

# Prosthetic rehabilitation with removable dentures positively influences quality of life in older patients: a systematic review

A reabilitação protética com próteses removíveis influencia positivamente a qualidade de vida de pacientes idosos: uma revisão sistemática

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## Abstract

**Objective:** This systematic review assessed the effects of prosthetic rehabilitation with removable dentures on oral health-related quality of life (OHRQoL) in older adults. **Methods:** A comprehensive electronic search was conducted in the PubMed/MEDLINE, Web of Science, and Cochrane databases to identify randomized clinical trials and prospective clinical studies. The included studies evaluated the effects of prosthetic rehabilitation on OHRQoL in patients whose mean age was > 60 years. The interventions included complete dentures, implant-retained overdentures, and removable partial prostheses, with a minimum follow-up period of 1 month after prosthetic rehabilitation. Patient-reported outcome measures, specifically OHRQoL, were the primary outcome. Risk of bias was assessed using the Cochrane RoB 2 tool for randomized clinical trials and the ROBINS-I tool for prospective clinical studies. **Results:** Eleven articles were considered eligible for the systematic review. The findings indicated that removable dentures improved various OHRQoL domains, mainly functional limitations and physical and psychological disabilities. Retention, stability, comfort, speech, and masticatory efficiency were significantly better with implant overdentures than complete dentures, leading to higher patient satisfaction and OHRQoL. **Conclusions:** This systematic review suggests that prosthetic rehabilitation with removable dentures has a positive influence on OHRQoL in older patients. The findings highlight the beneficial impact of implant overdentures and fixed adhesive prostheses for enhancing functional outcomes and patient satisfaction. PROSPERO Registration: CRD42020209175.

**Keywords:** aged; dental prosthesis; quality of life; denture, overlay; dental prosthesis, implant-supported; systematic review.

## Resumo

**Objetivo:** Esta revisão sistemática avaliou os efeitos da reabilitação protética com próteses removíveis na qualidade de vida relacionada à saúde bucal (QVRSB) em pacientes idosos. **Metodologia:** Foi realizada uma pesquisa eletrônica abrangente nas bases de dados United States National Library of Medicine/ Medical Literature Analysis and Retrieval System Online — PubMed/MEDLINE, Web of Science e Cochrane para identificar ensaios clínicos randomizados (ECR) e estudos clínicos prospectivos. Os artigos selecionados tiveram como foco avaliar o efeito da reabilitação protética na QVRSB em indivíduos com média de idade superior a 60 anos. As intervenções descritas incluíram próteses totais, *overdentures* suportadas por implantes e próteses parciais removíveis, com acompanhamento mínimo de um mês após a reabilitação protética. As medidas de resultados relatadas pelos pacientes, especificamente QVRSB, foram o desfecho primário. O risco de viés foi avaliado com a ferramenta Cochrane RoB 2 para ensaios clínicos randomizados e a ferramenta ROBINS-I para estudos clínicos prospectivos. **Resultados:** Os resultados mostraram que as próteses dentárias removíveis melhoraram vários domínios da QVRSB, principalmente limitações funcionais e físicas e deficiências psicológicas. A retenção, estabilidade, conforto, fala e eficiência mastigatória foram significativamente melhores com *overdentures* sobre implantes do que com próteses totais, levando a maior satisfação do paciente e QVRSB. **Conclusões:** Esta revisão sistemática sugere uma influência positiva da reabilitação protética com próteses removíveis na QVRSB em pacientes idosos. As descobertas destacam o impacto benéfico das *overdentures* sobre implantes e das próteses adesivas fixas para melhorar os resultados funcionais e a satisfação do paciente. Registro PROSPERO: CRD42020209175. **Palavras-chave:** idosos; prótese dentária; qualidade de vida; revestimento de dentadura; prótese dentária fixada por implante; revisão sistemática.

