

Review

Temporomandibular Joint (TMJ) Replacement Affects Quality of Life: A Systematic Review and Synthesis of Clinical Trials

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Abstract: This systematic review aims to determine the impact of temporomandibular joint (TMJ) replacement on health-related quality of life. The review was reported following the Enhancing Transparency in Reporting the Synthesis of Qualitative Research (ENTREQ) guidelines. An electronic search using the Bielefeld Academic Search Engine was performed to identify primary studies reported in English and published up until November 2023. Ten reports fulfilled the inclusion criteria and were assessed according to the Critical Appraisal Skills Programme (CASP): Qualitative Studies Checklist. The overall research value of the studies ranged from high (dominant) to moderate. The synthesis of the results concerning TMJ replacement in severe degenerative disease showed an improvement in (1) quality of life, (2) pain intensity, (3) mastication efficiency, and (4) mandibular mobility. One study presented favorable outcomes for patients suffering from ankylosis.

Keywords: health-related quality of life; temporomandibular joint; temporomandibular joint disorders; temporomandibular joint dysfunction syndrome; mandibular prosthesis; maxillofacial prosthesis



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1. Introduction

The need for partial or complete replacement of the temporomandibular joint (TMJ) structures is a known problem in the field of maxillofacial surgery. Indications for total temporomandibular joint arthroplasty are situations where: (1) the joint has not developed, regardless of the cause; (2) joint tissues have been lost to the point where regeneration is not possible, for example, due to necrosis or neoplasm; (3) the joint tissues have undergone advanced degeneration and less invasive treatment options have been exhausted, including conservative treatment, intra-articular injections and arthroscopic methods [1–10].

TMJ arthroplasty is a surgical procedure that involves remodeling, realigning, or removing the joint surfaces and replacing it with implants. In the latter approach, the first implant is placed on the temporal bone and is intended to imitate the socket; the second one is attached to the stump of the mandible in the place of the condylar process. Their mutual movement is intended to allow for mobility that ensures effective food intake. Artificial

temporomandibular joints do not reproduce all natural movements of the mandible. During surgery, some of the muscle attachments may be lost, which further reduces jaw control.

Giving or restoring any mobility to the mandible is no longer a satisfactory result of treatment. Currently, the aim is to ensure the most physiological movements possible. The growing range of available materials allows for minimal friction, for example, by combining a milled metal artificial condylar process with a printed ultra-high molecular weight artificial polyethylene socket. Serial and individually designed prostheses are manufactured to achieve a variety of affordable and highly functional solutions. Attempts are made to meet the growing requirements by individually designing articular heads and sockets that are a mirror image of a healthy joint. In addition, surgeons can gain experience with bone and implant models before each procedure. Templates are also used to facilitate predictable and precise osteotomies. The challenge for the future is to digitally design the shape of bilaterally lost joints [11–18].

Temporomandibular joint replacement is a complex medical procedure with a high risk of failure. Possible intraoperative complications include opening the cranial cavity, damage to motor and sensory innervation, and injury to blood vessels and the parotid duct. Postoperatively, infection, rejection of implants, cerebrospinal fluid flow, salivary fistula, and facial disfigurement with unsightly scars may occur. Due to the above risks, temporomandibular joint prosthesis implantation is suitable for cases in which less invasive treatment methods have failed [19–23].

Whenever the temporomandibular joint undergoes arthroplasty when affected by ankylosis or malignancy, the only alternatives are palliative treatment and resection without reconstruction. Taking possible complications into account, it is more difficult to determine the limit of treatment that preserves the joint in degenerative disease. In the course of progressive damage to the cartilage on the joint surfaces, pain intensifies and may reach unbearable levels. As a consequence, they cause painful limitations in mandibular mobility, a decrease in mastication efficiency, and deteriorate health-related quality of life. Temporomandibular disorders in their early stages can be slowed and treated. In addition to multiple symptomatic treatment methods, there are currently attempts to regenerate articular cartilage. For this purpose, autologous transplants of blood products and stem cells contained in adipose tissue are used. Albeit degenerative disease can reach a severity that exceeds the possibilities of conservative and minimally invasive treatment. Then, TMJ replacement should be considered as a real alternative to more conservative pain relief approaches [6,24–32].

