

The Influence of Chronic Diseases in the Oral Health of the Elderly

This article was published in the following Scient Open Access Journal:

Journal of Dental and Oral Health

Received March 30, 2016; Accepted April 26, 2016; Published May 3, 2016

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Abstract

Introduction: Aging is a natural and progressive process that produces limitations and changes in the functioning of the human body, making the individual more vulnerable and susceptible to chronic disease development. The most affected systems in the elderly are the neurological, cardiovascular, respiratory, endocrine and musculoskeletal. Overall, all they affect a special system: the oral cavity. The objective of this review article consists in characterizing the influence of the major chronic diseases on the oral health of the elderly and define how the oral health professional can diagnose the oral manifestations of a chronic disease.

Material and Methods: To carry out this review article the search strategies included electronic databases, reference lists of articles, and selected textbooks. Articles and textbooks used in this study were mainly reached by using the following keywords: "oral health", "elderly", "chronic diseases", "cardiovascular disease", "Parkinson's disease", "kidney dysfunction", "metabolic disorders", "quality of life". By the end of the research, 34 scientific articles were selected.

Results: An inflammation in the oral cavity can trigger a cell and immune response, which will be transmitted by the blood stream to the other components of the individual systems. Parkinson's disease has repercussions in the oral cavity, not only by motor dysfunction, but also by administered drugs that can lead to xerostomia. Regarding renal impairment, the dental professional must pay special attention primarily to the medication prescribed to the patient, in order not to increase the risk of nephrotoxicity. Apart from this fact, scientific studies indicate a strong association between metabolic disorders and the development of oral diseases.

Discussion: The weakening of oral health in the elderly mainly occurs when there is a frequent decrease in medical and dental care, neglect of oral hygiene and when there is a systemic pathology responsible for the development of poor oral health conditions.

Conclusions: As a result of the heterogeneity of the elderly population, the improvement of oral health should be given according to the diversity of needs required. The frequent presence of systemic diseases and polypharmacy among the elderly, in addition to the possible coexistence of various risk factors, contribute significantly to the development of oral diseases. Thus, in order to enable healthy aging, the dental professional has a key importance in the prevention, diagnosis and treatment of oral diseases among the elderly.

Keywords: Chronic diseases, Oral health, Elderly, Quality of life

Introduction

Aging is a natural and progressive process capable of producing limitations and changes in the functioning of the body making the individual more vulnerable and susceptible to chronic diseases. An individual is considered elderly when they are in the limit of their working lives and aged over 65 years [1].

The results of the 2011 national census in Portugal showed that the elderly population of Portugal in 2005, represented 17.1% of the total population [2]. According to projections of the National Statistics Institute of Portugal expected for 2060, studies have demonstrated the high probability of a strong demographic aging due to low birth rate and high life expectancy among the Portuguese population [2].

Given the technological and scientific developments in the field of medicine there has been an improvement in living conditions and the access to health care and early detection of diseases which justifies the aging of the population worldwide [2]. Therefore, the general aging of the population and the need to create favorable conditions for the many patients with chronic diseases elderly is incontestable. According to Guralnik *et al.*, the elderly tend to suffer dramatic psychological, physiological and functional

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changes at the end of their lives, enhancing the incidence of various systemic diseases [3].

Some of the predisposing factors, in addition to cellular degeneration - directly proportional to the increase in age - are stress, careless diet, sedentary lifestyle, bad habits such as alcohol and tobacco consumption and, in some way, the individual genetic predisposition [4].

The most frequent diseases affecting the elderly are diabetes, kidney and liver dysfunction, cardiovascular problems, obesity, Parkinson's disease and Alzheimer's disease, among others [5].

Overall, all of which affect a special system: the oral cavity. Oral health is a crucial factor for the maintenance of balance and harmony of the human body. The quality of chewing, swallowing, speech, aesthetics and psychological state, directly interfere with and individual's quality of life [6].

It should be noted that, beyond the limitation and loss of autonomy induced by chronic diseases in the elderly, there is also an increased burden on their carers, whether family, professional caregivers and healthcare professionals [6].

