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Review Article

Are mandibular overdentures retained by one implant associated with higher patient satisfaction? A systematic review

Overdentures mandibulares retidas por um implante estão associadas a maior satisfação do paciente? Uma revisão sistemática

¿Las overdentures mandibulares retenidas por un solo implante están asociadas con una mayor satisfacción del paciente? Una revisión sistemática

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Abstract

Objective: Aimed to evaluated if mandibular overdentures retained by one implant provide the same level of patient satisfaction when compared to those retained by two implants. Methods: This systematic review was registered on PROSPERO (CRD42024585772) and follows the PRISMA checklist. The PICO was: "*Are mandibular overdentures retained by one implant associated with higher patient satisfaction compared to those retained by two implants?*", "P" were patients using mandibular overdentures, "I" was the using of mandibular overdentures retained by a one implant, "C" was the using of overdentures retained by two implants and "O" was patient satisfaction. The search was carried out in PubMed/Medline, Cochrane Library and Embase databases. RoB 2 scale was used to determine the risk of bias and GRADE approach was used to assessed the quality of the evidence. Results: The databases search retrieved 2408 studies. After removing duplicates and reading the full five studies were considered eligible. According to RoB 2 scale there was a predominance of low risk of bias among the seven domains. According to the GRADE approach no large effect was observed in the included studies. Conclusion: The use of one implant in mandibular overdenture is a clinical approach viable with good patient satisfaction.

Descriptors: Implant-Retained Dental Prosthesis; Edentulous Mandible; Patient Satisfaction; Overdenture; Systematic Review.

Resumo

Objetivo: Avaliar se sobredentaduras mandibulares retidas por um implante proporcionam o mesmo nível de satisfação do paciente quando comparadas àquelas retidas por dois implantes. Métodos: Esta revisão sistemática foi registrada no PROSPERO (CRD42024585772) e segue a lista de verificação PRISMA. O PICO foi: "Sobredentaduras mandibulares retidas por um implante estão associadas a maior satisfação do paciente em comparação com aquelas retidas por dois implantes?", "P" foram pacientes usando sobredentaduras mandibulares, "I" foi o uso de sobredentaduras mandibulares retidas por um implante, "C" foi o uso de sobredentaduras retidas por dois implantes e "O" foi a satisfação do paciente. A busca foi realizada nas bases de dados PubMed/Medline, Biblioteca Cochrane e Embase. A escala RoB 2 foi utilizada para determinar o risco de viés e a abordagem GRADE foi utilizada para avaliar a qualidade da evidência. Resultados: A busca nas bases de dados recuperou 2.408 estudos. Após a remoção de duplicatas e a leitura completa, cinco estudos foram considerados elegíveis. De acordo com a escala RoB 2, houve predominância de baixo risco de viés entre os sete domínios. De acordo com a abordagem GRADE, nenhum efeito significativo foi observado nos estudos incluídos. Conclusão: O uso de um implante em sobredentadura mandibular é uma abordagem clínica viável com boa satisfação dos pacientes.

Descritores: Prótese Dentária Fixada por Implante; Satisfação do Paciente; Qualidade de Vida; Mandíbula Edêntula; Revisão Sistemática**.**

Resumen

Objetivo: Evaluar si las overdentures mandibulares retenidas por un solo implante proporcionan el mismo nivel de satisfacción del paciente en comparación con las retenidas por dos implantes. Métodos: Esta revisión sistemática fue registrada en PROSPERO (CRD42024585772) y sigue la lista de verificación PRISMA. La pregunta PICO fue: "¿Se asocian las overdentures mandibulares retenidas por un solo implante con una mayor satisfacción del paciente en comparación con las retenidas por dos implantes?". La "P" correspondió a pacientes que utilizan overdentures mandibulares; la "I", al uso de overdentures retenidas por un solo implante; la "C", al uso de overdentures retenidas por dos implantes; y la "O", a la satisfacción del paciente. Se realizó una búsqueda en las bases de datos PubMed/MEDLINE, Cochrane Library y Embase. Se utilizó la herramienta RoB 2 para evaluar el riesgo de sesgo y el enfoque GRADE para valorar la calidad de la evidencia. Resultados: La búsqueda en las bases de datos recuperó 2408 estudios. Tras eliminar los duplicados y realizar la lectura completa, cinco estudios fueron considerados elegibles. Según la herramienta RoB 2, se observó un predominio de bajo riesgo de sesgo en los siete dominios evaluados. De acuerdo con el enfoque GRADE, no se observó un efecto significativo en los estudios incluidos. Conclusión: El uso de un solo implante para la retención de overdentures mandibulares es una opción clínica viable que ofrece una buena satisfacción del paciente.

