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Original Study

Medication Use and Its Potential Impact on the Oral Health Status of Nursing Home Residents in Flanders (Belgium)

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A B S T R A C T

Background: Polypharmacy is considered the most important etiologic factor of hyposalivation, which in turn can initiate oral health problems.
Objectives: To describe the medication use of nursing home residents, to identify the medications related to hyposalivation and to find possible associations between the different classes of medication, the number of medications, and the oral health status of the residents.
Design: A cross-sectional study.
Participants: The study population consisted of the residents of a nonrandom sample of 23 nursing homes from 2 Belgian provinces, belonging to the oral health care network Gerodent. All residents of the sample visited the Gerodent mobile dental clinic between October 2010 and April 2012.
Measurements: For each resident, oral health data, demographic data, and an overview of the total medication intake were collected.
Results: The study sample consisted of 1226 nursing home residents with a mean age of 83.9 years [standard deviation (SD) 8.5]. The mean number of medications per person was 9.0 (SD 3.6, range 0-23, median 9.0). Of all prescribed medication, 49.6% had a potential hyposalivatory effect with a mean number per person of 4.5 (SD 2.2, range 0-15, median 4.0). In the bivariate analyses, associations were found between medication use and oral health of residents with natural teeth: the higher the number of medications (with risk of dry mouth) and the overall risk of medication-related dry mouth, the lower the number of natural teeth ($P = .022$, $P = .005$, and $P = .017$, respectively). In contrast, the total treatment need tended to decrease with rising medication intake, resulting in a clear increase of the treatment index with rising medication intake ($P = .003$, $P < .001$ and $P = .002$). The logistic regression model analysis confirmed that the proportion of carious teeth diminished and the treatment index increased in case of rising medication intake, especially when considering the number of medications with a risk of dry mouth and the overall risk of medication-related dry mouth. A possible explanation for this trend might be the finding that in the group with a high medication use, the teeth most sensitive to caries and plaque retention could already have been extracted at the moment of screening for the study, because of a lifelong history of caries pathology.
Conclusions: This study shows a high level of medication use, including the substantial intake of medication with a possible hyposalivatory effect. Moreover, clear associations were found between the medication intake and the oral status of the residents.

The authors declare no conflicts of interest.

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Nursing home residents are characterized by multiple chronic diseases, disability, frailty and considerable care dependency. Correspondingly, the majority of them suffers from cognitive impairment and requires assistance with activities of daily living (ADL). In addition, the complex care for these residents is further challenged by the high prevalence of pain, depression, behavioral and psychological symptoms, urinary incontinence, malnutrition, falls, and pressure ulcers.[1] Consequently, the pharmacologic treatment of nursing home residents often results in polypharmacy.[2] Elseviers et al[3] reported that the mean number of medications per resident in Belgium was 8.4 in the year 2010. Only 1% of the residents took no medication and one-third were prescribed 10 or more medications. The most recurrent chronic medication types were hypnosedatives (61%), antidepressant agents (50%), and laxatives (50%). Similar results were found in other countries.[4–7]

Polypharmacy is considered the most important etiologic factor of hyposalivation. Other etiologic factors are age-related degenerative changes in the salivary glands[8–13] and several systemic disorders such as diabetes, depression, Parkinson disease, Alzheimer disease, rheumatoid arthritis, and nutritional deficiencies.[14–17] Not only the type but also the number of medications has an impact, causing decreasing salivary flow rates as the number of medications increases.[18,19]

Previous studies investigated medication use with a hyposalivatory side effect in community-dwelling older people.[18–21] However, the only similar study in nursing home residents to date, which measured salivary flow, had a limited sample size[22] and other studies in nursing homes only reported on the prevalence of xerostomia (the feeling of a dry mouth) in relation to medication use.[23,24] So far, few studies have discussed the prevalence of salivary gland hypofunction in nursing home residents. A study of Glazar et al[25] showed that 27% of the residents suffered from hyposalivation. A second study of van der Putten et al[22] stated that 24% had an unstimulated whole saliva below 0.1 mL/min. A common and primary symptom of salivary gland hypofunction or hyposalivation is xerostomia, the subjective feeling of dry mouth. The prevalence of xerostomia among nursing home residents varies between 36% and 52%, depending on the study.[22,24,26,27] Unfortunately, all studies on salivary flow or xerostomia in nursing homes exclude cognitively impaired residents, because they could not follow instructions to measure salivary flow or answer the xerostomia questions, and therefore these studies cannot be considered representative for the overall nursing home population.

