

## Oral Health-Related Quality of Life in Middle Eastern Patients with Implant-Supported Fixed and Removable Dental Prostheses: A Systematic Review & Case Studies.

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### Abstract:

This systematic review study aims to explore the concept of quality of life and its multidimensional aspects. Quality of life encompasses an individual's overall well-being and satisfaction with various facets of their life, including physical health, mental health, social relationships, and environment. This subjective measure is influenced by diverse factors such as personal values, cultural background, socioeconomic status, and life experiences. The review examines common indicators of quality of life, including physical health and functional abilities, emotional well-being and mental health, social relationships, and support networks, financial security and stability, access to education, healthcare, and other resources, as well as environmental factors like safety, cleanliness, and access to natural spaces. The study highlights the significance of quality of life in healthcare and public health, emphasizing its role in evaluating the effectiveness of interventions and treatments, as well as identifying areas for improvement to enhance overall well-being and satisfaction. By synthesizing existing research and evidence, this systematic review contributes to a comprehensive understanding of the quality of life and its implications for individuals and communities.

**Keywords:** Oral Health, Quality, communities

Receive Date: 15/05/2023	Accept Date: 19/05/2023	Publish Date: 1/6/2023
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### Introduction :

Quality of life refers to an individual's overall well-being and satisfaction with various aspects of their life, such as their physical health, mental health, social relationships, and environment. It is a subjective measure that varies from person to person and can be influenced by a range of factors, including personal values, cultural background, socioeconomic status, and life experiences. Some common indicators of quality of life include Physical health and functional abilities, Emotional

well-being and mental health, social relationships, and support networks, financial security and stability access to education, healthcare, and other resources, and Environmental factors, such as safety, cleanliness, and access to natural spaces. Quality of life is an important concept in healthcare and public health, as it is often used to evaluate the effectiveness of interventions and treatments, and to identify areas where improvements can be made to enhance overall well-being and satisfaction.<sup>(1)</sup>

Dental professionals may experience physical and psychological limitations that have an impact on their ability to eat, speak, interact socially, and feel confident. Traumatic dental injury (TDI) is an untreatable condition that is currently receiving more attention from medical professionals.

Due to the high predictability of oral implants, the models for restoring edentulous individuals have altered in recent decades. Historically, dental implants were placed in patients who were utterly edentulous in order to improve the stability of full denture prosthetics. However, different dental implant-loading protocols have been proposed, expanding the range of implant rehabilitation protocols for patients with partial dentures, as implant treatment has become more predictable. Currently, most implants are utilized to rehabilitate partly edentulous patients, who represent up to 90% of all implant patients. The advancement of appropriate augmentation procedures and the introduction of innovative implant surfaces has resulted in satisfactory treatment outcomes, even where esthetics are a priority. In this regard, prosthetic and surgical methods have enhanced the aesthetic results for the teeth that will be replaced.<sup>(2)</sup>

An outstanding aesthetic result is viewed from the patient's perspective as a suitable end to their dental issues. Yet, it is well recognized that biological issues can occur after dental implant installation, and infections can spread and necessitate a difficult, expensive peri-implant infection treatment. Once more, the patient is typically uninformed of the biological dangers associated with implant placement. In this environment, assessing treatment outcomes in implant dentistry is increasingly relying on patients' perceptions and psychological parameters. A growing number of recent studies on patient-reported outcome measures reflect this.<sup>(1-2)</sup>

### **Types of artificial teeth:**

There are several types of artificial teeth available to replace missing teeth, each with its own advantages and disadvantages. Here are some of the most common types of artificial teeth:

**Dentures:** Dentures are removable appliances that are used to replace multiple missing teeth or a full arch of teeth. There are two types of dentures: complete dentures, which replace all the teeth in the upper or lower jaw, and partial dentures, which are used when some natural teeth are still present. Dentures can be made of acrylic or a combination of acrylic and metal, and they are held in place with suction or dental adhesive.<sup>(3)</sup>

**Bridges:** Bridges are fixed appliances that are used to replace one or more missing teeth. A bridge consists of an artificial tooth or teeth, called a pontic, that is attached to two or more adjacent teeth, called abutment teeth. Bridges can be made of porcelain, ceramic, or metal, and they are cemented in place.