Descriptores: Prótesis Dental Retenida sobre Implantes; Mandíbula Edéntula; Satisfacción Del Paciente; Sobredentadura; Revisión Sistemática.

INTRODUCTION

Rehabilitation with mandibular overdentures is a challenge since the musculature and the anatomy of the lower ridge, and lingual spreading will influence the retention of the prosthesis during masticatory and functional movements[1,2]. Studies report[3] that the addition of dental implants improves the biomechanics of mandibular overdentures with a good prognosis and higher longevity[3].

In cases with a lack of sufficient bone for planning implant retained fixed prostheses the mandibular overdentures are an excellent treatment option for completely edentulous patients in terms of function and chewing ability, satisfaction and comfort for users[4,5]. Mandibular overdentures can be designed with two implants between the mental foramina with mechanical and biological results described in the literature as satisfactory[6-8].

However, other studies[9-11] states that rehabilitation with one implant located in the midline will have an immensely better prognosis, stability, satisfaction and comfort compared to the use of a total mandibular prosthesis[10,11]. There is no consensus in the literature regarding patient satisfaction with one implant-retained total mandibular rehabilitations[12,13]. This is due to the scarcity of randomized controlled clinical trials with long follow-up periods of one implant-retained overdentures to aid clinical decision-making.

Patient satisfaction is still a constant question when it comes to carrying out interventions of this kind[12] and are related to patients' initial expectations, maintenance of dental prostheses, implant failures or fractures, psychological and emotional expectations, treatment performance, sociodemographic factors and perception of cost-benefit[14-18]. Therefore, this systematic review aimed to evaluate if mandibular overdentures retained by one implant provide the same level of patient satisfaction when compared to those retained by two implants.

MATERIAL AND METHOD

- *Protocol and registration*

This systematic review was registered in the Prospective International Register of Systematic Reviews (PROSPERO) (CRD42024585772) and followed the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist[19].

- *Focused question*

The PICO strategy for this systematic review[20] was through the following question: "*Are mandibular overdentures retained by one implant associated with higher patient satisfaction compared to those retained by two implants?*" where the "P" are patients using mandibular overdentures, the "I" are overdentures retained by a one implant, the "C" are overdentures retained by two implants and the "O" are the outcome was patient satisfaction.

- *Eligibility criteria*

The inclusion criteria for the studies are: 1 - randomized controlled clinical trials 2 - studies that evaluated the use of one implant compared to two implants in mandibular overdentures, 3 - studies that had a follow-up of at least 12 months and 4 - studies that included tools to evaluate satisfaction measured on the Visual Analogue Scale (VAS), or on the Oral Health Impact Profile-EDENT (OHIP-EDENT questionnaire) – only the satisfaction domain or other questionnaire that evaluate patient satisfaction. The exclusion criteria for the studies will be: 1 - in vitro, computational or animal model studies, 2 - non-randomized retrospective and prospective clinical studies, 3 - studies that did not have a control group or intervention group, 4 - studies with a sample of less than twenty patients, 5 - studies that had a clinical follow-up period of less than twelve months, 6 - studies that evaluated mini implants.

- *Search strategy*

The search was carried out in the PubMed/Medline, Cochrane Library and Embase databases by two authors independently (A.L.V.S., M.V.P.) using specific keywords linked by boolean operators for each database. Grey literature searches were carried out at Google Scholar and SciElo.