## INTRODUCTION

Tooth loss leads to functional limitations and has a psychological impact, significantly affecting self-esteem.<sup>1</sup> Global population aging and extraction-based dental practice in former decades have resulted in many edentulous people.<sup>2</sup> Since edentulism damages oral health-related quality of life (OHRQoL),<sup>3</sup> oral rehabilitation is needed to restore masticatory and speech function and esthetic appearance.<sup>4</sup>

A study evaluating responses from the 2010 National Oral Health Survey<sup>5</sup> found prevalences of 78.2% and 68.7% for the use of and need for dental prosthesis, respectively, among older Brazilians (65-74 years). Tooth loss damages OHRQoL,<sup>6</sup> leading to chewing problems, dietary restrictions, speech difficulties, loss of facial support, decreased occlusal vertical dimension, and esthetic impairment.<sup>7</sup> However, it remains unclear whether oral prosthetics can alleviate these effects and which type of dental prosthesis yields the greatest improvement in quality of life.

Various treatments have been proposed to replace lost teeth and restore function and esthetics in partially or completely edentulous patients.<sup>6</sup> Conventional complete dentures supported by the mucosa are the traditional and most common method of oral prosthetic rehabilitation for edentulous patients. Other options include removable or fixed partial prostheses and osseointegrated implants with overdentures.<sup>8</sup> Patients seek solutions to compensate for tooth loss and regain their self-esteem. Thus, enhancing quality of life is a primary treatment goal of prosthetic oral rehabilitation, and patient satisfaction is relevant to treatment quality and the success of the most appropriate therapy in each clinical situation.<sup>9</sup>

OHRQoL is a comprehensive patient-centered measurement system for assessing the impact of oral problems and pathologies on individual well-being. Evaluating patient satisfaction with professional dental interventions is essential.<sup>6</sup> The Oral Health Impact Profile (OHIP), a popular tool for OHRQoL analysis, consists of from 12 to 53 subjective questions. These multidimensional questionnaires are quick to administer and score, allowing assessment of the severity, extent, and prevalence of negative impacts through a single application or application at different time points.<sup>10</sup> The OHIP has been translated into many languages, and its validity and internal consistency have been confirmed in a number of countries.<sup>11</sup> The Geriatric Oral Health Assessment Index is another frequently used OHRQoL scale among older patients.<sup>12</sup>

Evaluating the effectiveness of oral rehabilitation for tooth loss is crucial to improving its intended masticatory, speech, and esthetic effects.<sup>1</sup> Previous systematic reviews have investigated differences in OHRQoL and patient satisfaction with

dental prosthetics.<sup>13-15</sup> However, the influence of prosthesis type (complete dentures, implant overdentures, and removable partial dentures) on the quality of life of older patients remains unclear. Thus, this systematic review assessed the effects of prosthetic rehabilitation with removable dentures on the OHRQoL of older patients.

## METHODS

### Eligibility criteria and data sources

This study addressed the following research question: Does prosthetic rehabilitation with removable dentures improve the quality of life of older patients? This question was formulated using the PICOS format for clinical inquiries: Population — older adults; Intervention — prosthetic rehabilitation (complete dentures, removable partial dentures, and overdentures); Comparison — before and after prosthetic treatment; Outcome — OHRQoL; and Study design — randomized controlled trials (RCTs) and prospective clinical studies.

The inclusion criteria, defined prior to the search, were RCTs and prospective clinical studies with at least 1 month of follow-up that assessed the effects of prosthetic rehabilitation on the OHRQoL of older adults (mean age > 60 years). The interventions of interest were complete dentures, implant overdentures, and removable partial dentures. Articles that did not meet these criteria, such as animal or *in vitro* studies, case series or reports, letters, reviews, or experimental laboratory studies, were excluded.

The study adhered to Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines.<sup>16</sup> The review protocol was registered in PROSPERO (CRD42020209175).

### Search strategy and selection process

A comprehensive search strategy was used to identify potential articles. The PubMed/MEDLINE, Web of Science, and Cochrane Library databases were searched through April 2023 without restrictions on language or year of publication, using various keyword combinations (Older person OR Elderly OR Aged) AND (dentures OR prosthodontic rehabilitation OR dental prosthesis OR dental prostheses) AND (quality of life OR quality OR OHRQoL) (Appendix File 1). The references of the included articles were also manually searched.

The screening process consisted of three stages: title, abstract, and full-text screening. Two independent reviewers performed each step in duplicate. Initially, the titles were screened to eliminate unrelated publications and reviews. Subsequently, the abstracts of selected articles were the screened, and eligible

full-text articles were retrieved. A specially designed data extraction form was applied to the full-text articles to confirm eligibility and collect relevant data. In cases of disagreement about an article's eligibility, a third reviewer was consulted for further discussion until consensus was reached.