It is challenging to design randomized controlled trials for the diagnoses of ankylosis or malignancy due to the shortage of reasonable therapeutic alternatives. However, medical professionals who focus on curing the underlying disease should not ignore the patient's perspective. Despite formal recovery and prosthetic replacement, amputees can generally feel worse than before surgery or during palliative therapy. Therefore, research is needed on the quality of life of patients undergoing joint replacement, including the temporomandibular joint. The sense of mutilation and disfigurement as part of TMJ arthroplasty surgery must be questioned and verified by scientists [1–10].

Initial searches revealed that there are both original and review papers on TMJ replacement. Further searches confirmed that there are clinical trials on the subjective experiences of people who have had their TMJ replaced. However, no systematic reviews of health-related quality of life resulting from TMJ replacement, regardless of indication, have been identified. The lack of a suitable available synthesis was decided to be supplemented with this paper. Hence, this systematic review aims to determine whether temporomandibular joint replacement improves quality of life [26,33].

2. Materials and Methods

This systematic review was conducted and reported under the Enhancing Transparency in Reporting the Synthesis of Qualitative Research (ENTREQ) guidelines. The Prospective Register of Systematic Reviews (PROSPERO), maintained by the Center for

Reviews and Dissemination, University of York, registered the review protocol under the number CRD42023488503 [34].

2.1. Synthesis Methodology

Initial searches showed that sufficient material was available to conduct a first synthesis of the results and conclusions of primary studies on the changes in quality of life due to the TMJ replacement. Already when planning this review, methodological differences in the assessment of health-related quality of life and non-homogeneity in terms of diagnoses in the study groups were noticed. Therefore, quantitative syntheses were not possible, and it was decided to meta-aggregate qualitative data. This allowed the identification of a subgroup in which the next review could probably be summarized with a meta-analysis and subgroups that currently do not allow for any syntheses and require the publication of further primary studies before a new review attempt is made [35].

2.2. Approach to Searching

The searches were pre-planned to identify all sources from the searched medical databases that matched the keywords.

2.3. Inclusion Criteria

The inclusion and exclusion criteria recommended in the ENTREQ guidelines were applied, presented in Table 1. Studies in which patients underwent TMJ replacement with a prosthesis were included. Another criterion was the availability of at least two health-related quality of life assessments in the study report: (1) preoperative and (2) postoperative, which allowed for the assessment of change in this variable. All methods of assessing quality of life were allowed, including: (1) general quality of life; (2) pain intensity; (3) mastication efficiency; (4) mandibular mobility. Single patient cases, reports not available in English, and unpublished papers were not included.

Table 1. Eligibility criteria.

| Domain | Criteria for Inclusion | Criteria for Exclusion |
|------------------|---|--|
| Population | Subjects undergoing temporomandibular joint replacement | Cadaveric and animal research |
| Outcomes | Quality of life assessment | None |
| Language | English language | Incomplete content in the requested language |
| Year limits | No time frame restriction was applied | Not applicable |
| Publication type | Journal papers | Unaccepted preprints |
| Study type | Primary studies regardless of the presence of controls or case series | Less than 3 cases in a study group or series |

2.4. Data Sources

To ensure complete coverage, the searches were conducted using the Bielefeld Academic Search Engine (BASE; Universität Bielefeld, Bielefeld, Germany) in 11,377 medical databases indexing 347,900,868 documents. For the comprehensiveness of the search, an engine with a reach many times greater than that of typical medical databases such as PubMed, Scopus, or Web of Science was intentionally chosen. Another advantage of the BASE engine is free access, which ensures repeatability of the search. The final search was conducted on 25 November 2023 [36].

2.5. Electronic Search Strategy

The following query was submitted to the search engine: “quality of life” OR “life quality” tit:temporomandibular AND tit:(replace OR replacing OR replacement OR prosthesis OR prostheses OR prosthetic OR implant OR implants OR implantation).