- *Selection process*

The findings are saved and exported to the Rayyan software[21] when duplicates will be removed and the title and abstract of each study will be read to select the studies to be read in full based on the inclusion and exclusion criteria. After selecting the studies, all the selected studies will be read in full. After the studies have been selected and included by the first researcher (A.L.V.S.), the search and inclusion strategy will be redone by another independent reviewer (J.M.L.G.) and if there are any disagreements, these will be resolved by a third reviewer (E.P.P.). The Kappa index will be calculated to measure the agreement between the researchers during the selection and inclusion of the studies[22].

- *Data collection process*

After reading all the selected studies in full, data extraction was carried out independently by two authors (A.L.V.S., J.P.J.O.L.). One author (A.L.V.S.) was responsible for collecting the qualitative and quantitative information and the other author (J.P.J.O.L.) reviewed all the information collected.

- *Additional analysis*

Independently, two authors (A.L.V.S., J.M.L.G.) used version 2 of the Cochrane Risk of Bias Tool to determine the risk of bias[23]. The quality

of the evidence was assessed using the Grading of Recommendations, Assessment, Development and Evaluation (GRADE) approach and a Kappa test was carried out for the agreement of the searches between the evaluators.

RESULTS

- Search strategy

The database search retrieved 2408 studies: 1060 from PubMed/Medline, 899 from Embase, 449 from the Cochrane Library. After removing duplicates (n = 1083), 1325 studies remained. A total of 8 studies were selected for reading in full and, after reading these studies, five studies[14-18] were considered eligible for this review, with one study[24] being excluded because they have the same authors and included patients. Thus, the most recently published studie[21] was included. Another study[25] was excluded for having a follow-up period of only 6 months. In addition, the study of Singh et al.[26] was excluded because comparing one piece and two pieces implant design. The results of the search strategy can be seen in Figure 1. The Kappa index between the researchers was 0.89, showing high agreement between the researchers.

- *Study characteristics*

All the included studies are randomized controlled trials[14-18] and a total of 228 patients. One hundred eleven patients belong to the group that received only one implant to support the mandibular overdenture and the other 117 patients received two implants to support the mandibular overdenture. The mean age was 65,36 years old (average 40 to 80years). All patients received titanium-based implants with a length of at least 10 millimeters from different commercial brands: Straumann® n = (171 patients), Nobel Biocare (n = 36) and Conexão® (n = 21). The following attachments were used as retainers: Retentive Anchor (n = 130), Ball Attachments (n = 150), LOCATOR (n = 34) and O'ring (n = 31). The studies by Patil and Seow[17] and Kronstrom et al.[15] used the immediate loading technique and the other studies[14,16,18] used delayed loading. Table 1 shows all the data extracted.

The studies by Bryant et al.[14] and Kronstrom et al.[15] had five years of clinical follow-up, the first used the VAS to assess patient satisfaction and the second used the Oral Health Impact Profile-EDENT (OHIP-EDENT) questionnaire. In the first study[14], although the VAS satisfaction scores were widely dispersed, the differences between the groups were statistically insignificant. There were also no statistically significant associations between the number of maintenance events and the number of implants. In the second study[15], it was concluded that patient satisfaction scores increased significantly when compared to baseline values and remained high for both groups, with no significant differences. The scores were significantly high in 1, 3 and 5 years but were not significantly different between 1, 3 and five years.

The studies by Paleari et al.[16], Patil and Seow[17] and Walton et al.[18] had a 1-year clinical follow-up. The first study[16] concluded that both groups evaluated showed a significant increase in overall patient satisfaction in all periods evaluated except for the one implant group after 12 months of follow-up. The satisfaction levels of the one-implant group and the two-implant group were similar at the beginning of the study, at 3 and 6 months, but the two-implant group showed higher satisfaction levels than the one-implant group at 12 months. The second study[17] concluded that the mean VAS score for the level of patient satisfaction favored the group with two implants, but not in a statistically significant way. And the third study[18] concluded that the VAS score was the same in both groups after 1 year of clinical follow-up, with no difference in satisfaction.

The main findings of this systematic review were that four of the included studies showed no difference between the groups evaluated[14-18] and only one study[16] indicated that the use of two implants led to greater patient satisfaction. No study indicated that the intervention group led to higher satisfaction rates than the control group.

