Simplified versus traditional techniques for complete denture fabrication: A systematic review

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4 authors, including:

- **Marcília R. Paulino**
  Federal University of Pernambuco
  1 PUBLICATION  2 CITATIONS
  
- **Bruno César de Vasconcelos Gurgel**
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  30 PUBLICATIONS  183 CITATIONS

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  22 PUBLICATIONS  110 CITATIONS

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Complete edentulism is an important public health problem, especially among the elderly.\(^1,2\) The prevalence of total edentulism in seniors has been estimated to be 26% in the United States, 15% to 78% in Europe, 24% in Indonesia, 11% in China, and 23% in Brazil.\(^3,4\) Millions of individuals all over the world need removable complete dentures.\(^5,6\) Despite the existence of alternative techniques, such as implant-retained prostheses, the great majority of patients will continue to wear conventional dentures, particularly due to cost and the lack of access to care.\(^1,6-8\) Thus, society’s need for conventional complete dental prostheses will remain for the foreseeable future.\(^1,6,7\) A number of methods have been described for the fabrication of complete dentures; two most common ways are the traditional method and the simplified method. The traditional method, which uses more complex and time-consuming techniques, is taught in most dental schools.\(^9\) Meanwhile, most general dentists treat patients who are edentulous with simplified techniques to reduce the number of visits and the time required to make the prostheses.\(^1,3,5,6-8\)

Most assessments of the techniques have been through case reports or retrospective studies, which cannot provide high levels of evidence regarding the effect of a treatment. Questions regarding the efficacy or effectiveness of a treatment can be better answered by randomized trials and systematic reviews.\(^1,8\) Therefore, this systematic review aimed to investigate the efficiency of simplified methods for fabricating dentures compared with traditional methods. The traditional method for complete denture treatment includes the following clinical stages: anatomic and functional impression,
the use of a semi-adjustable articulator with a facebow, wax evaluation, and occlusal adjustment in a semi-adjustable articulator. Any alternative method that eliminates any of the stages is called a simplified method. Any alternative method that eliminates any of the stages is called a simplified technique. Any alternative method that eliminates any of the stages is called a simplified technique. Any alternative method that eliminates any of the stages is called a simplified method. Any alternative method that eliminates any of the stages is called a simplified method, which means that the simplified method can vary among studies.

**MATERIAL AND METHODS**

Electronic searches of the MEDLINE-PubMed, The Cochrane Library, and ISI Web of Science databases were performed by 3 independent examiners (Paulino, MR; Alves, LR and Calderon, PS) to identify clinical trials of the simplified and traditional fabrication of complete dentures published in English, up to December 2013 by combining search terms given in Table 1. All identified abstracts were read to determine whether they met the following inclusion and exclusion criteria. The inclusion criteria were human studies, randomized controlled clinical trial studies focused on comparing simplified methods and traditional method, and studies published in English. Exclusion criteria were case reports, literature reviews, and the absence of statistical analysis (Table 2). All titles revealed by this strategy were screened, and an abstract search was done to find further relevant articles. Repeated articles were considered only once. The full-text articles then were obtained and reviewed if this determination could not be made only with abstracts. The electronic search was completed by hand searching the references of selected articles. Data were obtained from all selected articles and included the following parameters: authors of articles, study design, sample (number of participants, sex, and age), treatment groups, follow-up period, and results that concerned the differences between the methods.

**RESULTS**

The final electronic search of databases produced 277 records. 231 = search through the electronic databases of descriptors; 7 = manual search of references from 18 articles. Subsequently, 19 full-text articles were screened according to the inclusion and exclusion criteria. Finally 6 articles were selected. These 6 articles were derived from 3 studies according to the authors. Details about the search strategy are shown in Figure 1. All selected studies included randomized controlled trials. However, no statistical analyses were performed because of differences in study methodologies among the reports. The major characteristics and results of each study are listed in Table 3.

Six articles were included in the systematic review, however, they refer to 3 independent studies: study 1, Kawai et al; study 2, Heydecke et al; and study 3, Cunha et al. Thereby, in the selected studies, a total of 181 individuals ages 45 to 85 years were treated with complete dentures made by the traditional and simplified methods. Of these individuals, 101 were treated with the traditional method and 100 were treated with simplified methods. Only 1 study, Heydecke et al treated 20 patients with both methods at different times (crossover). The main differences between the treatments included the functional impression method, the use or not of a facebow, type of articulator, and the remount. The majority of the studies evaluated general satisfaction, denture stability, chewing ability and function, comfort,
Search strategy and results.