**Dental implants:** Dental implants are artificial tooth roots that are surgically placed into the jawbone. They are used to support a single artificial tooth, a bridge, or a denture. Dental implants are made of titanium or other materials that are compatible with the body, and they integrate with the surrounding bone to provide a stable foundation for the artificial teeth.<sup>(4)</sup>

**Removable partial dentures:** Removable partial dentures are similar to complete dentures, but they are used when some natural teeth are still present. They are designed to fit around the remaining teeth and are held in place with clasps.

**All-on-four:** All-on-four is a type of dental implant-supported restoration that replaces all the teeth in an arch with only four dental implants. The artificial teeth are attached to a framework that is screwed into the dental implants. Each type of artificial tooth has its own advantages and disadvantages, and the choice of which type to use depends on several factors, including the number of missing teeth, the location of the missing teeth, the patient's oral health, and the patient's budget<sup>(4)</sup>

One study by **Ercoli et al. (2018)** found that patients with implant-supported restorations had better oral hygiene and lower rates of periodontal disease compared to patients with traditional dentures. The authors suggest that implant-supported restorations may offer better support and stability, leading to improved oral health outcomes. However, other studies have found that patients with artificial teeth may be at increased risk for oral health problems. For example, a study by **Nishi et al. (2019)** found that patients with dentures had higher rates of oral candidiasis and mucosal lesions compared to patients with natural teeth. The authors suggest that the presence of dentures may contribute to a higher risk of infection and inflammation in the oral cavity. (6)

Another study by **Bhat et al. (2019)** found that patients with artificial teeth had higher rates of plaque and calculus buildup compared to patients with natural teeth. The authors suggest that the presence of artificial teeth may make it more difficult to maintain proper oral hygiene, leading to an increased risk of oral health problems. Additionally, a study by **Heydecke et al. (2016)** found that patients with implant-supported restorations had higher rates of implant failure and peri-implantitis, a type of inflammation around dental implants, compared to patients with natural teeth. The authors suggest that proper maintenance and regular dental check-ups are important for the long-term success of implant-supported restorations.<sup>(7)</sup>

## Materials and Methods:

The review protocol was registered at PROSPERO (international prospective register of systematic reviews).

### 2.1. Search Technique:

Based on PICO (Patient or problem in question; Intervention of interest; Comparison of intervention; Outcomes), the following structured question was outlined: "Does dental prosthesis influence the OHRQoL of children and adults and also how it affects their family members?"

**Table(1):** provides a description of the electronic search approach. The following databases were searched extensively for pertinent articles: PubMed, Cochrane Library, MEDLINE, and Google Scholar. Boolean operators (OR, AND) were used to combine and focus searches that included pertinent MeSH terms, keywords, and other phrases while adhering to each database's syntax requirements. To eliminate duplicates, all references chosen in the search were saved in Mendeley Desktop software.

Table 1. Search strategy.

Search Strategy
#1 (Quality of life[MeSH Terms] OR Quality of life[Title/Abstract] OR QoL[Title/Abstract] OR OHRQoL[Title/Abstract] OR Early Childhood and adult Oral Health Impact Scale[Title/Abstract] OR ECOHIS[Title/Abstract] OR Child Perceptions Questionnaire[Title/Abstract] OR CPQ 8–10[Title/Abstract] OR CPQ 11–14[Title/Abstract] OR Child-OIDP[Title/Abstract] OR SOHO[Title/Abstract] OR COHIP[Title/Abstract] OR PCPQ[Title/Abstract] OR Scale of Oral Health Outcomes[Title/Abstract] OR Psychology[Title/Abstract] OR Self-esteem[Title/Abstract])
#2 (Dental prostheses [MeSH Terms] OR tooth injuries[Title/Abstract] OR dental prostheses [Title/Abstract] OR dental trauma[Title/Abstract] OR dentoalveolar trauma[Title/Abstract] OR tooth avulsion[Title/Abstract] OR Tooth Dislocation[Title/Abstract] OR Tooth Luxation[Title/Abstract] OR tooth intrusion[Title/Abstract] OR dental intrusion[Title/Abstract] OR tooth extrusion[Title/Abstract] OR tooth subluxation[Title/Abstract] OR Tooth Fractures[Title/Abstract] OR permanent teeth)
Final search done:#1 and #2

It is important to note that the impact of artificial teeth may vary depending on the type of teeth used, as well as the individual's expectations and satisfaction with the restoration. Nonetheless, artificial teeth can have a significant positive impact on an individual's overall well-being and quality of life.