2.6. Study Screening Methods

At the initial stage, the titles and abstracts were assessed by two independent researchers (K.C. and M.C.), and only items that were unanimously assessed as ineligible were rejected. Attempts were then made to obtain full-text reports, and an independent full-text review was performed (K.C. and M.C.) against the established inclusion and exclusion criteria. In case of disagreement between the judges' assessments, an attempt was made to reach a consensus, and if necessary, a third researcher (M.S.) had the decisive vote.

2.7. Appraisal

The rationale for and methods of appraising source reports consistent with the ENTREQ guidelines recommendation and implemented in this review are presented in Table 2. The Qualitative Studies Checklist developed as part of the Critical Appraisal Skills Program was applied. Appraisal was performed by two independent investigators (K.C. and M.C.). In cases of dispute, unblinded decisions were subjected to consensus, with a casting vote of a third judge (M.S.) if necessary [37].

Table 2. Appraisal rationale and approach.

| Rationale for Appraisal | Appraisal Approach |
|--------------------------------|--|
| Assessment of conduct | The research conduct was assessed based on verification of the correctness of (1) aim, (2) methodology, (3) design, (4) recruitment strategy, (5) data collection, and (6) relationship between the researcher and participants. |
| Assessment of reporting | The reporting method was assessed in the domains of (6) ethical issues consideration, (7) data analysis correctness, and (8) findings presentation clarity. |
| Assessment of findings utility | The assessment of (10) research value was made in the context of the objectives of the study, not the objectives of this review. |

2.8. Data Extraction

As part of the data collection process (K.C. and M.C.), the Results and Conclusions sections of the source reports were analyzed. Data relevant to this systematic review were identified without the use of automation tools and copied from electronic versions of reports into Google Workspace software 2024 (Google LLC, Mountain View, CA, USA; release 29 January 2024). The data were then tabulated, and the text was manually unified, preserving its original content but facilitating its reception in a synthesized form.

2.9. Study Comparison

The change in patients' quality of life as a result of temporomandibular joint replacement was compared between the studies in the table, taking into account: (1) indication for surgery (e.g., temporomandibular disorders, ankylosis, malignancy), (2) general quality of life assessment, (3) pain assessment, (4) masticatory efficiency assessment, (5) mandibular mobility assessment, and (6) skin appearance assessment. In addition to the above-predefined synthesis concepts, new concepts were allowed to be created when needed.

2.10. Derivation of Themes

The derivation process was deductive. It was hypothesized that replacement of the temporomandibular joint improves the quality of life of patients. The hypothesis was verified, taking into account the diagnosis and individual assessments, which in total provided a matrix of various clinical situations for which the results were provided. Then, taking into account the quality of the observational evidence, conclusions were formulated.

3. Results

3.1. Study Characteristics

The selection process of the studies included in the review (Figure 1) and their characteristics (Table 3) are presented below. A report by Connelly et al. was rejected at

the full-text stage due to inappropriate population. This study evaluated patients who underwent an articular disk allograft rather than TMJ replacement [1–10,38].

