Impact of implant support for mandibular dentures on satisfaction, oral and general health-related quality of life: a meta-analysis of randomized-controlled trials
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CRD summary
This review concluded that mandibular implant overdentures may result in greater patient satisfaction compared with conventional dentures, but the magnitude of treatment effect remained inconclusive and further research was needed. There were a number of limitations with the included studies (such as significant heterogeneity), but the authors' conclusions appear appropriately cautious.

Authors' objectives
To assess the efficacy of mandibular implant-retained overdentures on patient's satisfaction, oral and general health-related quality of life.

Searching
MEDLINE (from 1966), EMBASE (from 1980), The Cochrane Central Register of Controlled Trials (CENTRAL) and Cochrane Systematic Reviews Database were searched up to April 2007. It was unclear whether or not searches were restricted by language. Search terms were reported. Reference lists of retrieved articles and 14 journals were searched manually. Abstracts from International Association of Dental Research meetings were searched. Experts in the field were contacted for unpublished data.

Study selection
Randomised controlled trials (RCTs) of toothless individuals aged 18 years or older who wore maxillary conventional dentures with either mandibular implant-retained overdentures or conventional dentures (control group) were eligible for inclusion. Eligible studies reported on rates of general satisfaction and general and oral health-related quality of life with a follow-up period of at least two months.

Most included studies were conducted at university dental clinics or hospitals in the Netherlands, USA, Canada and UK. Patients were aged between 35 and 84 years. One study compared overdenture retained by implants with conventional dentures and preprosthetic surgery and conventional dentures. Participants in the implant arms received different implant systems. General satisfaction, psychological well-being, oral health-related quality of life and social and sexual activities were measured using different assessment tools.

Two reviewers independently screened articles for inclusion. Disagreements were resolved through consensus.

Assessment of study quality
Study quality was assessed according to the following criteria: randomisation; allocation concealment; completeness of follow-up; and use of intention-to-treat analysis. Criteria were graded adequate, inadequate, unclear and not reported. Sample size was assessed.

The authors did not state how many reviewers performed the quality assessment.

Data extraction
One reviewer extracted data on pre- and post-treatment scores to calculate mean differences and their standard deviations (SDs) and hence standard mean differences and 95% confidence intervals (CIs). Where median scores were presented, values were converted to means. Data extracted from visual analogue scales were transformed to Likert-type scales. Authors were contacted for additional or missing data where necessary. A second reviewer checked the data extraction for accuracy. It was unclear how discrepancies were resolved.

Methods of synthesis
A random-effects model was used to combine standard mean differences and their 95% CIs to calculate an overall effect size (ES). An ES of 0.3 represented a small effect, 0.5 a medium effect and 1.0 a large effect.

Statistical heterogeneity was assessed using the Cochrane Q test and $I^2$ statistic, and further investigated using a priori subgroup analyses according to the recruitment method (general population recruited via advertisement, participants with poor oral condition recruited via referral to specialist clinics and diabetic participants recruited via medical centres).

The authors intended to assess publication bias using funnel plots.

Results of the review
Six RCTs (n=588: 322 implant overdentures and 266 conventional dentures) were included in the review (figures taken from the review narrative; the table of study characteristics suggested seven RCTs, n=649). Sample sizes ranged between 60 and 157 participants. All RCTs reported adequate sequence generation and adequately reported on withdrawals and dropouts. Follow-up periods ranged from two months to 10 years. Dropout rates ranged from 4% to 55%. According to the quality assessment, allocation concealment was not reported in any of the RCTs. The number of RCTs that included intention-to-treat analysis was unclear.

General patient satisfaction was significantly more positive in patients who received implant overdenture treatment compared with conventional dentures (ES 0.80, 95% CI 0.36 to 1.24; six RCTs). There was evidence of statistical heterogeneity ($I^2$=84%). Subgroup analyses showed similar findings in the general population recruited via advertisements (two RCTs) and in participants with poor oral conditions recruited via referral to specialist clinics (three RCTs). There were no statistically significant differences between treatments in diabetic patients from medical centres (one RCT).

There were no statistically significant differences between implant overdentures and conventional dentures on oral health-related quality of life (ES -0.41, 95% CI -1.02 to 0.20; three RCTs). There was evidence of significant statistical heterogeneity ($I^2$=83%). Subgroup analyses indicated similar findings for participants with poor oral conditions recruited via referral to specialist clinics (one RCT), but when restricted to the general population recruited via advertisements there was a significant difference in favour of implant overdentures (ES -0.71, 95 % CI -1.03 to -0.39; two RCTs).

One RCT measured perceived general health and found no difference between patients who received implant overdentures and patients who received conventional dentures.

The authors did not report publication bias due to the small number of included RCTs.

Authors' conclusions
Evidence suggested that mandibular implant overdentures may result in greater patient satisfaction compared with new conventional dentures, but findings about the magnitude of treatment effect were inconclusive and further research was needed.

CRD commentary
The review question and inclusion criteria were clear. A satisfactory literature search was undertaken and included both published and unpublished data, which reduced potential for publication bias. It was unclear whether or not literature searches were limited to French and English articles (as per the abstract) or performed without language restrictions, which meant that language bias could not be ruled out completely. The authors went some way to minimise reviewer error and bias by undertaking study selection and data extraction in duplicate; it was unclear whether the same was true for quality assessment. The authors assessed the quality of included studies to some extent and acknowledged certain limitations with the quality of the studies. There was significant statistical heterogeneity among studies and the authors acknowledged differences in patient characteristics and study methods; these should be taken into consideration when interpreting the results. There were limitations with the number of RCTs included and the large dropout rates in some studies. Follow-up periods were short-term in most studies. Given these limitations, the authors' inconclusive findings regarding the magnitude of treatment effect and recommendations for further research appear appropriate.
Implications of the review for practice and research

**Practice:** The authors did not state any implications for practice.

**Research:** The authors stated that well-conducted RCTs were needed to assess the true magnitude of effect of mandibular implant overdentures on patient satisfaction and oral health-related quality of life, and the cost effectiveness of this technology. It may be useful to assess the impact of this treatment on subgroups of patients whose conditions differ and over a long-term follow-up period.

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