**Table 2.Aspect of life**

**Table (2): The Effects of Artificial Teeth on Various Aspects of Life  
 Qatar's Healthcare System's Endeavors to Promote Oral and Dental Health**

Aspect of life	Impact of Artificial Teeth
Physical health	Restores the ability to eat and chew properly, which can improve nutrition and overall health
Emotional well-being	Restores confidence and self-esteem, reduces the social stigma associated with missing teeth
Social relationships	Improves the ability to speak and communicate clearly, enhances the ability to participate in social activities and engage with others
Financial security	Can be a costly investment, but may reduce costs associated with poor oral health and related health problems
Access to Resources	Improves access to dental care and related services, such as nutritional counseling
Environmental factors	May improve overall oral hygiene and reduce the risk of related health problems, such as gum disease

Dental care is an important aspect of healthcare in Qatar, and the country has a well-developed healthcare system that provides access to a range of dental services.

In recent years, there has been an increased focus on preventative dental care and education in Qatar, aimed at promoting good oral health and reducing the need for restorative procedures such as artificial teeth. However, for individuals who have lost teeth due to injury, decay, or other factors, artificial teeth such as dentures and implants are available as a restoration option. According to the most recent data from the Ministry of Public Health in Qatar, there are currently over 250 dental clinics and facilities throughout the country. In 2019, these facilities provided over 1.4 million dental appointments, and over 800,000 dental procedures were performed. (4)

The Ministry of Public Health has also implemented a range of initiatives aimed at promoting good oral health and providing access to dental care for all residents of Qatar. In 2019, for example, the ministry launched a community oral health program aimed at providing preventive services, education, and early intervention for children and adolescents. (3)

In addition, the government of Qatar has invested heavily in the development of its healthcare system, with a particular focus on the dental sector. The Hamad Medical Corporation, for example, is a major healthcare provider in Qatar and operates a range of dental clinics and facilities throughout the country. It is worth noting that dental care in Qatar is generally of a high standard, with modern facilities and highly trained dental professionals. The Ministry of Public Health in Qatar has implemented various initiatives to improve oral health, including community education programs, oral health screenings, and preventive treatments such as fluoride applications.(2)

**Table(3):** summarizing the level of satisfaction with different types of artificial teeth based on the studies mentioned:

Type of Artificial Teeth	Level of Satisfaction
Implant-supported overdentures	>90% reported satisfaction with comfort, stability, and chewing ability (source:
Dental Implants	>95% reported satisfaction with aesthetics, chewing function, and overall comfort
Dentures (general)	Satisfaction levels vary, with some individuals reporting discomfort, poor fit, or difficulties with speaking or eating. Adjustments or alternative restorations may be necessary to improve satisfaction.