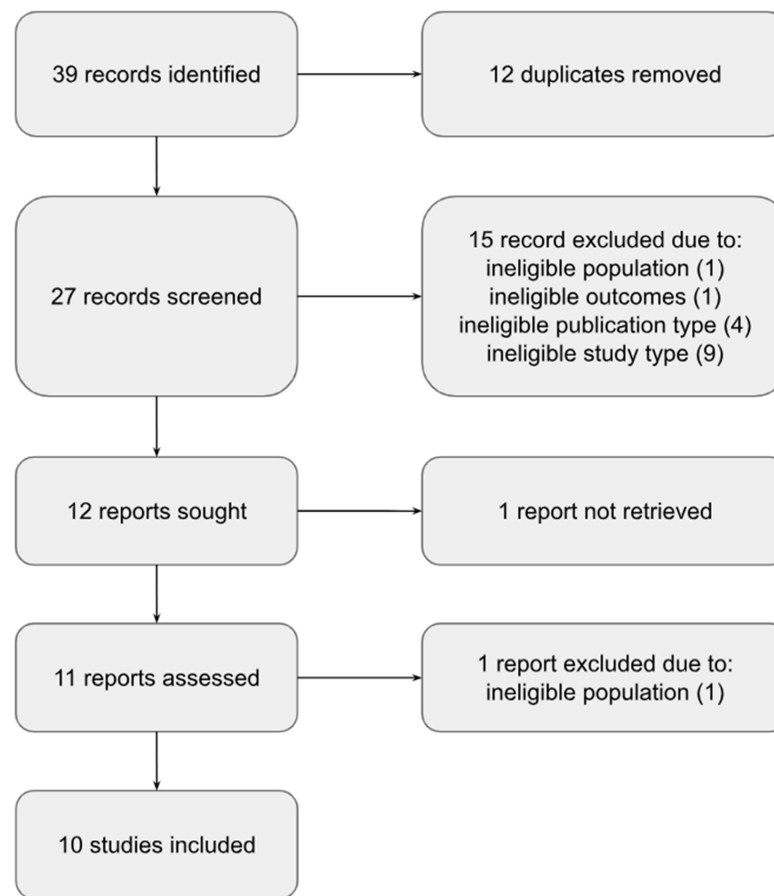


Figure 1. Flow diagram.

Table 3. Study characteristics.

| First Author, Publication Year | Country | Population | Number of Participants | Observation Time | Data Collection | Methodology | Analysis |
|--------------------------------|--------------|----------------------------------|------------------------|------------------|--|---|-----------------------------------|
| Zumbrunn Wojczyńska, 2021 [8] | Switzerland | Various | 14 | ≥6 months | Quality of life, pain intensity, mastication efficiency, mandibular abduction | Questionnaire, numerical scales, distance measurement | Mean differences |
| Gupta, 2020 [9] | Australia | Various | 36 | 12 months | Quality of life, pain intensity, mastication efficiency | Questionnaire, numerical scales | Mean differences, patient numbers |
| Sapin-de Brosse, 2020 [2] | France | Advanced TMJ osteoarthritis | 5 | 6 months | Quality of life, pain intensity, mandibular abduction | Descriptive assessment, distance measurement | Mean differences |
| Desai, 2018 [1] | South Africa | Wilkes IV–V internal derangement | 23 | 24 weeks | Quality of life, pain intensity, mastication efficiency, mandibular abduction, skin appearance | Numerical scales, distance measurement | Mean differences |

3.3. Results of Individual Studies

Table 5 presents a summary of treatment results in each of the assessed domains, for various diagnoses. The individual cells of the table contain synthesized statements developed by the authors of this review based on the source data. Due to the lack of division into subgroups based on diagnosis and therefore the lack of suitability for syntheses, the results of studies by Briceño et al., Elledge et al., Gupta et al., Kunjur et al., Linsen et al., and Zumbrunn Wojczyńska et al. were omitted [3,6–10].

Table 5. Results in individual diagnoses.

| Diagnosis | Quality of Life | Pain Intensity | Mastication Efficiency | Mandibular Mobility | Skin Appearance |
|------------------------------------|--|---|----------------------------|---|----------------------------------|
| Ankylosis | Gerbino: increased almost two and a half times | Gerbino: decreased by over one and a half times | Gerbino: more than doubled | Gerbino: increased almost three and a half times | Not specified |
| Severe temporomandibular disorders | Sapin-de Brosses: increased | Sapin-de Brosses: decreased | | Sapin-de Brosses: increased almost one and a half times | |
| | Desai: almost doubled | Desai: decreased almost threefold | Desai: Doubled | Desai: increased one and a half times | Desai: deteriorated almost twice |
| | Alakailly: increased | Alakailly: decreased | Alakailly: Increased | | |

3.4. Synthesis Output

Only one study was identified presenting isolated results for 12 patients who suffered from ankylosis. Therefore, it is not possible to compare these findings with the reports of other researchers. The synthesis of the results concerning severe temporomandibular disorders is presented in Table 6. The quality of the evidence was determined by providing the number of source studies, the total size of the examined sample, and the appraisal results for source studies for a given finding.