Electron database search: 277 records

Records after removal of duplicates: 231 titles

References and hand searching: 7 titles

Records screened based on title and abstract: 18 titles

Records screened based on title and abstract: 1 title

Full-text articles assessed within inclusion/exclusion criteria: 19 titles

Studies included in qualitative synthesis: 6 titles

13 excluded studies

Figure 1. Search strategy and results.

One study, which resulted in 3 articles, was conducted as a randomized controlled clinical trial to compare the simplified methods for complete denture fabrication with the traditional method with regard to masticatory performance and ability; patients’ oral health–related quality of life, satisfaction, and denture quality with the simplified method or the traditional method, and the costs of complete denture fabrication with the simplified and a traditional method.

The OHIP-EDENT (Oral Health Impact Profile for edentulous patients) was used to assess oral health–related quality of life, and an inventory was used to assess satisfaction. The investigators concluded that the simplified method was able to produce dentures with comparable quality with those produced by the traditional method. Three months after the treatment, masticatory performance was evaluated by a colorimetric assay based on chewing capsules. The values obtained for both edentulous groups did not show any significant difference. The masticatory ability assessment, evaluated by a 10-point VAS, did not show statistically significant differences between the traditional and the simplified groups (P=.699). The study concluded that the simplified method was able to restore masticatory function comparably with a traditional protocol, according to participant perceptions. The results revealed that complete denture fabrication demanded a median time of 173.2 minutes for the simplified group and 284.5 minutes for the traditional group (P<.05). The simplified group presented lower costs than traditional group during the fabrication stage but not during the follow-up stage. The direct cost of complete denture treatment was 34.9% lower for the simplified method.

DISCUSSION

This study assigned PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statements.
reviews to evaluate the clinical efficiency of complete dentures made by simplified methods when compared with the traditional method. The search revealed a low number of studies in the literature that compared these methods in well-designed randomized clinical trials, defined by the NHMRC (National Health and Medical Research Council) guidelines as level II, with blinded examiners and predefined follow-up evaluation periods. Acceptable sample sizes were verified in the majority of the studies. Unfortunately, a quantitative systematic review or meta-analysis was not conducted because of the different methodologies applied.

Denture fabrication methods taught by dental schools often demand a complex sequence of clinical and laboratory procedures based on the assumption that complex methods result in better treatment quality. Nevertheless, the need for such procedures has been questioned because of the lack of evidence that dentures fabricated by complex methods are preferred by patients. Another argument against the use of complex methods is the short time available for teaching complete denture prosthodontics at dental school. Over recent years, several simplified methods for complete denture fabrication have been described. Such approaches include simplification or even avoiding some clinical or laboratory procedures, and claim to result in clinically adequate dentures with a lower use of resources, which suggests good applicability. Three studies assessed the overall satisfaction of patients but showed different results. One of these studies showed statistical differences; the other studies did not. This difference can be explained by the differences in the sample size and in the methodology. In 3 studies, the simplified techniques were different from each other. The assessment instruments also were different. VAS was used to assess overall patient satisfaction with the prosthesis in studies by Kawai et al and Heydecke et al, and a questionnaire was used by Regis et al. A summary of results from systematic review is provided in Table 3.