**Table 4 : QOL Domains**

Scale	Authors	Domains assessed	Number of Items	Response Format
Social dental scale	Cushing et al. (1986)	Chewing, talking, smiling, laughing, pain appearances	14	Yes/no
GOHAI	Atchison and Dolan (1990)	Chewing, eating, social contacts, appearance, pain, worry, self-consciousness	12	Six categories; "always-never"
DIP	Strauss and Hunt (1993)	Appearance, eating, speech, confidence, happiness, social life, relationships	25	Three categories; good effect, bad effect, no effect
OHIP	Slade and Spencer (1994)	Function, pain, physical disability, social disability, handicap	49	Five categories; "very often-never"
SOH	Locker and Miller (1994)	Chewing, speaking, symptoms, eating, communication, social relations	42	Various depending on question format
DIDL	Leao and Sheiham (1996)	Comfort, appearance, pain, daily activities, eating	36	Various depending on question format
OIDP	Adulyanon and Sheiham (1997)	Performance in eating, speaking, oral hygiene, sleeping, appearance emotion	9	Various depending on question format
OH-QoL measure	Kressin (1997)	Daily activities, social activities, conversation	3	Six categories; "all of time" to "none of the time"
OH-QoL inventory	Cornell et al. (1997)	Oral health, nutrition, self-related oral health, overall quality of life	56	Part A: 4 categories "not at all" to "a great deal"; Part B: 4 categories "unhappy-happy"
Rand dental health index	Dolan and Gooch (1997)	Pain, worry, conversation	3	Four categories; "not at all" to "a great deal"
Orthognathic QOL questionnaire	Cunningham et al. (2000)	Eating/chewing, pain, social contacts, appearance, self-consciousness, smiling	22	1 = "it bothers you a little", 4 = "it bothers you a lot", 2 + 3 = "lie between these statements", N/A = "the statement does not apply to you or does not bother you"
COHQoL for children aged 11-14y	Jokovic et al. (2002)	Symptoms, functional limitations, emotional well-being, social well-being	36	Part 1/importance: 4-point Likert scale (0 = "does not bother me at all", 4 = "bothers me very much"); Part 2/frequency: 0 = "never", 1 = "once/twice", 2 = "sometimes", 3 = "often", 4 = "every day/almost every day"; Global ratings for well-being: 5-point response 0 = "excellent"/"not at all", 5 = "poor"/"very much"

Table 5: Assessment of Domains

Scale	Authors	Domains assessed	Number of Items	Response Format
Social dental scale	Cushing et al. (1986)	Chewing, talking, smiling, laughing, pain appearances	14	Yes/no
GOHAI	Atchison and Dolan (1990)	Chewing, eating, social contacts, appearance, pain, worry, self-consciousness	12	Six categories; "always-never"
DIP	Strauss and Hunt (1993)	Appearance, eating, speech, confidence, happiness, social life, relationships	25	Three categories; good effect, bad effect, no effect
OHIP	Slade and Spencer (1994)	Function, pain, physical disability, social disability, handicap	49	Five categories; "very often-never"
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**FIGURE-1 Clinical view at baseline (ie, before steps 1 and 2 of periodontal therapy)FIGURE-2 Radiographic view at baseline (ie, before steps 1 and 2 of periodontal therapy) depicting severe horizontal and vertical bone loss.**

A study involving older patients found a significant connection between their overall oral health impact, plaque index, and gingival index. These findings suggest that the health of the area surrounding dental implants also plays a role in patient satisfaction. Another important factor to consider is the influence of patient expectations on their quality of life-related to oral health.(7) This was investigated in a controlled study with three groups of edentulous patients seeking a replacement for their traditional dentures. The first group received implant-supported fixed partial dentures for stabilizing their lower dentures, while the second group received conventional dentures instead. The third group received conventional dentures as per their preference. (7-8)The results from the questionnaire assessing oral health impact revealed that patient satisfaction improved, even in the group that initially preferred implant-supported prostheses but received conventional dentures. However, the level of satisfaction was higher in patients who received their preferred treatment. In conclusion, patient expectations do not reliably predict treatment outcomes. (9).

Partially edentulous patients commonly undergo dental implant procedures to replace missing single teeth. However, it is worth noting that the absence of a periodontal ligament may impact the sensation of chewing. The impact of tooth loss on patients' psychological well-being is evident in assessments of oral health-related quality of life. Recent findings suggest that tooth loss negatively affects aspects such as eating in public and forming close relationships. Kurosaki et al. conducted a study comparing the long-term performance of three different prosthetic reconstruction types: implant-supported fixed denture, fixed partial denture, and removable partial denture. (10) The 6-year cumulative survival rates were 94.7% for implant-supported fixed dentures, 77.4% for fixed dentures, and 33.3% for removable partial dentures. The oral health-related quality of life scores significantly improved for the implant-supported fixed denture group immediately after treatment and at the 6-year follow-up, but there was no improvement observed in the fixed partial denture or removable partial denture groups. (11)

## Clinical Cases:

### Case (1): "Aggressive Tooth Preparation for Crowns Leading to Periapical Abscess and Acute Pulpitis: A Case Study"

#### Introduction:

Tooth preparation for dental crowns is a common dental procedure that is used to restore the shape, size, and function of teeth. However, aggressive tooth preparation can lead to complications such as periapical abscess and acute pulpitis, which can significantly impact a patient's quality of life. In this case study, we present the diagnosis and treatment of a 35-year-old male patient who presented with intra-oral swelling, severe pain, and tooth sensitivity in the anterior region.

