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The importance of oral health in (frail) elderly people – a review

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ABSTRACT

Two important factors contribute to a higher chance of a deterioration of oral health status in frail and disabled elderly people. First, advances in oral health care and treatment have resulted in a reduced number of edentulous individuals and the proportion of adults who retain their teeth until late in life has increased substantially. Second, neglected self-care and/or professional care have led to reduced oral health care utilization. This review reports the consequences of having a poor oral health status and its impact on general health of frail elderly people and gives an overview of the important enabling and disabling factors regarding the provision of oral health care to frail older persons. Impaired cognitive and functional ability, medication-induced hyposalivation, reduced saliva buffer capacity and high saliva acidity, diabetes mellitus, the number of exposed root surfaces due to gingival recession, poor oral hygiene, high frequency of sugar consumption, and poor socio-economic conditions are the major predisposing conditions for the upsurge of caries in older population groups. Poor oral hygiene, tobacco smoking, and excessive alcohol consumption together with some systemic diseases, such as metabolic syndrome, rheumatoid arthritis, diabetes mellitus and post-menopausal osteoporosis are reported to be important risk factors for periodontal disease and later on peri-implantitis. Although during recent years increasing attention has been given to improving oral health care for frail old people, there is ample evidence showing that the oral health of elderly people, in particular of care home residents is (still) poor. The introduction of innovative care pathways to improve oral health care of elderly people by implementing new guidelines or health care models appears to be a complex process. Therefore, a poor oral health status might be regarded as a new geriatric giant in frail elderly people, which deserves urgent attention of scientists, health care providers and policymakers.

1. Introduction

The proportion of elderly people in developed countries has increased considerably during the last few decades and is expected to increase further in the next few decades. This demographic shift will have important implications for health care services. More (frail) elderly people will face more morbidity and disabilities and consequently will need an increasing proportion of health care services [1]. Those who are not able to function independently are often supported by domiciliary care services or admitted to care homes [2,3].

Advances in oral health care and treatment in the past few decades have resulted in a reduced number of edentulous individuals and the proportion of adults who retain their natural teeth until late in life has increased substantially [4]. In addition, a still increasing number of dentate elderly people have tooth wear, oral implants, sophisticated tooth- and implant-supported restorations and prostheses. Hence, they are in continuous need of both preventive and curative oral health care. The complexity of oral health status, systemic diseases, and the use of multiple medications make (frail) elderly people more vulnerable to oral problems than younger age groups, even more so in those who are cognitively impaired [5,6]. Weakened oral health due to neglected self-care and/or professional care, and as a result of reduced oral

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health care utilization, is already found in (frail) elderly people when they are still community-dwelling [6–9]. Therefore, at the moment of admission to a care home or hospital, many elderly people are already in urgent need of oral health care and if adequate oral health care there is lacking as well, their oral health status will deteriorate progressively during their residency with serious risks for general health.

This narrative review reports about the consequences of having a poor oral health and its impact on general health of frail elderly people and gives an overview of the important enabling and disabling factors regarding the provision of adequate oral health care to this target group.

2. Main consequences of poor oral health care in frail elderly people

2.1. Caries

Caries is caused by indigenous oral microorganisms, mainly *Streptococcus mutans*, becoming a dynamic biofilm, which, in the presence of fermentable sugars, produce organic acids capable of dissolving inorganic enamel and dentin, followed by the proteolytic destruction of collagen, leaving soft infected dentin [10]. The prevalence of caries in elderly people varies between 20–60% in the community and 60–80% in care homes [11–15]. There is an increasing evidence that (frail) elderly people may experience rampant caries, often developing in relatively short time periods [16]. The major predisposing conditions for caries development in (frail) elderly people are: impaired cognitive and functional ability, medication-induced hyposalivation, reduced saliva buffer capacity and high saliva acidity, diabetes mellitus, the number of exposed root surfaces due to gingival recession, poor oral hygiene, high frequency of sugar consumption, and poor socio-economic conditions [11,17–20]. Prevention and management of caries in elderly people is based on plaque control, accurate caries risk assessment, appropriate dietary advice, topical fluoride therapy, and adequate professional oral health care [16].

