Aspects of xerostomia prevalence and treatment among rheumatic inpatients

Žygimantas Guobis, Nomeda Basevičienė, Pajauta Paipalienė, Irena Niedzelskienė, Giedrė Januševičiūtė[1]

Department of Dental and Oral Diseases,
[1]Faculty of Odontology, Kaunas University of Medicine, Lithuania

Key words: *xerostomia; xerophthalmia; rheumatic diseases; caries; treatment.*

Summary. *Objectives. The aim of the study was to evaluate the prevalence of xerostomia among inpatients with rheumatic disorders at the Hospital of Kaunas University of Medicine (HKUM) and its association with age, sex, and xerophthalmia. Determining adequate treatment for xerostomia was also important, because untreated xerostomia may become aggravated and thus significantly impair patient's quality of life.*

Material and methods. The authors designed a special questionnaire for conducting all study-related enquiries. Patients for this study were selected according to their case records ranging from 1998 to 2004. In total, there were 483 cases chosen based on prevalent rheumatic diseases, which were most conducive to xerostomia.

Results. The results showed no significant evidence that the prevalence of xerostomia increased with age. Also, women were more susceptible to rheumatic diseases than men (W:M = 10:1) and are more likely to be affected by xerostomia and xerophthalmia (W:M = 2.5:1). A significant correlation was found between xerostomia and xerophthalmia.

Only 17.7% of xerostomia-positive patients were treated for xerostomia, in comparison with xerophthalmia-positive patients who were treated for xerophthalmia in 84.8% of cases. It was shown that the modalities of treatment administered for xerostomia were neither sufficient nor up-to-date according to current recommendations found in medical literature.

Conclusions. Xerostomia is closely correlated with xerophthalmia in rheumatic diseases. Xerostomia is more prevalent in older segments of population, especially in women, but we failed to prove statistical significance of older age in prevalence of sicca symptoms. Treatment administered to rheumatic patients for xerostomia in the HKUM is neither sufficient nor adequate.

Introduction

Xerostomia is often defined as a subjective complaint of dry mouth that may result from deficient production of saliva. Most of xerostomic patients' complaints are oral dryness, burning mouth, increased thirst, loss of taste, difficulty swallowing, chewing, speaking, oral breathing, unpleasant taste and odor, sensitive teeth, gastroesophageal reflux, and malfunction of removable prosthesis (1–6). Accordingly, the evaluation of xerostomia is very subjective, because most of xerostomic patients have no pathology in salivary glands. Thus, xerostomia is often considered a psychological expression. However, thorough clinical oral evaluation is necessary (7–14). Xerostomia can be found approximately in 4% to 29% of the general population, most commonly in women (1, 15–17).

Sometimes, when examining a xerostomic patient, first signs of oral candidiasis can be observed, caused by radical changes in immunological and microbiological status of the oral cavity (18, 19). Often xerostomia is found in patients with a considerable number of caries-affected and missing teeth, filled surfaces (DMF and DMFs), and poor oral hygiene indexes (20, 21) despite proper maintenance of oral hygiene by the patient (10, 22–24). Therefore, it appears that xerostomia is a polyetiological symptom, also caused by the use of various medications (4, 11), by primary and secondary Sjögren's syndrome (SS) (1, 21, 25–28), head and neck radiation therapy (26, 29–33), various hormonopathies, diabetes mellitus, long-lasting stress, intense smoking, decreased masticatory function, aplasia or agenesis of salivary glands, cystic fibrosis, primary biliary cirrhosis, AIDS, HIV, Parkinson's disease, renal dialysis, immunosuppression,

Correspondence to Ž. Guobis, Department of Dental and Oral Diseases, Kaunas University of Medicine Hospital, Eivenių 2, 50009 Kaunas, Lithuania. E-mail: zygimantasg@yahoo.com

amyloidosis, hemochromatosis, E avitaminosis, or silicon breast implants (9, 23, 33–36).

Research is conducted worldwide on the correlation of rheumatic diseases with xerostomia and patients' quality of life (37–41). It has been established that one of the most common factors causing xerostomia are rheumatic diseases, especially the so-called secondary Sjögren's syndrome (sSS) (1, 2, 4, 7, 9, 25, 29, 32–36, 42). Secondary Sjögren's syndrome is diagnosed when autoimmune changes in exocrine glands appear, following other rheumatic diseases such as systemic lupus erythematosus, rheumatoid arthritis, and scleroderma. