant procedures, both treatment methods achieved high clinical success with similar OHIP-14 scores. Overall participants were satisfied with the treatment. Their clear message was “preserving natural teeth as long as possible”. Therefore in addition to prognosis and clinical results, patient preference and long term and short term effect of treatment on quality of life should also be considered when evaluating treatment outcomes [40].

Single implants versus fixed partial dentures (FPDs)

Fixed partial denture is used to replace single or multiple teeth. In this method, significant cutting of adjacent teeth is needed to gain optimal functional and aesthetic results. This can cause endodontic, periodontic or tooth structure problems [41]. In a systematic review, Creugers et al, analyzed 26 studies in which FPDs were followed for more than 15 years. The overall 10 year and 15 year survival rate was 90% and 74% respectively. This means that after 10 years less than 15 percent of FPDs needed removal or exchange whereas after 15 years one third of FPDs were in need of exchange [42]. Considering removed or failed FPDs (a broader definition of failure), Walter reported a 87% survival rate after 10 years and 69% after 15 years [43]. In 2015, Pjetursson et al, noted survival rate of all types of all-ceramic FDPs to be less than metal-ceramic FDPs [44]. Using implants for teeth replacement is a predictable method. Walton reported the 15 year survival rate of posterior FPDs and implant supported single crowns to be 92.7% and 95.9% respectively. This difference was not statistically significant. In contrast the survival rate of anterior implant-supported single crowns (93.3%) was significantly higher than anterior FPDs (82.8%). Both treatment options were similar in complications, whereas FPDs economic burden was considered to be higher [45]. Park et al compared the quality of life in 35 people treated with single tooth implants and 36 people treated with FDPs. In both treatment options, OHRQOL increased but no significant difference existed between the two groups [46].

Implant supported over dentures

For more than a century, soft tissue supported maxillary and mandibular dentures have been an acceptable treatment method. Over time and especially in the mandible, bone loss leads to loose dentures, thus functional, social and psychological failure [47]. Bouma et al, reported improved OHRQOL 12 months after over denture treatment. In spite of better OHRQOL, general quality of life did not improve [48]. Implant supported over denture increased patient satisfaction in terms of aesthetics, denture stability, comfort, speech, food choice and social activities [49]. In a systematic review carried out by Thomason et al, strong evidence supported the fact that implant supported over dentures increase quality of life more than conventional dentures. Although patients show high satisfaction after maxillary implant supported over dentures, compared to conventional dentures, no significant superiority existed [49]. Wilfried Kleis et al concluded that type of attachment did not influence OHRQOL in cases of mandibular over denture supported by two implants [50]. Regarding mandibular over dentures, it cannot be concluded that

level of bone loss, patient satisfaction and after treatment complications is related to the number of supporting implants [51]. Evidence shows that an over denture supported by two implants, should be the first and least treatment option offered to edentulous patients. Although this treatment option is not the gold standard for mandibular edentulous patients, regarding time, cost and patient satisfaction, it is considered to be adequate for most patients [52].

Implant supported removable partial dentures

Removable partial denture is a prevalent method offered to partially edentulous patients. Lower cost, easy hygiene and replacement of several teeth all in one denture are advantages of this treatment option. On the other hand lower retention and stability (especially in cases of free end, occlusal disharmony and soft tissue pain are among disadvantages of such treatment. Any way prosthesis clinical success does not necessarily show patient satisfaction [53]. Patient age, previous experience of a denture, number and location of replaced teeth are factors contributing to the clinical success of removable partial dentures [54].

In a study by Ali et al, anterior teeth replacement with removable partial denture increased OHRQOL [54]. In another assessment of OHRQOL, partially edentulous patients without dentures, reported higher OHRQOL compared to partially edentate patients who used a removable partial denture [55].

In cases of anatomical or economical limitations, Implants are used to support partial dentures instead of using fixed prosthesis [53]. In a 3-16 year retrospective study, class 1 Kennedy edentulous patients who used implant supported partial dentures reported an implant survival rate of 91.7%. Also level of implant surrounding bone loss was 0.9mm. In this study the mean overall OHIP score was 16.7 and patient satisfaction was reported high [56].

Gates study reported a 41 unit decrease in OHIP score after replacing removable partial denture with implant supported partial denture [20]. According to Campus et al, the strategic replacement of implants in posterior alveolar ridge, significantly increases patients' quality of life, retention and stability of denture in patients with implant supported partial removable dentures [53].

Implant supported fixed prosthesis

For people who prefer this treatment option or those who previously had a removable partial denture, implant supported fixed prosthesis are recommended (57). The 10 year survival rate of implant and the prosthesis is reported to be 96% for mandibular implant fixed complete dental prosthesis. Also survival rate of implants with coarse surfaces were similar to implants with smooth surfaces. Number of implants and anterior-posterior position of implants did not influence survival rate [58].

In a systematic review, Kern et al, reported implant survival rate to be 97.9% for maxilla and 98.9% for mandible. Implant loss was significantly higher in maxilla and lower in implant supported fixed dentures compared to implant supported

fixed prostheses, implant supported removable prostheses and conventional dentures. Although quality of life increased in all three groups after treatment, OHRQOL was significantly higher in patients with implant supported fixed prostheses and implant supported removable prostheses, compared to patients who used conventional dentures. Specifically, compared to conventional dentures, functional limitation, physical pain and psychological problems significantly improved in implant supported fixed prosthesis patients and functional limitation improved in implant supported removable denture patients [4]. Brennan et al, noted lower quality of life and satisfaction in patients with implant supported over denture in comparison to implant supported fixed prosthesis [60].

Conclusion

Patients with conventional dentures, were lower in quality of life compared to patients treated with implant supported fixed prosthesis, implant supported removable partial dentures and implant supported over dentures hence showing the importance of implant use for teeth replacement according to clinician and patient perceptions.

Acknowledgement

The authors thank Dr Naeimeh hashemi poor, PhD Student of Oral Health and Community Dentistry Department of Kerman dental school for her help to perform this literature review.

References

- Gerritsen, A. E., Allen, P. F., Witter, D. J., Bronkhorst, E. M., & Creugers, N. H. (2010). Tooth loss and oral health-related quality of life: a systematic review and meta-analysis. *Health and quality of life outcomes*, 8(1), 126.
- Mariño, R., Schofield, M., Wright, C., Calache, H., & Minichiello, V. (2008). Self-reported and clinically determined oral health status predictors for quality of life in dentate older migrant adults. *Community dentistry and oral epidemiology*, 36(1), 85-94.
- Gilbert GH, Meng X, Duncan RP, Shelton BJ. Incidence of tooth loss and prosthodontic dental care: effect on chewing difficulty onset, a component of oral health-related quality of life. *Journal of the American Geriatrics Society*. 2004 Jun 1;52(6):880-5.
- Oh, S. H., Kim, Y., Park, J. Y., Jung, Y. J., Kim, S. K., & Park, S. Y. (2016). Comparison of fixed implant-supported prostheses, removable implant-supported prostheses, and complete dentures: patient satisfaction and oral health-related quality of life. *Clinical oral implants research*, 27(2)
- Nickenig, H. J., Wichmann, M., Andreas, S. K., & Eitner, S. (2008). Oral health-related quality of life in partially edentulous patients: Assessments before and after implant therapy. *Journal of Cranio-Maxillofacial Surgery*, 36(8), 477-480.
- Emami, E., Heydecke, G., Rompré, P. H., De Grandmont, P., & Feine, J. S. (2009). Impact of implant support for mandibular dentures on satisfaction, oral and general health-related quality of life: a meta-analysis of randomized-controlled trials. *Clinical oral implants research*, 20(6), 533-544.
- Saintrain, M. V. D. L., & de Souza, E. H. A. (2012). Impact of tooth loss on the quality of life. *Gerodontology*, 29(2).
- Lang, N. P., & Lindhe, J. (Eds.). (2015). *Clinical Periodontology and Implant Dentistry*, 2 Volume Set. John Wiley & Sons.
- Zitzmann NU, Hagmann E, Weiger R. What is the prevalence of various types of prosthetic dental restorations in Europe? *Clin Oral Implants Res*. 2007;18(S3):20-33.
- Nassani, M. Z., & Kay, E. J. (2011). Tooth loss—an assessment of dental health state utility values. *Community dentistry and oral epidemiology*, 39(1), 53-60.
- Grogono, A. L., Lancaster, D. M., & Finger, I. M. (1989). Dental implants: a survey of patients' attitudes. *The Journal of prosthetic dentistry*, 62(5), 573-576.
- Palmer, R. M., Smith, B. J., Palmer, P. J., & Floyd, P. D. (1997). A prospective study of Astra single tooth implants. *Clinical Oral Implants Research*, 8(3), 173-179.
- Meskin, L. H., Brown, L. J., Brunelle, J. A., & Warren, G. B. (1988). Patterns of tooth loss and accumulated prosthetic treatment potential in US employed adults and seniors, 1985-86. *Gerodontology*, 4(3), 126.
- Douglass, C. W., & Watson, A. J. (2002). Future needs for fixed and removable partial dentures in the United States. *The Journal of prosthetic dentistry*, 87(1), 9-14.
- Lekholm, U., Gröndahl, K., & Jemt, T. (2006). Outcome of oral implant treatment in partially edentulous jaws followed 20 years in clinical function. *Clinical implant dentistry and related research*, 8(4), 178-186.
- Zitzmann, N. U., & Marinello, C. P. (2000). Treatment outcomes of fixed or removable implant-supported prostheses in the edentulous maxilla. Part I: patients' assessments. *The Journal of prosthetic dentistry*, 83(4), 424-433.
- Chang, M., Wennström, J. L., & Andersson, B. (1999). Esthetic outcome of implant-supported single-tooth replacements assessed by the patient and by prosthodontists. *International Journal of Prosthodontics*, 12(4).
- Strassburger, C., Kerschbaum, T., & Heydecke, G. (2006). Influence of implant and conventional prostheses on satisfaction and quality of life: A literature review. Part 2: Qualitative analysis and evaluation of the studies. *International Journal of Prosthodontics*, 19(4).
- Gates, W. D., Cooper, L. F., Sanders, A. E., Reside, G. J., & Kok, I. J. (2014). The effect of implant-supported removable partial dentures on oral health quality of life. *Clinical oral implants research*, 25(2), 207-213.
- Heydecke, G., Boudrias, P., Awad, M. A., De Albuquerque, R. F., Lund, J. P., & Feine, J. S. (2003). Within-subject comparisons of maxillary fixed and removable implant prostheses. *Clinical Oral Implants Research*, 14(1), 125-130.
- Johannsen, A., Westergren, A., & Johannsen, G. (2012). Dental implants from the patients' perspective: transition from tooth loss, through amputation to implants—negative and positive trajectories. *Journal of clinical periodontology*, 39(7), 681-687.
- Brånemark PI, Breine U, Adell R, Hansson BO, Lindström J, Ohlsson Å. Intra-osseous anchorage of dental prostheses: I. Experimental studies. *Scandinavian journal of plastic and reconstructive surgery*. 1969 Jan 1;3(2):81-

- 23- Pjetursson, B. E., Karoussis, I., Bürgin, W., Brägger, U., & Lang, N. P. (2005). Patients' satisfaction following implant therapy. *Clinical oral implants research*, 16(2), 185-193.
- 24- Bouchard, P., Renouard, F., Bourgeois, D., Fromentin, O., Jeanneret, M. H., & Beresniak, A. (2009). Cost-effectiveness modeling of dental implant vs. bridge. *Clinical oral implants research*, 20(6), 583-587.
- Altuntas, B., Aydin, Y., Eroglu, A. (2016). Tracheobronchial Foreign Bodies Aspirations in Adults: A 25-Years Experience. *European Journal of General Medicine*;13(2):94-99
- 25- Chun, J. S., Har, A., Lim, H. P., & Lim, H. J. (2016). The analysis of cost-effectiveness of implant and conventional fixed dental prosthesis. *The journal of advanced prosthodontics*, 8(1), 53-61.
- 26- Frazadmoghadam, M., Mohammadi, T. M., Mohammadi, M., & Goudarzi, R. (2017). Evaluation of Patients' utility Values for Replacement Options of Lost Teeth. *INTERNATIONAL JOURNAL OF ADVANCED BIOTECHNOLOGY AND RESEARCH*, 8(3), 1643-1648.
- 27- Petricevic, N., Celebic, A., & Rener-Sitar, K. (2012). A 3-year longitudinal study of quality-of-life outcomes of elderly patients with implant-and tooth-supported fixed partial dentures in posterior dental regions. *Gerodontology*, 29(2).
- 28- Allen, P. F., & McMillan, A. S. (1999). The impact of tooth loss in a denture wearing population: an assessment using the Oral Health Impact Profile. *Community Dental Health*, 16(3), 176-180.
- 29- De Cock, J., de la Calle, M. I., De Sabata, S., Edwards, S., Fahy, N., Guldmond, N., & Khanna, D. (2017). Senior Editorial Team. *Eurohealth*, 23(3).
- 30- Whoqol Group. (1995). The World Health Organization quality of life assessment (WHOQOL): position paper from the World Health Organization. *Social science & medicine*, 41(10), 1403-1409.
- 31- Scully, C. (2000). Oral health in America: a report of the surgeon general. 1-308.
- 32- Broder, H. L., & Wilson-Genderson, M. (2007). Reliability and convergent and discriminant validity of the Child Oral Health Impact Profile (COHIP Child's version). *Community dentistry and oral epidemiology*, 35(s1), 20-31.
- 33- Sischo, L., & Broder, H. L. (2011). Oral health-related quality of life: what, why, how, and future implications. *Journal of dental research*, 90(11), 1264-1270.
- 34- Vermeylen, K., Collaert, B., Lindén, U., Björn, A. L., & De Bruyn, H. (2003). Patient satisfaction and quality of single-tooth restorations. *Clinical oral implants research*, 14(1), 119-124.
- 35- Jung, R. E., Pjetursson, B. E., Glauser, R., Zembic, A., Zwahlen, M., & Lang, N. P. (2008). A systematic review of the 5-year survival and complication rates of implant-supported single crowns. *Clinical oral implants research*, 19(2), 119-130.
- 36- Jung, R., Zembic, A., Pjetursson, B. E., Zwahlen, M., & Thoma, D. (2012). Systematic review of the survival rate and the incidence of biological, technical, and aesthetic complications of single crowns on implants reported in longitudinal studies with a mean follow-up of 5 years. *Clinical oral implants research*, 23(s6), 2-21.
- 37- Pjetursson, B. E., Brägger, U., Lang, N. P., & Zwahlen, M. (2007). Comparison of survival and complication rates of tooth-supported fixed dental prostheses (FDPs) and implant-supported FDPs and single crowns (SCs). *Clinical oral implants research*, 18(s3), 97-113.