- *Risk of bias*

According to the bias scale Version 2 of the Cochrane risk-of-bias tool for randomized trials (RoB 2), there was a predominance of low risk of bias among the seven items assessed in the randomized clinical trials. The area with the highest risk of bias included the professional/patient blinding stage, where the studies by Patil and Seow[17], and Bryant et al.[14] presented a high risk of bias because they did not use any form of blinding, either of the professional or the patient.

The study by Paleari et al.[16] presented an uncertain risk of bias as it did not include information on professional and patient blinding in its work. There were some concerns about the randomization process in the study by Walton et al.[18] as it is reported that randomization was carried out, but the randomization method adopted is not described and the study by Patil and Seow[17] does not report how allocation concealment was carried out, but only mentions that it was done. The studies by Kronstrom et al.[15] and Bryant et al.[14] did not report how blinding the outcome assessor was carried out, presenting an uncertain risk.

The five included studies presented a low risk of incomplete outcome, since all lost data were reported and justified a low risk of selective outcome since all had the adopted protocol available and all studies seem to be free of other sources of bias. The data relating to the classification of the risk of bias using the Cochrane Risk of Bias tool, version 2.0 (RoB 2.0) is available in Table 2, the graph of the risk of bias analysis is available in Figure 2.

Figure 1 - Search Strategy Used in Databases

Databases	Search Strategy
PubMed	("Implants"[All Fields] OR "implant"[All Fields] OR "mandibular overdentures"[All Fields] OR "dental implants"[All Fields] OR "implant-supported dental prosthesis"[All Fields] OR "overdentures"[All Fields] OR "mandibular overdentures"[All Fields] OR "edentulous mandible"[All Fields] OR "edentulous jaw"[All Fields]) AND ("one"[All Fields] OR "1 implant"[All Fields] OR "Single-implant overdentures"[All Fields] OR "single implant"[All Fields] OR "single-implant denture"[All Fields] OR "one implant"[All Fields] OR ("one"[All Fields] AND ("drug implants"[MeSH Terms] OR ("drug"[All Fields] AND "Implants"[All Fields]) OR "drug implants"[All Fields] OR "implant"[All Fields] OR "embryo implantation"[MeSH Terms] OR ("embryo"[All Fields] AND "implantation"[All Fields]) OR "embryo implantation"[All Fields] OR "implantation"[All Fields] OR "implant s"[All Fields] OR "implantability"[All Fields] OR "implantable"[All Fields] OR "implantables"[All Fields] OR "implantate"[All Fields] OR "implantated"[All Fields] OR "implantates"[All Fields] OR "implantations"[All Fields] OR "implanted"[All Fields] OR "implanter"[All Fields] OR "implanters"[All Fields] OR "implanting"[All Fields] OR "implantion"[All Fields] OR "implantitis"[All Fields] OR "Implants"[All Fields]) AND ("denture, overlay"[MeSH Terms] OR ("denture"[All Fields] AND "overlay"[All Fields]) OR "overlay denture"[All Fields] OR "overdenture"[All Fields] OR "overdentures"[All Fields])) OR "single-implant denture"[All Fields] OR "single implant retained overdenture"[All Fields]) AND ("two-implants"[All Fields] OR "two-implant"[All Fields] OR "two-implants"[All Fields] OR "two-implant"[All Fields] OR ("two"[All Fields] AND ("drug implants"[MeSH Terms] OR ("drug"[All Fields] AND "Implants"[All Fields]) OR "drug implants"[All Fields] OR "implant"[All Fields] OR "embryo implantation"[MeSH Terms] OR ("embryo"[All Fields] AND "implantation"[All Fields]) OR "embryo implantation"[All Fields] OR "implantation"[All Fields] OR "implant s"[All Fields] OR "implantability"[All Fields] OR "implantable"[All Fields] OR "implantables"[All Fields] OR "implantated"[All Fields] OR "implantates"[All Fields] OR "implantations"[All Fields] OR "implanted"[All Fields] OR "implanter"[All Fields] OR "implanters"[All Fields] OR "implanting"[All Fields] OR "implantion"[All Fields] OR "implantitis"[All Fields] OR "Implants"[All