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Review

Effect of oral health education programs for caregivers on oral hygiene of the elderly: A systemic review and meta-analysis

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ABSTRACT

Objectives: To evaluate the effects of oral health education for caregivers on the oral health status of the elderly.
Design: A systematic review and meta-analysis.
Data sources: The Medline, EMBASE, Cochrane Library (CENTRAL), PsycINFO, CINAHL were searched up to September, 2014.
Review methods: Randomized controlled trials or comparative before-and-after studies involving an oral health education program for caregivers of the elderly (≥65 years old) were identified by two independent reviewers. Primary outcome was the percentage of patients with normal mucosa in the oral cavity. The secondary outcomes were the percentage of patients with no visible plaque and the percentage of patients without denture stomatitis.
Results: A total of five studies, involving 602 elders, met the eligible criteria for inclusion in the meta-analysis. It was found that the percentage of residents with normal oral mucosa (odds ratio (OR) = 1.81, $P = 0.027$), no visible plaque (OR = 1.54, $P = 0.001$), and no detectable denture stomatitis (OR = 2.89, $P < 0.001$) significantly increased after the group was treated by caregivers who had received a recent oral health education program.
Conclusions: The systemic review and meta-analysis found limited evidence that oral health education for caregivers may be effective for improving the oral health of the elderly.

What is already known about the topic?

- Poor oral health in the elderly is associated with malnutrition, cognitive decline, and a higher risk for cardiovascular disease and infectious respiratory diseases.
- Various oral health education programs have been presented to nursing personnel with anticipation that the elderly may benefit from caregivers' improved expertise in personal hygiene procedures.
- Regarding the improvement of oral health of the elderly, many studies reported conflicting conclusions of these oral health education programs on caregivers.

What this paper adds

- This meta-analysis analysis, involving 602 elders, found that the percentage of elderly with normal oral mucosa, with no visible plaque, and with no detectable denture

Abbreviations: CI, confidence interval; OR, odds ratio; RCT, randomized clinical trial.

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stomatitis all significantly increased after the group was treated by caregivers who had received a recent oral health education program.
- An oral health education for caregivers may significantly improve the oral health of the elderly.

1. Introduction

The prevalence of elderly who lacked dental care ranged from approximately 17% in France (Herr et al., 2013) to >63% in institutionalized elderly in Spain (Cornejo et al., 2013), 82% in nursing home residents in Canada (Chen et al., 2013), and >90% in homebound elderly in the USA (Gluzman et al., 2013). Poor oral health in the elderly is associated with malnutrition, cognitive decline, and a higher risk for cardiovascular disease and infectious respiratory diseases, including pneumonia (Adachi et al., 2007; Awano et al., 2008; Juthani-Mehta et al., 2013). In fact, oral bacteria were the major pathogens in 15% of cases of community acquired pneumonia (Yamasaki et al., 2013). The ability of elders to maintain adequate oral health may be reduced by cognitive decline, reduced hand function (Padilha et al., 2007), sarcopenia (Walls, 2014), and loss of autonomy. Since poor oral health may exert a negative impact on the general health of the elderly and increase the cost of their care, effective methods that improve the oral health of elders is warranted.

A promising approach is the education of the caregivers for the elderly. Various oral health education programs have been presented to nursing personnel with anticipation that patients may benefit from caregivers' improved expertise in personal hygiene procedures. Many studies evaluated the effectiveness of the educational program on the improvement of knowledge, attitude, and perception of caregivers (Khanagar et al., 2014; Paulsson et al., 1998; Reed et al., 2006). These programs produced conflicting conclusions regarding oral health, level of knowledge, benefits over time (Brand et al., 2013; Sjogren et al., 2010), and attitudes toward dental issues of elderly (Isaksson et al., 2000; Kullberg et al., 2009; Reed et al., 2006; Simons et al., 2000). Therefore, we conducted a meta-analysis to evaluate the effects of oral health education of the caregivers on the oral health status of the residents.

2. Materials and methods

2.1. Search strategy

The systematic review and meta-analysis was conducted in accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Liberati et al., 2009). The Medline, EMBASE, Cochrane Library (CENTRAL), PsycINFO, CINAHL were searched for the keywords, "(frail OR aging OR aged OR dementia OR elderly OR older OR elder OR institutionalization) AND (dental OR oral) AND health AND (education OR Promotion) AND (nurses OR caregivers OR nurse OR caregiver)" for articles published up to September, 2014. The selection criteria were for research articles on one or more oral health education program(s) for caregivers of the elderly (≥65 years old). The elderly were living in the community, assisted living facilities, nursing homes, or other institutions. Additional inclusion criteria for the full meta-analysis were (a) a primary research article, (b) effects of oral educational program for caregivers on the oral health of the elderly, and (c) randomized controlled trials or comparative before-and-after studies that evaluated the elders' oral health after the caregivers' completion of educational program. Exclusion criteria were (a) caregivers of younger groups (<65 yrs) or (b) educational interventions for only the patients. Non-English articles were excluded.

2.2. Data extraction

Two independent reviewers identified studies by the search strategy. If the eligibility of a study was not unanimous, a third reviewer was consulted. The reviewers noted the reference (first author, year published, journal citation) and compiled the following data from the included studies: study design, participants' demographics (age and gender), number of participants before-and-after health education program, protocol of education program, duration of follow up period, and primary and secondary outcomes.

2.3. Assessment of quality of study

The two reviewers assessed the quality of the publication by using Newcastle-Ottawa Scale (Wells et al., 2006) to score across three categories: selection of study groups (four questions), comparability of study groups (two questions), and ascertainment of the outcome of interest (three questions). While most questions had a score of 1, separate points were awarded for controlling for age and sex (maximum, 2 points).

2.4. Outcome measures

The different studies had used different scales to measure abnormalities in mucosa, plaque, and denture stomatitis. Because each scale included one common grade – the identification of normal mucosa (Table 1), the primary outcome was the percentage of patients with normal mucosa in the oral cavity. Normal mucosa was defined as no inflammation, no erythema, no swelling, no

Table 1
Comparison of the scales for evaluating normal mucosa..

Study	Scale for evaluating oral mucosa	Reference for scale
Portella et al. (2013)	1: normal appearance 2: mild inflammation 3: moderate inflammation 4: severe inflammation	Henriksen et al. (1999)
Boczko et al. (2009)	1: normal 2–4: abnormalities in increasing severity	
Nicol et al. (2005)	Absent or present of mucosal disease	
Isaksson et al. (2000)	1: normal appearance 2: mild inflammation 3: moderate inflammation 4: severe inflammation	Henriksen et al. (1999)