### Data collection process and data items

The data were collected in Microsoft Excel using a pre-formatted database, where they were organized and tabulated with respect to author, publication year, study purpose and design, patient age, sample size, follow-up period, prosthetic rehabilitation type, OHRQoL questionnaire, and summary of the results.

Patient-reported outcome measures, specifically OHRQoL, were the primary outcome. The secondary outcome was the effects of different prosthetics on OHRQoL. All results for both outcome domains were investigated in each study.

### Risk of bias assessment

The Cochrane risk of bias tool (RoB 2)<sup>17,18</sup> was used for RCTs, while the ROBINS-I tool<sup>19,20</sup> was used for prospective clinical

studies. Thus, the studies' methodological quality and risk of bias of were comprehensively assessed.

## RESULTS

Only 75 of the 738 initial search results were selected for full-text analysis, of which 67 were excluded: 36 were not RCTs or prospective studies, 29 did not involve a population of older adults, and 2 were study proposals. Three additional articles were included from the manual reference search, resulting in 11 studies for the systematic review. The study selection flowchart is presented in Figure 1.

The studies were conducted between 2003 and 2020. All patients underwent prosthetic rehabilitation and responded to a questionnaire assessing post-treatment OHRQoL. Table 1<sup>12,21-30</sup> presents the characteristics of the included studies. The sample size ranged from 25 to 102 patients, and the mean patient age ranged from 62 to 74.2 years. Only 1 study included > 100 participants.<sup>26</sup> Each article underwent a thorough assessment, and relevant data were extracted and tabulated. Four articles were RCTs,<sup>23,24,29,30</sup> and the remaining