It is important to understand the direct association and the possible interactions between systemic diseases and the oral cavity. Studies that have linked oral health to systemic diseases have increased considerably, especially in association with metabolic diseases [7]. Some researchers have suggested that subjects with diagnosed chronic inflammations, such as periodontitis, active dental caries and tooth loss can increase the risk of cardiovascular disease [7]. An oral pathology leading to a local inflammation may lead to increased reactive protein, fibrinogen and circulating leukocytes, which are recognized by inflammatory markers, may increase the risk of hypertension and coronary heart disease [7].

Periodontal disease may also be associated with coronary heart disease, diabetes, and hypertension. Just as the systemic metabolic condition and the individual may be related to the emergence of the oral inflammatory reaction that may develop to a periodontal disease [8].

The increase in life expectancy and consequent aging of the population is one of the greatest achievements attained by mankind; but it is also a constant challenge [9].

Throughout this article we intend to review some systemic pathologies characteristics of the elderly and establish a relationship with the oral health of individuals, so that health professionals can intervene in a multidisciplinary way in the treatment and prevention of diseases.

Materials and Methods

To carry out this review article the search strategies included electronic databases, reference lists of articles, and selected textbooks. Articles and textbooks used in this study were mainly reached by using the following keywords: "oral health", "elderly", "chronic diseases", "cardiovascular disease", "Parkinson's disease", "kidney dysfunction", "metabolic disorders", "quality of life". By the end of the research, 34 scientific articles were selected.

Results

Cardiovascular Diseases

Cerebrovascular diseases, hypertension and coronary artery disease are examples of cardiovascular diseases. In Portugal, it represents 40% of the number of deaths of the population. This means that the likelihood of dying due to cardiovascular disease is almost 50% [6].

Periodontal disease seems to represent a significant role in cardiovascular disease. Both have chronic, multifactorial etiology and literature already has numerous cases that associate both pathologies [6].

The first study on this association with positive results was made in 1989 by Mattila, et al. In 1996, Beck, et al., published results of a prospective study which monitored 1147 men. The results mentioned that for each 20% increase of bone loss (associated with periodontitis) the incidence of coronary disease increased 40% [10]. De Stefano, et al. published a prospective study which concludes there is a 25% increase in the risk of coronary disease in patients with periodontal disease compared to individuals without periodontal disease [10].

Scannapieco also refers to chronic oral inflammations, dental caries at an advanced state, periodontal disease and tooth loss associated with infectious processes that can accelerate the risk of cardiovascular disease development [7].

Infections that develop in the oral cavity due to periodontal disease or a local infectious process (due to extensive caries, for example) increases the number of C-reactive protein, fibrinogen and white cells in the blood stream. These inflammatory markers, when found, are related to increased risk for developing coronary heart disease and hypertension [7].

Pathogens in the oral cavity responsible for inflammatory processes release lipopolysaccharides (endotoxins) that can invade the bloodstream and cause bacteremia, directly affecting the endothelium and providing the onset of atherosclerosis. With the continuous inflammatory process in the oral cavity, the atheromatous plaque may become unstable, leading then to the complete blockage of an artery which can lead to a stroke, which is nothing more than the leading cause of death in Portugal [11].

Despite all this evidence, the pathophysiological mechanisms that may establish the relationship between cardiovascular disease and oral inflammation, are not fully clarified. More studies are needed, with more homogeneous samples to study the cause and effect between the inflammatory diseases of the oral cavity and the development of cardiovascular diseases.

Parkinson's Disease

Aging corresponds to the physiological process of human beings, after reaching adulthood in which cell death occurs and some organ dysfunction may occur. Although the cognitive decline is not a normal part of aging, the probability of dementia and Parkinson's disease and Alzheimer's disease development is relatively high, representing the leading causes of mortality among the elderly [12].

Parkinson's disease is a neurodegenerative, idiopathic disease, which affects most adults over 60 years old and is characterized by dementia and loss of cognitive abilities [9].

Etiologically, it is a multifactorial disease involving environmental and genetic risk factors, such as family history, advanced age, decreased level of education, cardiovascular disease association, among others [9].