- 38- Raes, F., Cooper, L. F., Tarrida, L. G., Vandromme, H., & De Bruyn, H. (2012). A case-control study assessing oral-health-related quality of life after immediately loaded single implants in healed alveolar ridges or extraction sockets. *Clinical oral implants research*, 23(5), 602-608.
- 39- İlgün, E., Akyürek, O., Kalkan, A.O., Demir, F., Demirayak, M., Bilgi, M. (2016). Neutrophil/Lymphocyte Ratio and Platelet/Lymphocyte Ratio in Fibromyalgia. *European Journal of General Medicine*;13(2):100-104
- 40- Bilir, B., Altıntaş, N., Aydın, M., Oran, M., Özsu, S., Tutar, U. (2016). The Predictive Role of Neutrophil to Lymphocyte ratio in Chronic Obstructive Pulmonary Disease. *European Journal of General Medicine*;13(2):105-110
- 41- Creugers, N. H., Käyser, A. F., & Hof, M. A. (1994). A meta-analysis of durability data on conventional fixed bridges. *Community Dentistry and Oral Epidemiology*, 22(6), 448-452.
- 42- Walton, J. N., Gardner, F. M., & Agar, J. R. (1986). A survey of crown and fixed partial denture failures: length of service and reasons for replacement. *The Journal of prosthetic dentistry*, 56(4), 416-421.
- 43- Sailer, I., Makarov, N. A., Thoma, D. S., Zwahlen, M., & Pjetursson, B. E. (2016). Corrigendum to "All-ceramic or metal-ceramic tooth-supported fixed dental prostheses (FDPs)? A systematic review of the survival and complication rates. Part I: Single crowns (SCs)" [*Dental Materials* 31 (6)(2015) 603-623]. *Dental materials: official publication of the Academy of Dental Materials*, 32(12), e389.
- 44- Walton, T. R. (2015). An Up-to-15-Year Comparison of the Survival and Complication Burden of Three-Unit Tooth-Supported Fixed Dental Prostheses and Implant-Supported Single Crowns. *International Journal of Oral & Maxillofacial Implants*, 30(4).
- 45- Park, S. Y., Oh, S. H., Kim, J., Jung, Y. J., Park, J. Y., Lee, E. K., ... & Kim, Y. (2016). Single-Tooth Implant Versus Three-Unit Fixed Partial Denture: A Study of Oral Health-Related Quality of Life. *International Journal of Oral & Maxillofacial Implants*, 31(2).
- 46- Thomason, J. M., Feine, J., Exley, C., Moynihan, P., Müller, F., Naert, I., & Lynch, C. (2009). Mandibular two implant-supported overdentures as the first choice standard of care for edentulous patients-the York Consensus Statement. *British dental journal*, 207(4), 185-186.
- 47- Bouma, J., Boerrigter, L. M., Van Oort, R. P., van Sonderen, E., & Boering, G. (1997). Psychosocial effects of implant-retained overdentures. *International Journal of Oral & Maxillofacial Implants*, 12(4).
- 48- Thomason, J. M., Heydecke, G., Feine, J. S., & Ellis, J. S. (2007). How do patients perceive the benefit of reconstructive dentistry with regard to oral health-related quality of life and patient satisfaction? A systematic review. *Clinical oral implants research*, 18(s3), 168-188.
- 49- Kleis, W. K., Kämmerer, P. W., Hartmann, S., Al-Nawas, B., & Wagner, W. (2010). A Comparison of Three Different Attachment Systems for Mandibular Two-Implant Overdentures: One-Year Report. *Clinical implant dentistry and related research*, 12(3), 209-218.
- 50- Rocuzzo, M., Bonino, F., Gaudio, L., Zwahlen, M., & Meijer, H. J. (2012). What is the optimal number