Fields]) AND ("denture, overlay"[MeSH Terms] OR ("denture"[All Fields] AND "overlay"[All Fields]) OR "overlay denture"[All Fields] OR "overdenture"[All Fields] OR "overdentures"[All Fields])) OR "2 implants"[All Fields] OR ("two"[All Fields] AND ("drug implants"[MeSH Terms] OR ("drug"[All Fields] AND "Implants"[All Fields]) OR "drug implants"[All Fields] OR "implant"[All Fields] OR "embryo implantation"[MeSH Terms] OR ("embryo"[All Fields] AND "implantation"[All Fields]) OR "embryo implantation"[All Fields] OR "implantation"[All Fields] OR "implant s"[All Fields] OR "implantability"[All Fields] OR "implantable"[All Fields] OR "implantables"[All Fields] OR "implantate"[All Fields] OR "implantated"[All Fields] OR "implantates"[All Fields] OR "implantations"[All Fields] OR "implanted"[All Fields] OR "implanter"[All Fields] OR "implanters"[All Fields] OR "implanting"[All Fields] OR "implantion"[All Fields] OR "implantitis"[All Fields] OR "Implants"[All Fields]) AND ("retain"[All Fields] OR "retained"[All Fields] OR "retaining"[All Fields] OR "retains"[All Fields]) AND ("denture, overlay"[MeSH Terms] OR ("denture"[All Fields] AND "overlay"[All Fields]) OR "overlay denture"[All Fields] OR "overdenture"[All Fields] OR "overdentures"[All Fields]))) AND ("outcomes"[All Fields] OR "outcome"[All Fields] OR "satisfaction"[All Fields] OR "sucessfull"[All Fields] OR "sucess"[All Fields] OR "bone loss"[All Fields] OR "survival"[All Fields] OR "clinical survival"[All Fields] OR "impact"[All Fields])
Chocrane	("Implants" OR "implant" OR "mandibular overdentures" OR "dental implants" OR "implant-supported dental prosthesis" OR "overdentures" OR "mandibular overdentures" OR "edentulous mandible" OR "edentulous jaw") AND ("one" OR "1 implant" OR "Single-implant overdentures" OR "single implant" OR "single implant denture" OR "one implant" OR "one implant for overdenture" OR "single-implant denture" OR "single implant retained overdenture") AND ("two implants" OR "two implant" OR "two-implants" OR "two-implant" OR "two implants for overdentures" OR "2 implants" OR "two implants retained overdentures") AND ("outcomes" OR "outcome" OR "satisfaction" OR "sucessfull" OR "sucess" OR "bone loss" OR "survival" OR "clinical survival" OR "impact"). in All Text - (Word variations have been searched)
Embase	('implants'/exp OR 'implants' OR 'implant'/exp OR 'implant' OR 'dental implants'/exp OR 'dental implants' OR 'implant-supported dental prosthesis'/exp OR 'implant-supported dental prosthesis' OR 'overdentures' OR 'mandibular overdentures' OR 'edentulous mandible'/exp OR 'edentulous mandible' OR 'edentulous jaw'/exp OR 'edentulous jaw') AND ('one'/exp OR 'one' OR '1 implant' OR 'single-implant overdentures' OR 'single implant' OR 'single implant denture' OR 'one implant' OR 'one implant for overdenture' OR 'single-implant denture' OR 'single implant retained overdenture') AND ('two implants' OR 'two implant' OR 'two-implants' OR 'two-implant' OR 'two implants for overdentures' OR '2 implants' OR 'two implants retained overdentures') AND ('outcomes'/exp OR 'outcomes' OR 'outcome'/exp OR 'outcome' OR 'satisfaction'/exp OR 'satisfaction' OR 'sucessfull' OR 'sucess' OR 'bone loss'/exp OR 'bone loss' OR 'survival'/exp OR 'survival' OR 'clinical survival' OR 'impact'/exp OR 'impact')
SciELO	Portuguese: ("Revestimento de Dentadura" OR "um implante" OR "dois implantes" OR "1 implante" OR "2 implantes" OR "satisfação") Spanish: ("Prótesis de Recubrimiento" OR "uno implante" OR "dos implantes" OR "1 implante" OR "2 implantes" OR "satisfacción") English: ("Overdenture" OR "one implant" OR "two implants" OR "1 implant" OR "2 implants" OR "satisfaction")
Google Scholar	Portuguese: ("Revestimento de Dentadura" OR "um implante" OR "dois implantes" OR "1 implante" OR "2 implantes" OR "satisfação") Spanish: ("Prótesis de Recubrimiento" OR "uno implante" OR "dos implantes" OR "1 implante" OR "2 implantes" OR "satisfacción") English: ("Overdenture" OR "one implant" OR "two implants" OR "1 implant" OR "2 implants" OR "satisfaction")