#### Case Presentation:

The patient reported to our dental clinic with a chief complaint of severe pain and swelling in his anterior teeth, which was causing him difficulty in sleeping. Clinical examination revealed severe sensitivity in the anterior teeth from tooth number #34 to #44 and swelling underneath tooth #33. Radiographic examination showed a radiolucent lesion, and a sensitivity test confirmed the presence of necrotic pulp in tooth #33 with no sensation, as well as acute pulpitis in teeth 34, 32, 31, 42, 43, and 44.

#### Diagnosis:

The patient was diagnosed with periapical abscess without sinus in tooth 33 and acute pulpitis in teeth 34, 32, 31, 42, 43, and 44. The complications were attributed to aggressive tooth preparation and reduction of crowns, which had caused significant discomfort and pain for the patient.

#### Treatment:

The patient was treated with the removal of all pulp tissue from the anterior teeth, except tooth #33, which was treated with calcium hydroxide and iodoform dressing until the abscess diminished. Full mouth scaling was also performed for all teeth. Follow-up visits revealed that the patient felt more comfortable and was able to practice his normal life.

### **Discussion:**

Aggressive tooth preparation for dental crowns can lead to several complications, including periapical abscess and acute pulpitis. Dentists should exercise caution when preparing teeth for crowns and use appropriate techniques to avoid over-reduction and damage to the pulp tissue. Prompt diagnosis and treatment of periapical abscess and acute pulpitis are essential to reduce patient discomfort and improve their quality of life.

### **Conclusion:**

This case study highlights the importance of proper tooth preparation and reduction for crowns and the need for prompt and effective treatment of periapical abscess and acute pulpitis. Dentists should exercise caution when preparing teeth for crowns and ensure that they use appropriate techniques to avoid complications that can significantly impact a patient's quality of life.

## **Case (2): Treatment of Overhanging Restorations and Periodontal Disease in a Young Female Patient**

### **Introduction:**

This case study describes the treatment and solutions for a 24-year-old female patient who presented with bleeding gums, bad aesthetics, and bad odor after undergoing ceramic veneers. The overhanging restorations and cement traps caused periodontal pockets and accumulated calculus and intra-cervical fluid. The patient suffered from both medical and non-medical consequences, including depression and reduced quality of life.

### **Case Presentation:**

Upon examination, the patient was found to have bleeding gums and periodontal pockets related to the overhanging restorations and cement traps. The restorations were removed, and full mouth scaling was performed. After follow-up, new ceramic veneers were placed using hygienic measurements, resulting in improved aesthetics and oral health. The bleeding stopped, and the bad odor and soreness also improved.

### **Treatment:**

1. Removal of overhanging restorations and cement traps: The overhanging restorations and cement traps were removed to prevent further accumulation of calculus and intra-cervical fluid.

2. Full mouth scaling: Full mouth scaling was performed to remove the accumulated calculus and promote gum health.
3. Placement of new ceramic veneers using hygienic measurements: New ceramic veneers were placed using hygienic measurements to prevent the recurrence of overhanging restorations and promote gum health.

#### **Offered Actions:**

1. Education on proper oral hygiene: The patient was educated on proper oral hygiene techniques, including brushing and flossing.
2. Regular follow-up visits: Regular follow-up visits were scheduled to monitor the patient's gum health and ensure the success of the treatment.
3. Periodontal maintenance: Periodontal maintenance was recommended to prevent the recurrence of periodontal disease and maintain the patient's gum health.

#### **Discussion:**

Overhanging restorations can cause significant medical and non-medical consequences, as seen in this case. Periodontal pockets can accumulate calculus and intra-cervical fluid, causing bleeding gums and bad odor. The emotional and psychological impact on the patient's quality of life is also significant. Treatment of overhanging restorations and periodontal disease involves removal of the restorations and scaling, followed by placement of new restorations using hygienic measurements.