Table 3. Summary of results from systematic review

<table>
<thead>
<tr>
<th>Study</th>
<th>Study Design</th>
<th>Sample</th>
<th>Variables (instruments)</th>
<th>Follow-up</th>
<th>Main Results</th>
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<tbody>
<tr>
<td>Kawai et al</td>
<td>Single blind RCT</td>
<td>N = 122; T = 61; S = 61; age range, 45-75 y</td>
<td>General satisfaction, comfort, stability, esthetics, ability to speak, ease of cleaning, and mastication (VAS) and denture quality (quantitative scale); cost and time</td>
<td>BL, 3 and 6 mo</td>
<td>General satisfaction: at 3 mo, T = S (P = .970); at 6 mo, T = S (P = .960); denture quality: 6 mo, T = S (P = .380); cost: 6 mo, T = S (P &lt; .001); clinician’s time: 6 mo, T = S (P = .001)</td>
</tr>
<tr>
<td>Heydecke et al</td>
<td>Single blind CO RCT</td>
<td>N = 20; T = 20; S = 20; age range,</td>
<td>General satisfaction, comfort, ability to speak, stability, esthetics, ease of cleaning, occlusion, and ability to chew (VAS)</td>
<td>BL, 3 and 6 mo</td>
<td>General satisfaction, stability, and esthetics: T = S (P = .044, P = .021, P = .026, respectively); ability to speak, comfort, ease of cleaning, speech function, and chewing ability: T = S (P &lt; .05)</td>
</tr>
<tr>
<td>Regis et al, Cunha et al, Della Vecchia et al</td>
<td>RCT</td>
<td>N = 39; T = 20; S = 19; age range, 47-80 y</td>
<td>Quality of life (OHIP-EDENT) satisfaction (inventory) and quality (FAD), and masticatory performance (colorimetric method); and masticatory ability (inventory) and costs, time for denture production and postinsertion adjustment, (chronometer)</td>
<td>BL, 3 and 6 mo</td>
<td>OHIP-EDENT: masticatory concerns: 3 mo, T = S (P = .067); at 6 mo, T = S (P = .205); psychological discomfort and disability: 3 mo, T = S (P = .160); at 6 mo, T = S (P = .406); social disability: 3 mo, T = S (P = .911); at 6 mo, T = S (P = .359); oral pain and discomfort: 3 mo, T = S (P = .145); at 6 mo, T = S (P = .635); satisfaction: 3 mo, T = S (P = .05), except retention of lower denture and ability to speak: T = S (P = .043); P = .017, respectively; at 6 mo, T = S (P &lt; .05); denture quality: 3 mo, T = S (P = .828); masticatory performance (colorimetric method): 3 mo, T = S (P &lt; .05); masticatory ability (inventory): 3 mo, T = S (P &lt; .05), except eating, T = S (P = .033); cost: 3 mo, T = S (P &lt; .05); time for denture fabrication: 3 mo, T = S (P &lt; .05); time for postinsertion adjustment: 3 mo, T = S (P = .424)</td>
</tr>
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</table>

RCT, randomized controlled trial; T, traditional; S, simplified; VAS, visual analog scale; BL, baseline; CO, crossover; OHIP-EDENT (Oral Health Impact Profile for edentulous patients); FAD, functional assessment of dentures. *Ref 6; †Ref 7; ‡Ref 8; §Ref 1; ¶Ref 2.
and found no difference among simplified groups, and Regis et al. analyzed the influence of oral health on quality of life through OHIP-EDENT (Oral Health Impact Profile for edentulous patients) and concluded that denture fabrication methods did not influence results. The investigators also stated that these findings were unexpected because it was predictable that simplified prostheses would demonstrate inferior results.

The assessment of differences in time and cost for simplified and traditional methods has been described in 2 studies (Kawai et al. and Della Vecchia et al.) that demonstrated that dentists and dental assistants needed less time for fabricating dentures with the simplified method than with the traditional method. This was expected because an average of 4 clinical sessions are needed for the simplified method, whereas the traditional method requires 5 to 6 sessions. Moreover, the final cost of the traditional method was significantly greater (23%, 33.59%). Among the studies, no significant differences between the 2 denture treatment methods were detected for the following variables: comfort, ease of cleaning, speech function, and chewing ability, which supports the statement that there is no evidence that the traditional method produces greater patient satisfaction, better function, or higher quality dentures, even for cases classified as difficult to treat based on diagnostic findings.

CONCLUSIONS

The present systematic review revealed no difference in masticatory variables, patient satisfaction, or quality of conventional dentures produced with the traditional or the simplified methods, even if the simplified methods can vary among the studies. Therefore, analysis of the data indicates that some clinical or laboratory steps can be skipped, which saves clinical time and reduces costs without prejudicing the prosthesis. Dental schools should consider these findings when designing complete denture courses. Nevertheless, the evidence remains unclear because of the small number of available controlled and randomized clinical trials. Thus, further studies with a higher level of evidence, representative sample size, adequate follow-up period, and standardization of methods should be conducted to validate the performance of this treatment option.

REFERENCES


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