Oral Implications of Polypharmacy in the Elderly

Mabi L. Singh, DMD, MS[a,b,*], Athena Papas, DMD, PhD[b]

KEYWORDS

• Saliva • Medications • Salivary hypofunction • Elderly • Polypharmacy

KEY POINTS

- The elderly population is increasing and has the highest number of users of prescription and over-the-counter (OTC) medication.
- Age-related changes occur in the body, which affect pharmacokinetics and pharmacodynamics.
- Prescription and OTC medications can cause myriad side effects in the oral cavity, and the elderly are more vulnerable.
- The adverse events in the oral cavity may cause discomfort and loss of function and decrease quality of life in the elderly.

INTRODUCTION

Early diagnoses and treatment of diseases have led to longer life expectancy. However, the treatments of these diseases involve pharmacologic agents, and as people age, they develop multiple health ailments, which can lead to polypharmacy. There are age-related changes in the systems of the body, which alter the pharmacokinetics and pharmacodynamics of medications and make the elderly more vulnerable to adverse events. A major side effects of medications is the qualitative and quantitative change the cause in saliva (salivary hypofunction), by their anticholinergic effects. Saliva plays a pivotal role in the homeostasis of the oral cavity because of its protective and

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[a] Dry Mouth Clinic, Tufts University School of Dental Medicine, 1 Kneeland Street, Boston, MA 02111, USA; [b] Division of Oral Medicine, Department of Oral Pathology, Oral Medicine, Craniofacial Pain, Tufts University School of Dental Medicine, 1 Kneeland Street, Boston, MA 02111, USA
* Corresponding author. Department of Oral Pathology, Oral Medicine, Craniofacial Pain Center, Tufts University School of Dental Medicine, 1 Kneeland Street, Boston, MA 02111.
E-mail address: Mabi_l.singh@tufts.edu

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functional properties, which include facilitating speech, swallowing, enhancing taste, buffering and neutralizing intrinsic and extrinsic acid, remineralizing teeth, maintaining the oral mucosal health, preventing overgrowth of noxious microorganisms and xerostomia. With salivary hypofunction, a plethora of complications arise, resulting in decreased quality of life in the elderly. However, the anticholinergic effects of medications can be overcome, and the oral cavity can be restored to normalcy.

CHANGES IN THE ELDERLY POPULATION

With improvements in health care, nutrition, lifestyles, habits, and safety practices, the life expectancy of people in the United States is increasing. This trend is true regardless of race or sex. From 1950 to 2010, the life expectancy of Americans of all races, both male and female, rose from 68.2 years to 78.7 years. The average life expectancy for white Americans (78.9 years) is longer than that of black or African Americans (75.1 years). Further, the life expectancy of white women is 81.3 years, compared with that of white men at 76.5 years. The life expectancy of black women is also longer than that of black men, at 78 years and 71.8 years, respectively.[1]

Globally, with the increase in life expectancy, the demographics of the total population are changing. In 2011, 14% of the total population of the United States was older than 65 years. It is estimated that in 2020, this percentage will increase to 16.76%, and by 2050, the percentage of people, both male and female, older than 65 years in the total population will increase to 20.95%.[2]

AGE-RELATED EFFECTS ON THE BODY

Chronologic aging is a process that affects various biological and physiologic processes in the human body. With advancing age, the functional abilities of organ systems tend to decrease. Although there is variability in the age-related changes that take place within each individual, aging generally affects all of the major biological and physiologic systems of the body.

For example, as one ages, there is a change in the composition of the body leading to a decrease in total body water and lean body mass, countered by an increase in body fat. Together, these age-related changes result in a diminished ability to distribute, metabolize, and excrete (clear) certain drugs. This situation causes water-soluble medications to be processed differently and less effectively. Lipophilic drugs because they have an increased volume of distribution, causing a prolonged half life, whereas water-soluble drugs have a smaller volume of distribution and a shorter half life.[3]

The liver is affected in several ways as the body ages. Specifically, there is a decrease in hepatic mass, hepatic blood flow, and enzymatic efficiency. The kidneys also undergo age-related alterations, such as a decrease in renal plasma flow, glomerular filtration rate, and tubular secretion. After these changes, as one ages, there is an increased sensitivity to medications, which can result in medication-induced hepatotoxicity and nephrotoxicity. In the cardiovascular system, the elasticity of blood vessels begins to decrease with age. This stiffening of blood vessels results in the decreased mechanical effectiveness of the heart. Furthermore, in the gastrointestinal system, the secretion of hydrochloric acid and pepsin decreases with the aging of the body. This situation then results in changes in absorption in the gastrointestinal tract.[4]

In the salivary glands, the aging process may cause the number of acinar cells to be reduced and to be replaced by fibrous and fatty tissue. This process may cause the composition of saliva to change.[5–7]