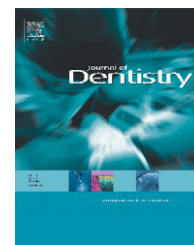


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# A preliminary investigation into the use of denture adhesives combined with dietary advice to improve diets in complete denture wearers

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## ABSTRACT

**Objectives:** To investigate how nutritional advice and denture adhesives may be associated with eating healthier foods.

**Methods:** 35 edentulous subjects (13 males and 22 females, mean age 73.9 years (55–84 years)), wearing complete dentures more than one year old, completed validated questionnaires analysing saturated fat, protein, Vitamin C, the number of servings of fruit/vegetables. In addition subjects completed the NDNS and OHIP Edent questionnaires. At baseline, nutritional information and the use of denture adhesive was provided. Subjects returned after 30 consecutive days and the questionnaires were repeated. A Wilcoxon signed rank test was used to test the effect of the denture adhesive on diet and on quality of life measures.

**Results:** The subjects increased mean intake from 2.2 portions of fruit/vegetables a day to 3.6. Fat and saturated fats were reduced from 23.2 g to 11.3 g and Vitamin C intake increased by 34.4 mg. All were statistically significant ( $p < 0.0001$ ). There was a statistically significant improvement over the 30-day treatment period in subjects' ability as measured by using OHIP Edent scores to bite ( $p = 0.017$ ) and chew a range of foods ( $p = 0.007$ ).

**Conclusion:** Within the confines of the study, use of simple dietary advice and denture adhesives improved diet.

**Clinical significance:** The results of this pilot study suggest that denture fixatives may improve dietary behaviour of complete denture wearers.

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## 1. Introduction

There is increasing recognition of the importance of healthy eating in all ages. Patients with complete dentures are potentially at risk of a less than healthy diet because of their reduced capacity to chew and eat healthy foods. Commonly,

healthy foods contain more roughage and are more difficult to eat for complete denture wearers.<sup>1</sup> Masticatory efficiency falls with tooth loss, being worst in edentulous conventional complete denture wearers.<sup>2,3</sup> Complete denture wearers have markedly worse diets than dentate people.<sup>4,5</sup> Being edentulous with dentures appears to be associated with poorer intake across multiple nutrients<sup>6,7</sup> and there is strong evidence that

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poor diet leads to ill health.<sup>8</sup> Whilst decreased masticatory efficiency of conventional complete dentures may adversely affect chewing ability and food choice, there is evidence that improving chewing ability, either by improving existing conventional complete dentures or by provision of mandibular implant supported overdentures, does not itself lead to any improvement in dietary choices.<sup>9,10</sup> Diet is complex, developed over a lifetime and influenced by many factors and is not easily modified for the better by dental interventions.<sup>10</sup> It has been shown that the use of a nutritional intervention in patients receiving new complete dentures can increase fruit and vegetable intake.<sup>11</sup>

There is disagreement between authors on the influence of quality of dentures on their success. Berg stated that no clinical or other factors were related to patient appreciation of complete dentures in a review paper that based its evidence on many small binary studies.<sup>12</sup> In patients with new complete dentures retention and stability was shown to significantly influence patient use of dentures for eating<sup>13</sup> and satisfaction with eating<sup>14</sup> in large multivariate modelling studies. These evidence-based-models explain how retentive and stable dentures provide patients with physical and psychological security. The apparent contradiction between these findings and those of others is explained because quality of complete dentures deteriorates rapidly in the mouth<sup>15</sup> and the fact that the effect of denture quality on satisfaction and outcome which was so strong at one week and at three months was completely abolished after two years.<sup>16</sup> The models also infer that improved retention and stability of maxillary dentures arising from use of a denture adhesive might result in improved chewing ability and patient reported satisfaction with, and use of, dentures.