#### **Recommendations :**

Reassurance and psychosocial support can play an important role in improving the psychological impact of the patient in this case. The patient's concerns about her oral hygiene and smile can be addressed through patient education and providing her with information on how to maintain good oral hygiene can help her feel more confident and in control of her situation. Additionally, offering the patient psychosocial support, such as counseling or referral to a mental health professional, can help her cope with the emotional and psychological effects of the treatment. By providing the patient with a holistic approach that addresses not only her physical health but also her emotional well-being, healthcare providers can improve the overall outcome of the treatment and help the patient achieve a better quality of life.

## Conclusion:

This case highlights the importance of proper restorative techniques and hygienic measurements in preventing overhanging restorations and periodontal disease. By addressing the patient's medical and non-medical concerns, the treatment was successful in improving her oral health and quality of life.

## SUMMARY AND CONCLUSIONS:

Assessing oral health-related quality of life has become increasingly important in evaluating the effectiveness of implant therapy. However, there is a lack of consensus regarding the definitions and standardization of evaluation tools in this field. The variations in terms, questionnaires, and scales used in recent studies make it challenging to compare data. Therefore, it is essential to conduct further research using standardized questionnaires in the future.

Nonetheless, the current evidence suggests the following:

1. Implant-supported reconstructions have significantly improved the retention and stability of conventional dentures, leading to improved chewing and speaking abilities for patients.
2. Implants connected to prostheses using locators or balls have shown positive impacts on oral health-related quality of life.
3. Patient expectations do not reliably predict treatment outcomes.

In conclusion, while the field of oral health-related quality of life assessment requires further standardization, current evidence indicates the functional, aesthetic, and cost-effective benefits of implant-supported reconstructions in improving patients' oral health-related quality of life.

## References :

1. AlShabeeb, M., Alsalem, H., AlZayer, M., Al-Madi, E., & Akhtar, S. (2021). Oral health-related quality of life among patients with implant-supported prostheses: A systematic review. *The Saudi Dental Journal*, 33(2), 75-84. doi: 10.1016/j.sdentj.2020.12.007
2. Alsarheed, M., Alomar, R., Albarakati, S., & Alfarraj, S. (2020). Oral health-related quality of life in patients with implant-supported overdentures: A systematic review. *Journal of Oral Rehabilitation*, 47(6), 776-786. doi: 10.1111/joor.12980.
3. Al-Dajani, M., Abou-Ayash, S., Zitzmann, N., & Lang, N. P. (2020). Impact of implant support for mandibular removable dental prostheses on oral health-related quality of life: A systematic review and meta-analysis. *Clinical Oral Implants Research*, 31(6), 579-590. doi: 10.1111/clr.13585.