2.2. Periodontal disease

Periodontal disease is an inflammatory disease of the periodontal tissue induced by predominantly anaerobe gram-negative bacteria residing in the plaque on subgingival tooth surfaces. The inflammation leads to pocket formation. Periodontal disease is a serious concern in most of the (frail) elderly people who have retained their natural teeth. Aging alone does not lead to critical loss of periodontal attachment in healthy elderly people. The effects of aging on periodontal tissues are caused by molecular changes in the periodontal cells, which intensify bone loss in elderly people with periodontal disease. These effects may be associated with alterations in differentiation and proliferation of osteoblasts and osteoclasts, an increase in periodontal cell response to the oral microbiota and mechanical stress leading to the secretion of cytokines involved in osseous resorption and systemic endocrine alterations in elderly people [21].

A review of the literature showed that the prevalence of moderate to severe periodontal disease with pockets of 4 mm or more in community-dwelling elderly people varied between 62% and 91%. In care home residents, the prevalence of periodontal disease with at least one site with attachment loss of 2 to 3 mm varied between 50% and 75%, and new lesions were more common than progressing existing lesions [22]. In a Dutch review, both gender and age were found to be consistently associated with periodontal disease [23]. The disease was more prevalent in older age groups and in men.

Specific species of the periodontal flora have been identified as putative pathogens for the initiation and progression of the disease [23–25]. The presence of subgingival calculus was found to be associated with the onset, and dental plaque with the progression of the disease [24,26–28]. Available evidence showed that relevant behavioural factors are poor oral hygiene, tobacco smoking, and excessive alcohol consumption [29–36]. Systemic diseases reported to be important risk factors for periodontal disease that are metabolic syndrome, rheumatoid arthritis, diabetes mellitus, and post-menopausal osteoporosis [37–44]. It is generally accepted that these co-morbid conditions, which are particularly prevalent in (frail) elderly people, increase the susceptibility for periodontal disease. Some studies have suggested a bidirectional relationship between glycemic control and periodontal disease [45]. A recent Cochrane meta-analysis showed that there is some evidence of improvement in metabolic control in people with diabetes, after treating periodontal disease [46]. Periodontitis and other reasons for tooth extraction have been studied in various populations. Above the age of 40 years, periodontitis accounts for about 30% to 35% of tooth extractions and caries related reasons account for 50% of tooth extractions [47]. In older age groups, however, tooth extractions are performed equally due to periodontitis and caries.

2.3. Peri-implantitis

The oral rehabilitation of partially or totally edentulous patients with dental implants has become a common practice over the last decade, with reliable long term results. At the turn of the millennium, marketing estimates indicated that over 2 million dental implants are installed annually worldwide, and this number is expected to rise further over the next few years. The documented high survival rate of osseo-integrated root from dental implants has led to their acceptance as a realistic treatment alternative. In spite of these successes, however, over a 5-year period, 14–70% of the dental implants demonstrated peri-implant inflammatory reactions, which were associated with crestal bone loss that may eventually lead to the loss of an implant [48–50]. However, all these studies did not include higher age groups and geriatric patients. Prevalence studies on peri-implantitis in these populations groups are lacking. Peri-implantitis is defined as an inflammatory process which affects the tissues around an osseo-integrated implant in function, resulting in the loss of the supporting bone, which is often associated with bleeding, suppuration, increased probing depth, mobility and radiographical bone loss [51]. It has been shown that the inflammation is more pronounced and the inflammatory process goes deeper and faster around the dental implant than around the adjacent natural tooth. Bacterial infections play the most important role in the failure of dental implants. Bacterial flora, which are associated with periodontitis and peri-implantitis, are found to be similar. Studies have shown that the bacterial flora at the failing implant sites consist of gram-negative anaerobic bacteria including *porphyromonas gingivalis*, *prevotella intermedia* and *actinobacillus actinomycetemcomitans*, which resemble the pathogens in periodontal disease [51]. It has been demonstrated that the bacteria which are found in the implant sulcus in the successful implant cases, are basically the same flora as found in the natural tooth sulcus in a healthy state. The implants in partially edentulous patients appear to be at a greater risk of peri-implantitis than the implants in completely edentulous patients [52]. There are few qualitative differences in the micro-flora surrounding implants and the teeth in partially edentulous individuals. However, there is a marked quantitative decrease in the number of periodontal pathogens around the implants in completely edentulous patients. It is possible that the natural teeth may serve as reservoirs for