Table 6. Summary of findings in severe temporomandibular disorders studies.

| Domain | Number of Source Studies | Population | Total Number of Patients | Value of Studies on Appraisal | Findings |
|------------------------|--------------------------|--|--------------------------|-------------------------------|---|
| Quality of life | 3 [1,2,5] | Advanced TMJ osteo-arthritis; Wilkes IV–V internal derangement; End-stage TMJ dis-ease | 46 | High or moderate | Quality of life increases as a result of joint replacement |
| Pain intensity | 3 [1,2,5] | Advanced TMJ osteo-arthritis; Wilkes IV–V internal derangement; End-stage TMJ dis-ease | 46 | High or moderate | Pain decreases after joint replacement. |
| Mastication efficiency | 2 [1,5] | Wilkes IV–V internal derangement; End-stage TMJ dis-ease | 41 | High or moderate | Mastication efficiency increases with joint replacement. |
| Mandibular mobility | 2 [1,2] | Advanced TMJ osteo-arthritis; Wilkes IV–V internal derangement; | 28 | High | Mandibular mobility range increases approximately one and a half times as a consequence of joint replacement. |
| Skin appearance | 1 [1] | Wilkes IV–V internal derangement; | 23 | High | Skin appearance deteriorates due to the presence of a postoperative scar. |

4. Discussion

4.1. General Interpretation of Results

Therapeutic management of advanced TMJ degeneration is not unified. A wide range of treatment methods are taken into account, from systemic pharmacotherapy, through joint lavage, intra-articular drug administration, arthroscopy, to open surgery, including TMJ replacement. Arbitrary indication of the appropriate course of action seems to be impossible and, in the opinion of the authors of this paper, it should be based on an individual calculation of benefits and losses. Improvements in health-related quality of life as a result of minimally invasive intra-articular interventions have been repeatedly demonstrated. However, in cases where (1) the improvement is so short-lived that the need to repeat therapy is too burdensome or too expensive, (2) in patients who, for various reasons, cannot attend regular visits, and (3) in the event of unsatisfactory effectiveness of less invasive treatments, TMJ replacement appears to be justified [23–25,27,29,39].

This review demonstrated the reproducible results of improvements in various aspects of quality of life following TMJ replacement in patients with end-stage TMD. These results are of great importance for considering such an invasive therapeutic method in this indication. This means that advanced degeneration is another indication for TMJ replacement, next to ankylosis, necrosis, injuries, cancers and developmental disorders [1–10].

Therapeutic methods are usually assessed quantitatively by comparing the values of objective disease indicators with those before treatment or with those measured in a control group. In this context, TMJ replacement brings obvious benefits measured by the range of jaw mobility. However, from the patient's point of view, variables that cannot be fully objectified are also important, such as (1) the general assessment of the health-related quality of life, (2) the intensity of pain, (3) chewing efficiency or (4) the appearance of the skin of the operated area. This review provided insight into the availability of qualitative research covering the domains mentioned above [1–10].

Most of the included primary studies conducted in homogeneous groups in terms of diagnosis concerned patients with advanced degenerative TMJ disease. The available material seems to be sufficient to draw meta-aggregative conclusions in this diagnosis [1,2,5].

In this study, the overall assessment of quality of life, pain intensity, mastication efficiency, mandibular mobility, and skin appearance were synthesized. These assessments differ for methodological reasons and require detailed explanation to properly interpret the results.

4.2. Health-Related Quality of Life

Attempts to quantify health-related quality of life involve the use of dedicated questionnaires. In the case of temporomandibular dysfunctions, e.g., the Fonseca questionnaire, Oral Health Impact Profile-14 (OHIP-14), or Oral Behaviors Checklist (OBC-21) are used. They make it possible to determine ailments with output scores. However, these results are still an imperfect representation of the patient's subjective experience. In the case of a clinical trial, the results of the assessment carried out according to a given questionnaire are averaged for the group. In the next stage, the difference in means between the endpoints and the initial point of the study is determined, and in the case of controlled studies, between the endpoints of the study and control groups. The differences in means obtained in this way are synthesized in review works, including this one. Such highly transformed data blur the content of individual patients' complaints. Therefore, great caution should be exercised when interpreting health-related quality-of-life syntheses [39–42]. The collected material shows that replacing the temporomandibular joint improves quality of life. The results of the primary studies, homogeneous in terms of the diagnosis of advanced TMJ degeneration, are consistent on this point. Therefore, it seems that in situations where the possibilities of conservative treatment and less invasive surgery have been exhausted (injections, arthroscopic procedures, open surgery with preservation of the TMJ structures), implantation of a prosthesis improves the comfort of functioning.