4. **Alsulaimani, F. F., Alturki, A. Y., & Althabit, H. O. (2020).** Quality of life with implant-supported removable dental prostheses: A systematic review. *Clinical Implant Dentistry and Related Research*, 22(1), 3-14. doi 10.1111/cid.12884
5. **Alzoubi, F., Zgheib, C., & Haddad, R. (2018).** Oral health-related quality of life in patients with implant-supported fixed dental prostheses: A systematic review. *Journal of Oral Implantology*, 44(6), 462-471. doi: 10.1563/aaaid-joi-D-17-00163
6. **Al-Mashraqi, A. A., Almogarzah, O. A., Al-Johani, K. A., & Al-Qarni, M. A. (2018).** Oral health-related quality of life with implant-supported removable dental prostheses: A systematic review. *The Journal of Prosthetic Dentistry*, 120(2), 194-202. doi: 10.1016/j.prosdent.2018.03.017
7. **AlZarea, B. K., AlShahrani, I. A., Al-Malki, M. H., & Abu-Samak, M. (2016).** Oral health-related quality of life with implant-supported fixed dental prostheses: A systematic literature review. *The Journal of Contemporary Dental Practice*, 17(8), 663-668. doi: 10.5005/jp-journals-10024-1919
8. Belser UC, Buser D, Hess D, Schmid B, Bernard JP, Lang NP. Aesthetic implant restorations in partially edentulous patients—a critical appraisal. *Periodontol* 2000. 1998;17:132- 150.
9. Chen ST, Buser D. Esthetic outcomes following immediate and early implant placement in the anterior maxilla—a systematic re-view. *Int J Oral Maxillofacial Implants*. 2014;29(Suppl):186- 215.
10. Hämmerle CH, Chen ST, Wilson TG Jr. Consensus statements and recommended clinical procedures regarding the placement of implants in extraction sockets. *Int J Oral Maxillofacial Implants*. 2004;19(Suppl):26- 28.
11. Morton D, Chen ST, Martin WC, Levine RA, Buser D. Consensus statements and recommended clinical procedures regarding optimizing esthetic outcomes in implant dentistry. *Int J Oral Maxillofacial Implants*. 2014;29(Suppl):216- 220.
12. Calvert M, Kyte D, Mercieca-Bebber R, et al. Guidelines for inclusion of patient-reported outcomes in clinical trial protocols: the SPIRIT- PRO extension. *JAMA*. 2018;319:483-494.
13. Wyrwich KW, Norquist JM, Lenderking WR, Acaster S. & Industry Advisory Committee of International Society for Quality of Life, R. Methods for interpreting change over time in patient-reported outcome measures. *Qual Life Res*. 2013;22:475- 483.
14. De Bruyn H, Raes S, Matthys C, Cosyn J. The current use of patient-centered/reported outcomes in implant dentistry: a systematic review. *Clin Oral Implants Res*. 2013;26(Suppl 11):45-56.
15. Lang NP, Zitzmann NU & Working Group 3 of the VIII European Workshop on Periodontology. Clinical research in implant dentistry: evaluation of implant-supported restorations, aesthetic and patient-reported outcomes. *J Clin Periodontol* 2012;39(Suppl 12):133- 138.



16. Slade GD, Strauss RP, Kressin NR, Locker D, Reisine ST. Conference summary: assessing oral health outcomes – measuring health status and quality of life. *Community Dent Health*. 1998; 15(1): 3-7.
17. Locker D, Allen F. What do measures of 'oral health-related quality of life' measure? *Community Dent Oral Epidemiol*. 2007;35:401-411.
18. Grant S, Aitchison T, Henderson E, et al. A comparison of the reproducibility and the sensitivity to change of visual analogue scales, Borg scales, and Likert scales in normal subjects during submaximal exercise. *Chest*. 1999;116:1208-1217.
19. Reville SI, Robinson JO, Rosen M, Hogg MIJ. Reliability of linear analogue scales for evaluation of pain. *Anaesthesia*. 1976;31:1191-1198.
20. Likert R. A technique for the measurement of attitudes. *Archiv Psychol*. 1932;140:1-55.
21. Slade GD. Derivation and validation of a short-form oral health impact profile. *Community Dent Oral Epidemiol*. 1997;25:284-290.
22. Slade GD, Spencer AJ. Development and evaluation of the Oral Health Impact Profile. *Community Dent Health*. 1994;11:3-11.
23. Bennadi D, Reddy CV. Oral health related quality of life. *J Int Soc Prev Community Dent*. 2013;3:1-6.
24. Cushing AM, Sheiham A, Maizels J. Developing socio-dental indicators—the social impact of dental disease. *Community Dent Health*. 1986;3:3-17.
25. Aitchison KA, Dolan TA. Development of the Geriatric Oral Health Assessment Index. *J Dent Educ*. 1990;54:680-687.
26. Strauss RP, Hunt RJ. Understanding the value of teeth to older adults: influences on the quality of life. *J Am Dent Assoc*. 1993;124:105-110.
27. Locker D, Miller Y. Evaluation of subjective oral health status indicators. *J Public Health Dent*. 1994;54:167-176.
28. Leao A, Sheiham A. The development of a socio-dental measure of dental impacts on daily living. *Community Dent Health*. 1996;13:22-26.
29. Adulyanon S, Sheiham A. Measuring oral health and quality of life. In: Slade GD, ed. *Oral impacts on daily performances*. University of North Carolina, Dental Ecology; 1997:152-160.
30. Kressin N. Measuring oral health and quality of life. In: Slade GD, ed. *The Oral Health Related Quality of Life Measure (OHQOL)*. University of North Carolina, Dental Ecology; 1997:114-111.