This neurodegenerative condition is described by the presence of extracellular amyloid B peptide and also neuronal and synaptic loss, mainly caused by the loss of dopaminergic neurons, which results in shaking, rigidity, and bradykinesia [9,13].

In the early stages, patients may present depressive symptomatology mainly identified by the inability to perform functions and loss of motor and cognitive autonomy. Due to loss of cognitive function and ability to maintain personal hygiene, people with Parkinson's disease are more susceptible to the development of oral health problems and deterioration of health and functioning as the disease progresses [12,14].

The treatment of patients with Parkinson's disease has the main goal of improving cognitive and functional performance, reduce behavioral disorders, mood stabilization and quality of life improvement [14].

As previously described, Parkinson's disease patients have greater difficulties in their motor skills in order to perform tasks related with their personal and oral health care, the having as a direct consequence deterioration of oral and general health [14]. Therefore, as is expected, it is often associated with Parkinson's disease, poor oral health conditions, the presence of plaque and gingival bleeding [14]. Daily brushing and cleaning dentures may be difficult tasks due to the symptoms that characterize a patient with Parkinson's disease [14].

Studies indicate that elderly patients with cognitive impairment, or Parkinson's disease have significantly degraded and less cleaned prostheses in comparison with healthy individuals. Another consequence of poor oral hygiene is an increasing trend of coronal and root caries, observed with increasing severity of dementia and motor deficit [14].

However, physical mobility limitation is not the only cause for the installation of a poor state of oral health. These patients also have high levels of caries, tooth loss, periodontal disease, pain experience, chewing difficulties and poor function of the prosthesis due to various risk factors [15].

These patients are also characterized by an increase in unstimulated salivary secretion, or drooling that can be physiological or pathological, and affects approximately 75% of unmedicated patients [16,17]. Tooth loss is strongly correlated with the use of anticholinergic and monoamine oxidase inhibitors and poor oral health, due to the development of xerostomia [17].

Dysphagia is known to be a common symptom in most patients with Parkinson's disease and may result in a pneumonia, especially when oral hygiene is neglected [17]. Due to the severity of the potential consequences of dysphagia, it is important that evaluation of these treatments on morbidity / mortality are well performed. Furthermore, saliva is an important component of oral health. It works like a buffer and a source of ions responsible for the remineralization of teeth [17].

In addition to this set of problems related with Parkinson's disease, also associated to, but less frequently, is the burning mouth syndrome that is a condition characterized by the

sensation of burning in the oral cavity, whereas the mucosa is clinically normal [18]. The most affected areas are the anterior third section of the tongue, hard palate, lips and edentulous alveolar ridge [18].

The increased quality of life and overall health among the elderly is associated with the maintenance of natural teeth and oral rehabilitation. However, a patient with Parkinson's disease the cognitive and motor skills are impaired and this condition can lead to inadequate control of dental biofilm [14].

During early dementia, it is essential routine dental appointments to eliminate potential sources of pain, illness and infection and restore teeth, dentures, or both for optimal function. It is important to anticipate future oral decline in treatment planning and establish aggressive preventive measures, such as the use of topical fluoride, chlorhexidine, or both [13].

Caregivers and family members should be informed about the need of daily patient care with daily oral hygiene. Clinicians should maintain medical records and current drug prescription on these patients to avoid possible complications such as postural hypotension, adverse interactions with epinephrine, the potential excessive sedation and salivary gland dysfunction induced by medication [13].

It is essential that both the family and the oral health professional are the knowledge holders concerning this and other conditions to be able to foresee and prevent the degradation of the oral health state of these patients, acting preventively.

Kidney dysfunction

Kidney failure is a systemic change quite common that causes a reduction or limitation of the glomerular filtration capacity of the kidneys, causing various health problems such as anemia, bone hemostatic problems and biochemical changes, gastrointestinal and dermatological disorders. The oral cavity may also suffer several changes that have been described in both soft and hard tissues, formation of dental calculus, increase in the number of dental caries and the incidence of periodontal disease associated to physiological disorders [19]. In addition, patients with chronic diseases are often affected by emotional stress, due to the need for continued treatment and limitation of their social activities, causing a decline in their quality of life [19].