The use of denture adhesive has been shown to improve retention and stability of complete dentures<sup>17</sup> and measures of quality of life.<sup>18</sup> However improved complete denture retention and stability does not necessarily result in improved diet.<sup>19</sup> There is a need to establish if a combination of denture adhesive and simple targeted dietary advice can improve diet. This study will test the hypothesis that use of a denture adhesive by complete denture wearers combined with simple dietary advice can beneficially alter nutrient intake. Possible changes in perception of biting and chewing ability, confidence and ability to eat more nutritious foods will also be investigated.

## 2. Materials and methods

Edentulous patients attending Guy's Hospital for consultations in relation to their existing complete dentures were considered for inclusion in this study. The inclusion criteria included experienced dentures wearers who were willing and able to give consent and to comply with the requirements of the study in self-reported good medical and mental health. The conventional complete dentures were free from major errors, one to seven years old, worn daily and for eating, the maxillary dentures were assessed to be well retained. The exclusion criteria included mucosal conditions or soreness/ulceration of the denture bearing tissues, immediate dentures of any age, denture intolerance or gagging tendency, history of

allergy to denture or denture fixative constituents, xerostomia or use of xerostomia inducing medications, swallowing difficulties, current use of denture fixatives, objections to use of denture fixatives, severely resorbed maxillary or mandibular residual alveolar ridges.

Following consent, potential participants had a clinical examination. Dentures were assessed using the Olshan's modification<sup>20</sup> of Kapur retention and stability sum score.<sup>21</sup> Only those subjects with a retention and stability sum score of  $\geq 6$  (fair, good or very good denture fit) were included. Edentulous ridges were classified according Cawood and Howell scale<sup>22</sup> and those with a Cawood and Howell score of 5 and above were excluded (ridge forms of inadequate height and width and those with depressed ridge forms). This was done because those with existing complete dentures who have very reduced residual alveolar ridge form have been shown to be consistently unhappy with their complete dentures.<sup>23</sup>

Following the clinical examination suitable subjects were invited to participate and subsequently a dietary history was recorded using the health equality audit (HEA).<sup>24</sup> In brief, this computer-based-questionnaire recorded a full range of foods and drinks, together with an estimation of the quantity of each intake which was entered into a programme on a laptop computer (Table 1). The programme calculates, based on the range of food and drinks, the levels of fats, saturated fats, protein intake, and estimation of the Vitamin C intake and the number of servings of fruit or vegetables. Furthermore each subject was asked a series of questions from the NDNS (National Diet and Nutritional Survey) questionnaire which recorded the ability to eat a range of foods as "could eat easily", "could eat with some difficulty" or "could not eat at all". The questions included soft foods such as sliced bread, cheese, crusty bread, toast, oranges and roast potatoes; harder foods such as raw carrots, apples, nuts; thinly sliced foods such as lettuce, sliced cooked meats, crisps and chocolate. Finally, subjects completed the Oral Health Impact Profile questionnaire for edentulous patients, OHIP Edent.<sup>25</sup> For all subjects a single previously trained examiner asked and recorded the questions, assisting or clarifying when necessary. Subjects were then given two printed pamphlets providing information on healthy diets ("eat well"<sup>26</sup> and the "good life"<sup>27</sup>) and shown how to use the denture adhesive (Poligrip<sup>®</sup> Denture Adhesive Cream, GlaxoSmithKline Consumer Healthcare, Parsippany, USA). Participants were requested to use the adhesive every day for 30 days and to read the pamphlets. No attempt was made to provide dietary counselling. After one month subjects had a second clinical examination to assess oral condition and denture function using the same approach as used in the initial examination. All of the questionnaires used initially were repeated.

Data collected from the HEA3, NDNS and OHIP Edent questionnaires were analysed. For changes in number of servings of fruit and vegetables, the within-subject change from baseline was analysed using a one-sample t-test at the 5% significance level. For the other two primary variables, since the assumptions underlying the use of parametric tests were violated, a median change from baseline was calculated and analysed using a Wilcoxon signed rank test.

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