Table 1 - Data extracted

Author (year)	Number of patients	Patients mean age	Attachments
de Resende et al, 2023	total (n = 47) I (n = 23) C (n = 24)	65.4 years old	Ball attachments
Patil; Seow, 2021	total (n = 52), I (n = 26), C (n = 26)	40 - 80 years old	Locator
Kronstrom et al, 2017	total (n = 36), I (n =17), C (n= 19)	53.3 years old	Ball attachments
Bryant; Walton; MacEntee, 2015	total (n = 62), I (n = 29), C (n = 33)	67 years old	Ball attachments
Policastro et al, 2019	total (n = 21), I (n = 11), C (n = 10)	64.4 years old	O-ring
Walton; Glick; Macentee, 2009	total (n = 86), I (n = 42), C (n = 44)	66 years old	Retentive Anchor
de Resende et al, 2021	total (n = 47), I (n = 23), C (n = 24)	65.4 years old	Ball attachments
Kronstrom et al, 2010	total (n = 36), I (n =17), C (n= 19)	53.3 years old	Ball attachments
Alsourori et al, 2018	total (n = 24), I (n =12), C (n= 12)	59.6 years old	Locator
Alsourori et al, 2023	total (n = 24), I (n =12), C (n= 12)	59.6 years old	Locator

Table 2 - Risk of bias

Lupi et al., 2016	
Random sequence generation	Low risk (Coin toss)
Allocation concealment	High risk
Blinding of participants/personnel	Unclear
Blinding of outcome assessor	Low risk (Blinding performed)
Incomplete outcome data	Low risk (No loss)
Selective outcome reporting	Low risk (Protocol available)
Other sources of bias	Low risk (Study free from other sources)
Schmidt et al., 2018	
Random sequence generation	Low risk (Number tables)
Allocation concealment	Low risk (Performed before selection)
Blinding of participants/personnel	Unclear
Blinding of outcome assessor	Low risk (Blinding performed)
Incomplete outcome data	Low risk (Missing data reported)
Selective outcome reporting	Low risk (Protocol available)
Other sources of bias	Low risk (Study free from other sources)
Wohlfahrt et al., 2019	
Random sequence generation	Low risk (Lottery)
Allocation concealment	Unclear
Blinding of participants/personnel	Unclear risk (Performed, but not specified)
Blinding of outcome assessor	Unclear risk (Not reported)
Incomplete outcome data	Low risk (Missing data reported)
Selective outcome reporting	Low risk (Protocol available)
Other sources of bias	Unclear risk (Insufficient information)
Tapia et al., 2019	
Random sequence generation	Low risk (Randomization tables)
Allocation concealment	Low risk (Opaque envelopes)
Blinding of participants/personnel	Low risk (Blinding performed)
Blinding of outcome assessor	Low risk (Blinding performed)
Incomplete outcome data	Low risk (Missing data reported)
Selective outcome reporting	Low risk (Protocol available)
Other sources of bias	Low risk (Appears free from other sources)
John et al., 2015	
Random sequence generation	Unclear risk (Performed but not reported)
Allocation concealment	Unclear
Blinding of participants/personnel	Unclear
Blinding of outcome assessor	Unclear risk (Not reported)
Incomplete outcome data	Low risk (Missing data reported)
Selective outcome reporting	Low risk (Protocol available)
Other sources of bias	Unclear risk (Insufficient information)
Al Ghazal et al., 2017	
Random sequence generation	Low risk (Lottery)
Allocation concealment	High risk (Process did not conceal allocation)
Blinding of participants/personnel	Unclear
Blinding of outcome assessor	Unclear risk (Not reported)
Incomplete outcome data	Low risk (Missing data reported)
Selective outcome reporting	Low risk (Protocol available)
Other sources of bias	Unclear risk (Insufficient information)
Persson et al., 2010	
Random sequence generation	Low risk (Computer)
Allocation concealment	Unclear
Blinding of participants/personnel	Low risk (Blinding performed)
Blinding of outcome assessor	Low risk (Blinding performed)
Incomplete outcome data	Low risk (Missing data reported)
Selective outcome reporting	Low risk (Protocol available)
Other sources of bias	Low risk (Appears free from other sources)
Renvert et al., 2009	
Random sequence generation	Low risk (Computer)
Allocation concealment	Unclear
Blinding of participants/personnel	Low risk (Blinding performed)
Blinding of outcome assessor	Low risk (Blinding performed)
Incomplete outcome data	Low risk (Missing data reported)
Selective outcome reporting	Low risk (Protocol available)
Other sources of bias	Low risk (Appears free from other sources)