One of the most common manifestations in patients undergoing hemodialysis is pallor of the oral mucosa, because of their anemic condition (erythropoietin production deficiency) [20].

Studies have reported that kidney dysfunction is a major role in periodontal disease severity due to the increased susceptibility to infection and / or decrease of the immune response of the host [21]. The decrease of oral health care is very common and the increase of inflammation and atherosclerotic complications may contribute to more severe clinical cases. This is mainly due to the advanced age of the patients [22].

Regarding the dental appointment, it is very important to instigate and motivate these patients to practice a proper oral hygiene. Almost all patients with kidney impairment have signs and / or symptoms in the oral cavity and it is necessary to adapt the treatment plan to the special condition of each patient [22]. The dental professional must pay attention to the administration

/ prescription of any drug [23]. The doses of the drugs which are excreted in the urine should be adjusted by increasing the intervals or by varying doses. Penicillin, clindamycin and cephalosporins are the antibiotics of first choice for these patients. Tetracyclines and aminoglycosides are not indicated. Regarding analgesic, acetaminophen is the best choice. Anti-inflammatory drugs like ibuprofen should be avoided due to the increased risk of worsening the kidney dysfunctional condition [23]. It is important to keep an updated record about metabolic conditions, acidosis and hypertension [22]. It is of crucial importance the assessment of the patient's symptoms, such as: fatigue, weakness, pruritus, nausea, and also the frequency of hemodialysis queries. The appointment with the dentist should be the day after dialysis, once the patient is stable [23].

Metabolic disorders

Several studies have been conducted in order to determine the relevance of metabolic disorders as risk factors for the development of oral diseases such as periodontitis [24]. It is known that the prevalence of metabolic disorders in many countries is high and tends to increase: 22% of the adult population and 42% of the elderly population in the United States of America and similar values have been registered in other developed countries [25].

Diabetes Mellitus is a chronic degenerative disorder characterized by abnormalities in the metabolism of carbohydrates, proteins and lipids due to absolute deficiency in insulin secretion and / or reduction of its biological effect. Scientific knowledge reveals that patients that suffer from this pathology have hyperglycemia and increased susceptibility to certain infections. These infections may lead to the loss of metabolic control and cause serious complications in other structures such as the retina, kidneys, nervous system or periodontal tissues [6].

According to research, the association between these disorders and oral diseases is very possible. Therefore, we may conclude that metabolic disorders are more commonly associated with periodontal diseases, so this should be officially considered a potential complication of diabetes, when assessing the patient [24,26].

The treatment of periodontal disease could be one of the main procedures in the health care of a patient with metabolic [25].

In 1990, Ueta *et al.* found that the prevalence of periodontal disease in patients with uncontrolled type 2 diabetes was generally higher compared with individuals without any systemic or metabolic disorder. The diabetic condition weakens the synthesis of collagen and glycosaminoglycans by the gingival fibroblasts, stimulates collagenolytic activity of the crevicular fluid, which results in a loss of periodontal fibers and supporting alveolar bone, leading to an increased mobility of the teeth.

However, several studies attribute periodontitis as being mainly a consequence of diabetes hyperlipidemic condition, revealing this to be a more important risk factor than the elevated blood glucose levels [24].

However, it is necessary to take into account factors such as age and the presence of infragengivais calculus and plaque that may play equally an important role in the increased prevalence

and severity of periodontitis [24]. Despite these data, regardless of metabolic disorders that the patient may have, it is imperative to maintain proper oral hygiene habits [24].

In order to prevent oral diseases in elderly patients, it is necessary to pay attention to the recommendations and promote proper oral health behavior. Furthermore, it is also important efficient management and control of diseases associated to metabolic consequences, including the most common characteristics in these patients such as obesity, hypertension and diabetes [27].

Discussion

Most oral cavity changes, tissue and functional, related to age are secondary to extrinsic factors that act throughout life, and the age, alone, has only a little effect [28].

The debilitation of oral health in the elderly mainly occurs when there is a decreased access to medical and dental care and oral hygiene neglect or when there is a systemic disease with secondary manifestations in the oral cavity [28].