4.3. Pain Intensity

The intensity of pain is also a subjective experience. In clinical trials, both descriptive and quantified assessments are collected. The visual analog scale (VAS) and numerical rating scale (NRS) are used for quantification. They differ in the assessment focused on illustrations (VAS) or numbers (NRS). Both typically have 11 points and range from 0 to 10. It is possible to refine the results by adopting a scale from 0 to 100. Unlike the various quality of life assessments, pain on VAS and NRS is easy to synthesize. The disadvantage of such an approach is, similarly to the quality of life, a high level of numerical transformation of data, which is qualitative in nature. Individual patients actually experience pain of various types (type, intensity, frequency, duration, presence of radiation, etc.), and attempts to define it on a scale are a significant distortion of the comprehensive description. The improvement shown in this synthesis must be interpreted as a difference in means, so some individual patients may even have experienced a significant deterioration [6,43–45].

TMJ pain can be a significant factor in worsening health-related quality of life. In patients suffering from articular pain, daily functioning is clearly impaired. The results collected unanimously indicate an improvement in the quality of life in patients with extreme temporomandibular disorders (TMDs). Therefore, TMJ replacement should be considered as an alternative to persistent or ineffective pain relief treatment.

4.4. Mastication Efficiency

Masticatory performance is partially assessed through TMJ health-related quality of life questionnaires. The separate assessment may be a description, a score on a scale, or a complex questionnaire. Thus, masticatory efficiency is another qualitative variable that can be expressed numerically, like quality of life and pain. Researchers may use VAS or NRS, with the consequences already discussed above [31].

Assessment of chewing quality is not routinely performed in TMDs therapy studies. It is taken into account in trials that focused on quality of life, especially when its assessment was carried out using an extensive questionnaire. Although the quality of chewing may depend on many factors, TMJ disorders significantly worsen it. The available material shows that in advanced TMDs, replacement of the TMJ or TMJs also results in improvement in this domain.

4.5. Mandibular Mobility

Mandibular mobility is usually measured objectively as the abduction amplitude. Additionally, measurements in other directions are possible, especially in the horizontal plane (protrusion and bilateral laterotrusion). The results are typically quantitative, given in millimeters, and most often concern only the maximum opening of the mouth. Typically, the points of contact between the incisal edges of the central incisors of both arches are taken as reference points. However, there is no consensus on how to measure this variable. The investigators evaluate pain-free maximal abduction, unassisted maximal abduction, and manually assisted maximal abduction. Of these three values, each subsequent one is more and more repeatable, but also causes increasing discomfort for the patient on examination. Taking into account the various methods to measure the range of mandibular abduction and the frequent omission of horizontal movements, which are crucial for mastication, for the purposes of this synthesis, mean differences were simplified to qualitative assessments of mandibular mobility [46–52].

The extent of mouth opening decreases significantly or is lost in the case of TMJ ankylosis. Advanced TMDs also manifest as limitations, but not loss, of mandibular mobility. The synthesis showed that in these cases the range of mandibular abduction increases approximately one and a half times as a result of replacing the TMJ with a prosthesis. While this value should be approached with caution due to the limited source material, the repeatability of improvement in this component of quality of life confirms the role of TMJ replacement as one of the possible therapies in highly advanced TMDs.

4.6. Skin Appearance

In the source studies, an attempt was made to assess the appearance of the skin with a postoperative scar compared to the skin before surgery and to place the result on a scale. The fact of deterioration in appearance seems to be both obvious and difficult to assess. This is a very individual issue, depending on the current condition of the skin (the presence of wrinkles and other defects), the way of combing the hair and wearing the beard, the presence of jewelry or tattoos, and the type of social activities performed [53–55].