Table 2 Continued - Risk of bias

Karring et al., 2005	
Random sequence generation	Unclear risk (Not reported)
Allocation concealment	Unclear
Blinding of participants/personnel	Low risk (Blinding performed)
Blinding of outcome assessor	Low risk (Blinding performed)
Incomplete outcome data	Low risk (No loss)
Selective outcome reporting	Low risk (Protocol available)
Other sources of bias	High risk (Smokers vs Non-smokers design)
Sahm et al., 2011	
Random sequence generation	Low risk (Computer)
Allocation concealment	Unclear
Blinding of participants/personnel	Unclear
Blinding of outcome assessor	Unclear
Incomplete outcome data	Low risk (Missing data reported)
Selective outcome reporting	Low risk (Protocol available)
Other sources of bias	High risk (Design)
Ji et al., 2013	
Random sequence generation	Low risk (Coin toss)
Allocation concealment	Unclear
Blinding of participants/personnel	Low risk (Blinding performed)
Blinding of outcome assessor	Unclear risk (Not reported)
Incomplete outcome data	Low risk (No loss)
Selective outcome reporting	Low risk (Protocol available)
Other sources of bias	Unclear risk (Insufficient information)
Toma et al., 2019	
Random sequence generation	Low risk (Computer)
Allocation concealment	Low risk (Performed before selection)
Blinding of participants/personnel	Unclear
Blinding of outcome assessor	Low risk (Blinding performed)
Incomplete outcome data	Low risk (No loss)
Selective outcome reporting	Low risk (Protocol available)
Other sources of bias	Unclear risk (Insufficient information)
Mussano et al., 2013	
Random sequence generation	Unclear risk (Not reported)
Allocation concealment	Unclear
Blinding of participants/personnel	Unclear
Blinding of outcome assessor	Unclear
Incomplete outcome data	Low risk (No loss)
Selective outcome reporting	Low risk (Protocol available)
Other sources of bias	High risk (Design)
Riben-Grundston et al., 2015	
Random sequence generation	High risk (Design)
Allocation concealment	Low risk (Opaque envelopes)
Blinding of participants/personnel	Low risk (Blinding performed)
Blinding of outcome assessor	Low risk (Blinding performed)
Incomplete outcome data	Low risk (Missing data reported)
Selective outcome reporting	Low risk (Protocol available)
Other sources of bias	Low risk (Appears free from other sources)

- *Quality of Evidence*

According to the GRADE analysis, there were no problems related to the design of the studies, the risk of bias, inconsistencies, indirect evidence or imprecision in relation to the patient satisfaction outcome, with a good certainty of evidence score, but no large effect was observed in the included studies[14-18], as can be seen in the Table 3.