A recent systematic review addressed the oral health–related clinical implications of medication-induced salivary gland dysfunction in the general population.[28] The authors stated that more research on this topic is needed, although several studies indicated a possible relationship between xerogenic medication and caries activity. Two recent studies of Tiisanoja[21,29] have uncovered an association between salivary flow and dental caries in older persons taking medication with sedative properties: the higher the sedative load, the higher the caries activity and the lower the salivary flow. Bardow et al[19] demonstrated that low unstimulated flow rates lead to higher levels of both Lactobacilli and tooth demineralization, which risks rapid caries progression. Dental restoration rate, reflection of caries incidence history, and intake of medication have also been indicated to be related: persons taking medication had higher restoration rates compared to those not taking medication.[30,31] Moreover, persons taking antidepressant xerogenic medication had higher restoration rates, compared to those taking nonxerogenic medication.[31] In contrast with caries, no clear relationship between salivary flow and periodontal infection or oral mucosal changes has been found.[29,32]

As previously stated by several authors,[18,30] there is a clear need to further explore medication classes and their potential association with salivary gland hypofunction and impairment of oral health. Moreover, scarce attention has yet been devoted to oral consequences of a dry mouth in nursing home residents.

The aim of this study is first to describe the medication use in a sample of nursing home residents in order to identify the medications related to hyposalivation and, second, to find possible associations between the different classes and numbers of medications and the oral health status of the residents.

Materials and Methods

Study Design, Study Population, and Study Sample

The present study is a cross-sectional study approved by the Ethical Committee of the Ghent University Hospital (B670201318461). The study population consisted of nursing home residents from East and West Flanders, 2 Belgian provinces, from which a sample of 23 nursing homes was obtained, which all belong to the oral health care network Gerodent. More information on the oral health care network is described in a previous article by Janssens et al.[33]

Data Collection

One of the tasks of the Gerodent oral health care network is providing preventive and curative oral care for nursing home residents. The data for this study were extracted from the oral health records of the nursing home residents attending the mobile dental clinic for a first consultation between October 2010 and April 2012. The oral assessment was performed by one of the 3 dentists of the Gerodent team (B.J., J.V., and L.D.V.), all of whom are experienced in geriatric dentistry and worked as a team. The oral health data included the number of natural teeth, dental caries, residual roots, filled teeth, the D_3MFt (sum of teeth with visually obvious dental decay in the dentine of the tooth D_3, missing teeth M, and filled teeth F), the restorative index $[F/(D_3+F)]$, information about the presence of denture-related pressure ulcers and removable dentures as well as an oral treatment needs assessment comprising the need for fillings and extractions, the treatment index $[(F + M)/(D_3 + M + F)]$, and the need for repair, rebasing or renewal of a removable denture. The oral health status was diagnosed in a fully equipped mobile dental unit with a portable dental operating light (Aseptico) and a mobile x-ray device (Rextar EXO1414). More information on how the data of the oral status were gathered can be found in the previously mentioned study.[33] Subsequently, age, gender, care dependency (KATZ scale[34]), and increased reimbursement were extracted from the medical records of the participating residents, which were kept by the caring staff and physician of the nursing home. Increased reimbursement is a governmental measure for persons whose income is below a certain limit, and who are thus entitled to a higher reimbursement for health care interventions. For the analysis, 3 levels of care dependency were defined as follows: low (KATZ O and A), medium (KATZ B), and high (KATZ C and Cd).

Only the residents with an overview of the total medication intake in their oral health records were considered for analysis. This overview was obtained by a print of the nursing homes' medication lists. For each resident, the medication was classified by the Anatomical Therapeutic Chemical (ATC) classification system from the WHO Collaborating Centre for Drug Statistics Methodology.[35] This classification system was designed as a tool for presenting drug utilization statistics and classifies drugs into groups at 5 different levels: 14 anatomical main groups (level 1), therapeutic/pharmacologic subgroups (level 2), chemical/pharmacologic/therapeutic subgroups (levels 3 and 4), and chemical substance (level 5). Complementary, homeopathic, and herbal traditional medicinal products are generally not included in the ATC classification system and were not considered as medication in this study, even if they occurred on the medication list of the resident. For this analysis, the prescribed daily dose and the duration of use were not considered.