4.7. Quantification of Qualitative Data

For all the above-mentioned subjective assessments expressed in the form of scales or questionnaires, the problem of transforming qualitative data into quantitative data is common. When interpreting a single patient assessment, the following should be taken into account: (1) the possibility of misunderstanding the question (e.g., What is “mandibular mobility”?); (2) difficulty in determining the severity (e.g., “I don’t know what my mastication efficiency is”); (3) differences between the assessments of different patients (e.g., “The scar doesn’t bother me, so I will rate skin appearance as high”); (4) low repeatability of assessments (e.g., “I would assess it differently today”); (5) the influence of other factors on the assessment (e.g., “When I have a hard day at work, my TMJ seems to hurt more”). Averaging the ratings of different patients, on the one hand, allows you to look for trends and indicate outlines, but on the other hand, it masks important information. When averaging the assessments of the change in quality of life over time, we can, for example, observe a general upward trend, while overlooking the fact that every 10th patient worsened significantly [39–45].

4.8. Diagnoses

In a significant part of the primary studies, patients with various indications for TMJ arthroplasty were included in the study group. These included severe degenerative disease, ankylosis, malignancy, condylar agenesis, and trauma. These are such different disease entities that the collective assessment of the overall quality of life and its individual aspects is questionable. Therefore, the authors of this study did not decide to synthesize the results of the mixed-diagnoses studies. However, they are available in the summary characteristics table and have also been assessed. In the most general terms, they showed improvement with treatment.

4.9. Limitations

An obvious limitation of this review was the exclusion of reports published in local languages by using an English-only query. The searches were based on a search engine with one of the largest ranges. Theoretically, the Google Scholar engine would be more appropriate, but it prevents searches strictly limited by the content of the query. Instead, it provides an excessive number of results, of which only an unspecified portion matches the query. Despite the selection of a broad-scope engine, records with poor indexation, which may include other thematically consistent studies, were omitted preassembly.

The important parameter of unilateral or bilateral joint replacement was not taken into account as the source studies combined results for patients in both groups. However, it should be remembered that, both in cases of ankylosis and end-stage degeneration, only the diseased joints are replaced.

Another reason for the heterogeneity of the source studies was the use of various types of joint prostheses. In future reviews on a larger research sample, consideration should be given to taking this parameter into account.

Some of the primary studies were conducted in groups that were not homogeneous in terms of diagnosis, making meta-aggregation of the data contained therein impossible. The results of this review showed that there is some primary research on changes in quality of life following joint replacement in patients with advanced temporomandibular degeneration. Therefore, future reviews for the discussed diagnosis should be planned taking

into account the following methodological improvements: (1) expanding the searches to include grey literature and non-English sources and (2) attempting to identify quality of life assessment questionnaires common to several studies, which may contribute to a quantitative meta-analysis. For the remaining diagnoses, there is insufficient material to justify conducting syntheses, hence the need to plan and carry out further primary research [1–10].

To the authors' knowledge, this review is the first to synthesize the results of research on changes in quality of life resulting from TMJ replacement. Pinpointing the right moment for the first synthesis on a given topic is always a challenge and carries the risk of obtaining too few results. In the course of this review, only the TMJ degenerative disease subset allowed meta-aggregation. The conclusions of all primary studies in this subgroup turned out to be consistent, strengthening the evidence [1–10].

5. Conclusions

There is preliminary synthetic qualitative evidence supporting (1) an improvement in quality of life (3 high to moderate quality studies on a total of 46 patients), (2) a decrease in pain intensity (3 high to moderate quality studies on a total of 46 patients), (3) an increase in masticatory efficiency (2 high to moderate quality studies on a total of 41 patients), (4) and an increase in mandibular mobility (2 high quality studies on a total of 28 patients) after temporomandibular joint replacement in severe degenerative disease. One study presented favorable outcomes in temporomandibular joint ankylosis cases.

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