of implants for removable reconstructions? A systematic review on implant-supported overdentures. *Clinical oral implants research*, 23(s6), 229-237.

51- Thomason, J. M., Feine, J., Exley, C., Moynihan, P., Müller, F., Naert, I., & Lynch, C. (2009). Mandibular two implant-supported overdentures as the first choice standard of care for edentulous patients-the York Consensus Statement. *British dental journal*, 207(4), 185-186.

52- Campos, C. H., Gonçalves, T. M. S. V., & Garcia, R. C. M. R. (2015). Implant-supported removable partial denture improves the quality of life of patients with extreme tooth loss. *Brazilian dental journal*, 26(5), 463-467.

53- Ali, Z., Baker, S., Barabari, P., & Martin, N. (2017). Efficacy of Removable Partial Denture Treatment: A Retrospective Oral Health-Related Quality of Life Evaluation. *The European journal of prosthodontics and restorative dentistry*, 25(2), 101.

54- 55-Augustin, M. M., Joke, D., Bourleyi, S. I., Shenda, L. P., Fidele, N. B., Van, T. M., & Naert, I. (2016). The Effect of Partial Removable Denture Use on Oral Health Related Quality of Life and Masticatory Function, after 5 Years Use. *Open Journal of Stomatology*, 6(10), 201.

55- Jensen, C., Meijer, H. J., Raghoebar, G. M., Kerdijk, W., & Cune, M. S. (2017). Implant-supported removable partial dentures in the mandible: A 3–16 year retrospective study. *Journal of prosthodontic research*, 61(2), 98-105.

56- Pjetursson, B. E., Thoma, D., Jung, R., Zwahlen, M., & Zembic, A. (2012). A systematic review of the survival and complication rates of implant-supported fixed dental prostheses (FDPs) after a mean observation period of at least 5 years. *Clinical oral implants research*, 23(s6), 22-38.

57- Méndez-Martínez, S., García-Carrasco, M., Mendoza-Pinto, C., García-Cano, E., Montiel-Jarquín, A.J. (2016). Surgical Complications of Simple and Complex Gastroschisis in Newborn. *European Journal of General Medicine*;13(2):88–93

58- Kern, J. S., Kern, T., Wolfart, S., & Heussen, N. (2016). A systematic review and meta-analysis of removable and fixed implant-supported prostheses in edentulous jaws: post-loading implant loss. *Clinical oral implants research*, 27(2), 174-195.

59- Yağmurkaya, O., Dikicier, E., Çakmak, G., Demir, H., Fırat, N., Çapoğlu, R., Uzunoğlu, Y., Altıntoprak, F. (2016). Carcinoid tumor of appendix; retrospective review of 1800 appendectomy patients. *European Journal of General Medicine*;13(4):109–111

60- Armutcu, F., Aras, S., Üstünsoy, S. (2016). Subscapular skinfold thickness is a handy tool till body mass index in the evaluation of obesity. *European Journal of General Medicine*;13(4):106–108