In the elderly the most common oral diseases are periodontal disease and dental caries, making these two situations the main causes of tooth loss. The oral lesions and xerostomia are also very common oral conditions among the elderly [28].

Risk factors such as low educational level, the absence of medical and dental monitoring the presence of a small number of teeth, systemic diseases and consumption of tobacco and alcohol contributes to the progression of periodontal disease in the elderly [28].

The most cariogenic risk in these patients is due to increased gingival recession (especially for root caries), dysfunction of the salivary glands, less effective oral hygiene habits, decreased motor function and a diet rich in sugars [28].

Xerostomia has an increasing prevalence with age, affecting nearly 30% of elderly people [28]. A hypofunction of the salivary glands, which results in qualitative change and / or quantity of saliva can be the result of drug therapies as well as systemic diseases such as diabetes, Sjögren syndrome and AIDS [29]. Moreover, also the most often prescribed drugs to elderly have as main side effect xerostomia [28]. Among these, the most common are the anti-depressives, anti-psychotics, anti-cholinergic, sedatives, antihypertensives, antihistamines and cytotoxic medication [6].

Among the elderly dementia and Alzheimer's disease influence oral health, in which the decrease in manual dexterity interferes with the oral hygiene capacity. In the case of Parkinson's disease the main difficulties are associated with the decrease of oral hygiene capacity but also decrease of chewing and prosthesis retention capacity [9]. The typical dysphagia in patients with Parkinson's disease turns to be a motivating factor to improve oral hygiene habits in order to avoid situations of pneumonia caused by the aspiration of plaque microorganisms [17].

Certain chronic diseases, as well as adverse effects of some drugs can condition appetite and cause poor diet that can also easily affect oral health by depressing the immune system, relating to cases of oral cancer and oral diseases [28].

It is commonly accepted that an inflammation in the oral cavity due to a pathological process (dental caries and periodontal disease) is associated with a response at the systemic level. The change is transmitted by the blood circulation and in patients with a pathology already installed, the risk of triggering symptoms is higher. The relationship between oral and systemic manifestation becomes an important issue that a health Professional needs to assess carefully.

The mechanical removal of plaque by brushing and flossing is a basic procedure for personal oral hygiene which should not be overlooked, for both dentate patients and for patients with prosthesis [29].

It is vital to know the physiological changes resulting from the aging process and knowing how to identify the geriatric syndromes to prevent diseases and promote health to the elderly [30].

The fact that the dental professional is aware of any abnormal changes in the oral cavity can not only lead to a diagnosis of a systemic pathology but can also end the progression of a condition that was already installed [31].

The relationship between the general practitioner and the dental professional is of high significance. There are numerous drugs which have manifestations in the oral cavity and procedures that require the suspension of certain drugs. The oral cavity must not be evaluated as a system independent of all others, but an important part of the whole human body [31,32].

Conclusion

The proportion of elderly people is constantly increasing worldwide, especially in the developed countries. This, together with the increased prevalence of oral diseases and chronic diseases in this population, presents a challenge to society due to its negative effects.

Due to the aging population, there is a need for services that meet expectations and particularities of elderly patients because, with age increasing, they develop numerous physiological and / or pathological changes that affect the dental treatment. All these aspects require new research about the oral health of the elderly, in a community basis.

The physiological changes that occur in the course of aging result from complex interactions between the various intrinsic and extrinsic factors and are manifested through structural and functional changes. Whatever the mechanism, and the cell aging time, this does not reach simultaneously all the cells, tissues, organs and systems, so degeneration occurs gradually.

As a result of the heterogeneity of the elderly population, the improvement of oral health should be given according to the diversity of needs required. The presence of systemic diseases and frequent medication among the elderly, in addition to the possible coexistence of various risk factors, contribute significantly to the development of oral diseases. Thus, to allow a healthy aging, the dental professional is very important in the prevention, diagnosis and treatment of oral diseases in elderly people that can increase morbidity and mortality. Furthermore, it is necessary to develop projects especially to control oral diseases, promote health and improve the quality of life of the elderly. A greater emphasis on implementation of protocols for oral health education of the population is essential for the maintenance of their quality of life.

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