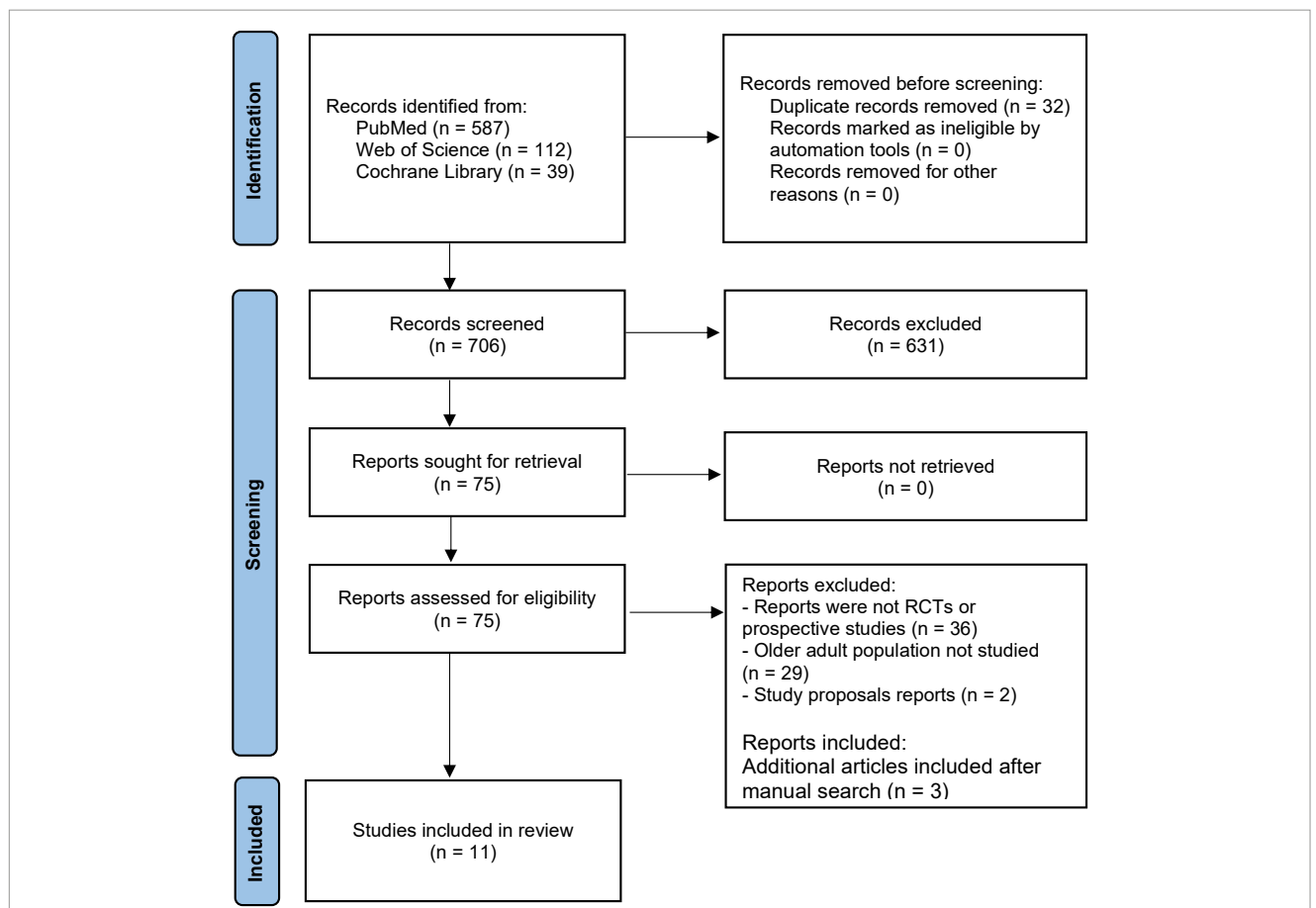


FIGURE 1. PRISMA study selection flowchart.

TABLE 1. Detailed data from the included studies.

Study	Study type	Number of patients (available for follow up)	Age	Outcomes evaluated	Follow-up	Interventions	OHRQoL questionnaire	Summary of OHRQoL-related results
<b>Shrestha et al.</b> <sup>21</sup>	Prospective	100 (88)	Mean age 67 years (range 53–91 years)	OHRQoL of edentulous patients, and associations with age and sex	Once during pretreatment (at the first visit) and once 8 weeks post-treatment	CD	OHIP-EDENT	CD improved the OHRQoL of edentulous patients.
<b>Figueredo et al.</b> <sup>22</sup>	Prospective	20 (20)	≥ 65 years (mean 77.6)	Self-perceived masticatory ability and oral OHRQoL in frail and nonfrail elders	Before and 2 months after prosthetic treatment	CD	OHIP-EDENT	CD insertion may play an important role in improving mastication and OHRQoL in older people, especially frail elders.
<b>McKenna et al.</b> <sup>23</sup>	RCT	65 (44) 67 (45)	Aged ≥ 65 years (mean 74.1 in RPD group and 73.9 in SDA group)	OHRQoL of 2 different tooth replacement strategies for partially dentate older patients	Baseline, 1, 6, 12, and 24 months after treatment	RPD and functionally oriented treatment based on SDA concept.	OHIP-14	Both treatment groups reported improvements in OHIP-14 scores at 24 months. Patients in the SDA group maintained improved OHRQoL scores throughout the 24-month study period. For the RPD group the initial improvement in OHRQoL score began to diminish after 6 months.
<b>McKenna et al.</b> <sup>24</sup>	RCT	65 (44) 67 (45)	Aged ≥ 65 years	Impact on OHRQoL measured using the short form of the OHIP-14	Baseline, 1, 6, and 12 months after treatment	RPD and SDA (resin bonded bridgework)	OHIP-14	Treatment based on the SDA concept achieved significantly better results than treatment based on RPD in terms of impact on OHRQoL 12 months after treatment intervention.
<b>Sun et al.</b> <sup>25</sup>	Prospective	50 (50)	55–74 years (mean 62)	Masticatory efficiency and OHRQoL in patients rehabilitated with implant-retained mandibular overdentures.	1 month before the mandibular CD were anchored to the osseointegrated implants, and 6 months after anchoring.	IOD treatments	OHIP-49	Implant-retained mandibular overdentures can significantly improve patients' masticatory efficiency and OHRQoL.

Continue...

TABLE 1. Continuation.