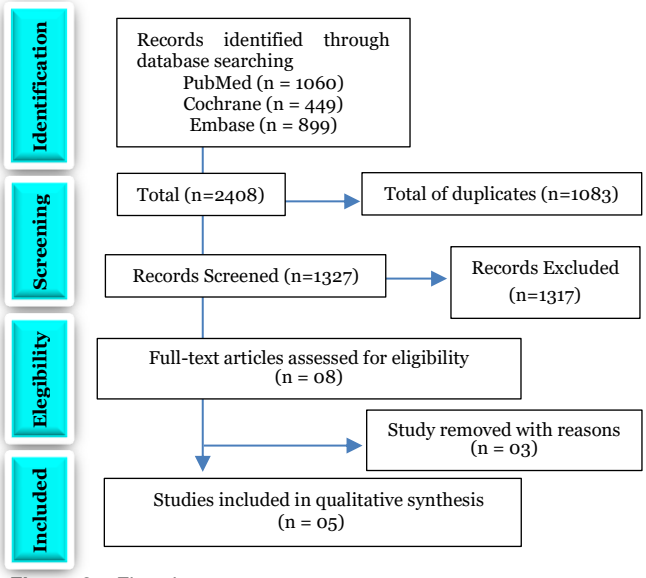

Figure 2 – Flowchart

Table 3 – GRADE analysis

Question: Mandibular overdentures supported by a single implant have the same level of patient satisfaction as mandibular overdentures supported by two implants?	**Outcome: SATISFACTION**
N° of Studies	5
Study Design	RCT
Risk of Bias	Not Serious
Inconsistency	Not Serious
Indirect evidence	Not Serious
Imprecision	Not Serious
Other Considerations	None
Large effect	No[a]
Certainty	⊕⊕⊕O

DISCUSSION

Regardless of whether the mandibular overdenture was retained by one or two implants all patients were satisfied with the rehabilitative treatment carried out and no study included in this systematic review reported that any patient preferred the initial oral/rehabilitative condition (use of full dentures) over the mandibular overdenture that was made[14-18].

Four of the included studies in this systematic review[14-18] two of which had the longest clinical follow-up periods[14,15] (5 years) indicated in their findings that the intervention (one implant) had the same patient satisfaction that when used two implants, which is in line with other studies prior to this one[4,27]. These findings can be related not only to the number of implants but also to the confection of the prostheses. The overdenture prosthesis is a mucous-supported prosthesis. To ensure comfort and, therefore, patient satisfaction, strict steps must be followed, from functional molding to choosing the correct occlusal scheme[28].

The most common occlusal scheme in complete dentures, whether implant-supported or not, is balanced bilateral occlusion. Studies show that this type of occlusal scheme is related to a better distribution of contact points on the posterior teeth and no effective contact in the anterior region[29], where the only implant is located.

However, one study[16] with a follow-up period of 1 year reported that the group with two implants had a higher level of satisfaction when compared to the one implant group. This is probably due to the type of attachment used in this study (O'ring), as in the other studies with the same follow-up period[17,18] the LOCATOR[17] and Retentive Anchor[18] devices were used, which provide a firmer and more stable fixation that can bring a higher degree of satisfaction to patients[30,31]. The O'ring is more flexible and may allow some movement[32] which, despite reducing the mechanical load on the implant and the peri-implant bone, could lead to lower patient satisfaction with one implant-retained overdentures.

In the studies with longer clinical follow-up[14,15] (5 years) the ball attachment system was used, which also tends to be more retentive than the O'ring system[31] and in both studies[14,15] there was

no effect of patient satisfaction. In addition, the study by Paleari et al.[21] was the one with the smallest sample size of all the studies included in this systematic review (n = 21 patients); most likely, if the sample size had been larger, the result could have been different.

Moreover, the subjective perception of satisfaction is influenced more by overall improvement than by technical differences. The simplicity of treatment with 1 implant, combined with lower costs and maintenance, also contributes to comparable outcomes. In practice, patients do not perceive significant additional benefits from using two implants[14-18].

CONCLUSION

We can conclude that the use of one implant in mandibular overdenture is a clinical approach viable with good patient satisfaction.

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CONFLICT OF INTERESTS

The authors declare no conflict of interest.

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