Study	Study type	Number of patients (available for follow up)	Age	Outcomes evaluated	Follow-up	Interventions	OHRQoL questionnaire	Summary of OHRQoL-related results
<b>Awad et al.</b> <sup>26</sup>	Prospective	203 (102)	Mean age 68.8 years	OHRQoL in patients who received mandibular 2-implant overdentures and CD.	Baseline and 6 months post-treatment	Mandibular CD or IOD compared to CD	OHIP-20	Mandibular 2-implant overdentures are more likely than CD to improve OHRQoL for edentulous patients.
<b>Dable et al.</b> <sup>12</sup>	Prospective	114 (63)	Mean age 69.41 years (range 60–82)	Problems of completely edentulous patients and their relationship with quality of life.	Before and 6 months after treatment	CD	GOHAI	There was a significant change in the quality of life in older patients after their prosthodontic rehabilitation, though self-rated general health did not show any significant improvement.
<b>Shigiti et al.</b> <sup>27</sup>	Prospective	35 (27)	Mean age 67.65 years (range 60–84)	OHRQoL among patients with complete dentures	Before and 1 month after denture insertion	CD	GOHAI	Patients reported improvement in functional changes after the placement of CD.
<b>Ellis et al.</b> <sup>28</sup>	Prospective	49 (40)	Mean age 74.2 years (range 55–85)	Patient satisfaction and OHRQoL of patients restored with complete conventional or duplicate dentures	Before and 1 month after delivery of new dentures	CD	OHIP-20	The provision of new CD resulted in an overall improvement in OHRQoL and satisfaction.
<b>Awad et al.</b> <sup>29</sup>	RCT	30 30	Mean age 69.3 years (range 65–75)	Older patients' satisfaction and OHRQoL with mandibular two-implant overdentures and complete dentures	Before treatment and 2 months after delivery	Mandibular 2-IOD and CD	OHIP-49 OHIP-EDENT	Mandibular two-IOD combined with maxillary CD provided better function and OHRQoL than CD alone.
<b>Heydecke et al.</b> <sup>30</sup>	RCT	30 (25) 30 (30)	Mean age 69.4 years (range 65–75)	OHRQoL of seniors who received either mandibular implant overdentures or complete dentures	Before treatment, and 2 and 6 months after delivery of the dentures (OHIP-20). The SF-36 was only completed at baseline and 6 months of follow-up	Mandibular IOD or CD	OHIP-20 and SF-36 general health questionnaire	Senior patients who received mandibular implant overdentures 6 months prior had significantly better oral health status than patients who received CD.

OHRQoL: Oral Health-Related Quality of Life; CD: Complete Dentures; OHIP-EDENT: OHIP for Edentulous Patients; RPD: Removable Partial Dentures; SDA: Shortened Dental Arch; OHIP: Oral Health Impact Profile; RCT: Randomized controlled trials; IOD: Implant Overdenture; GOHAI: Geriatric Oral Health Assessment Index; SF-36: Short Form Health Survey.

7 were prospective clinical studies.<sup>12,21,22,25-28</sup> Due to substantial variations in methodology, study design, and outcome, a meta-analysis was impossible.

Two of the studies compared fixed restoration groups (based on the shortened dental arch concept) to removable restoration groups,<sup>23,24</sup> and 3 compared complete denture groups to overdenture groups.<sup>26,29,30</sup> One study evaluated OHRQoL in patients rehabilitated with implant-retained mandibular overdentures,<sup>25</sup> while the others examined the impact of oral health-related conditions on patient quality of life before and after prosthetic treatment with complete dentures.<sup>12,21,22,27,28</sup> Nine studies used a version of the OHIP questionnaire to assess the effects of oral conditions on quality of life. The post-treatment follow-up period ranged from 4 weeks to 2 years.

Dental prostheses usually improved most OHRQoL domains,<sup>12,21-30</sup> mainly functional limitations, physical disabilities, and psychological aspects. Implant overdentures were more likely to improve OHRQoL than complete dentures.<sup>26,29,30</sup> Fixed adhesive prostheses were associated with significantly higher mean OHRQoL scores than removable partial dentures.<sup>23,24</sup> Mandibular two-implant overdentures effectively improved OHRQoL in edentulous patients.

The risk of bias between and within studies is presented in Figures 2A and 2B (RCTs) and Figures 2C and 2D (prospective clinical studies). There was a high risk of bias in 1 of the 4 RCTs. There was no risk of bias in any domain in 2 of the prospective clinical studies.

## DISCUSSION

This systematic review focused on the effects of prosthetic rehabilitation on OHRQoL in older patients. Removable dentures were associated with improvements across various OHRQoL domains. Several clinical studies assessed patient satisfaction with speech, masticatory function and efficiency, and the need for follow-up appointments for different dental prosthesis types, including complete dentures, removable or fixed partial prostheses, and implant overdentures.<sup>12,21-30</sup>

Studies analyzing OHRQoL in patients undergoing prosthetic oral rehabilitation with complete dentures showed improvements in most domains, especially functional limitations, physical disabilities, and psychological aspects.<sup>12,21,22,27,28</sup> There was significant improvement in chewing, social interaction, satisfaction with appearance, and worry/embarrassment. Sex differences were found, with women usually experiencing better outcomes, possibly due to a greater acceptance of prosthetic treatment.<sup>12</sup> However, the least affected domains

were physical pain and social disability, which was likely due to the challenges of adapting to complete dentures.

Three studies compared OHRQoL between implant overdentures and complete dentures.<sup>16,29,30</sup> Implant overdentures significantly increased OHRQoL in these studies, including psychological and social domain improvement. This might be due to enhanced masticatory efficiency with implant-retained prostheses.<sup>26,29,30</sup> Cross-sectional studies and systematic reviews involving adult patients have reported similar findings, highlighting drastic improvements in retention, stability, comfort, speech, and masticatory efficiency with overdentures, thus increasing patient satisfaction and OHRQoL.<sup>11,13</sup>

Two studies compared functional treatment with fixed adhesive prostheses to removable partial dentures in partially edentulous older adults.<sup>23,24</sup> Functional treatment with fixed prostheses resulted in significantly higher OHRQoL scores than removable partial dentures. This might be attributed to the similarity of fixed dentures to natural teeth, since patients do not need to remove the prosthesis, thereby simulating a more realistic experience of natural teeth. However, a recent study reported different findings, ie, that both restoration types improved OHRQoL, but removable dental prostheses resulted in greater improvements than fixed restorations in various dimensions.<sup>10</sup>

Older people frequently report tooth loss, and dental prostheses can improve esthetics, speech, psychological aspects, and masticatory efficiency. Such improvements affect dietary intake and nutritional status, improve social acceptance, and directly influence quality of life.<sup>23,27</sup>

Nine of the 11 studies used versions of the OHIP questionnaire, which provides information on self-perceived oral health. Due to being more time-consuming, the OHIP-49/53 was used in only 1 study. Three studies used the OHIP-20, 2 used the OHIP-14, and 3 used the OHIP-EDENT, a specialized version for edentulous patients. Two studies used the Geriatric Oral Health Assessment Index to assess quality of life and treatment satisfaction.

Many patients show little interest in implant treatment despite the proven benefits of implant-retained overdentures, such as residual alveolar bone preservation, improved masticatory efficiency, and increased overdenture retention and stability. This reluctance may be due to the fear of surgical interventions and/or their associated costs.

Most of the included studies were conducted at specialized dental prosthesis clinics. It would be beneficial to investigate the outcomes in primary care settings, where most of the general population is treated.<sup>8</sup> Additionally, using different instruments to assess OHRQoL, such as



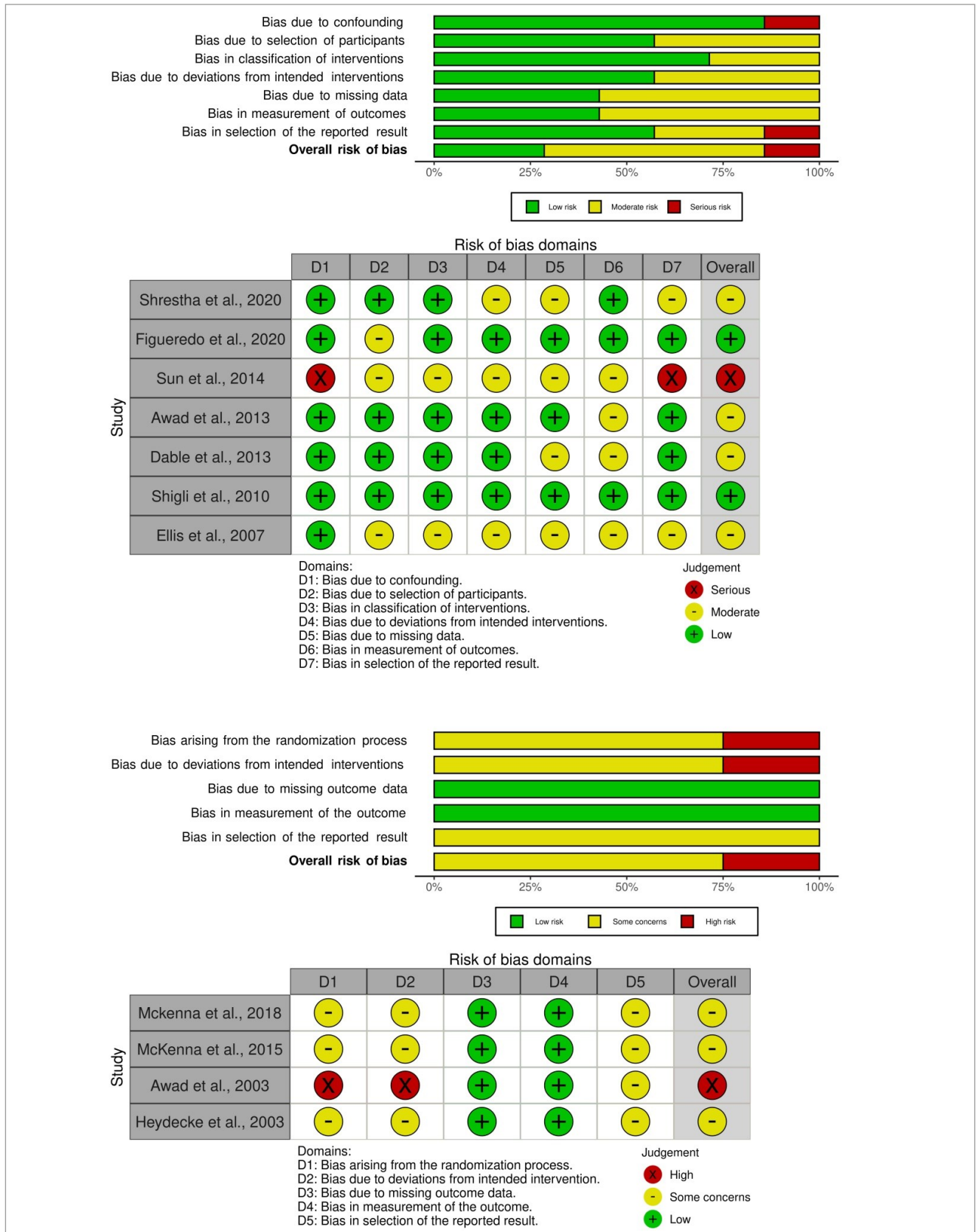


FIGURE 2. A, risk of bias graph. B, risk of bias summary for randomized controlled trials (RCTs) based on the revised Cochrane risk of bias tool for RCTs (RoB 2). C, risk of bias graph. D, risk of bias summary for prospective clinical studies based on the ROBINS-I tool.

other OHIP versions, makes it difficult to compare studies. Cultural and international differences may also influence various aspects of OHRQoL with respect to dental prostheses.<sup>26</sup>

The limitations of the included studies were the relatively short follow-up periods and small sample sizes. Longer follow-up is necessary to assess the long-term impact of different prostheses on OHRQoL. The data should be interpreted with caution due to the small sample sizes. These findings should serve as a basis for further studies in the field.

## CONCLUSION

The evidence from the included studies indicates that prosthetic rehabilitation with removable dentures positively affects OHRQoL in older patients. However, patients with complete dentures experience lower OHRQoL than those with overdentures. Moreover, functional treatment with fixed adhesive prostheses yielded significantly higher mean OHRQoL scores than removable partial denture treatments.

These findings underscore the relevance of dental prosthesis type for OHRQoL in older patients.

## Conflict of interest

The authors declare no conflicts of interest.

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## Authors' contribution

JAB: conceptualization, data curation, formal analysis, investigation, methodology, project administration, software, validation, visualization, writing – original draft, writing – review & editing. WLOR: methodology, validation, visualization, writing – original draft, writing – review & editing. RGL: conceptualization, data curation, formal analysis, investigation, methodology, project administration, software, supervision, validation, visualization, writing – original draft, writing – review & editing.

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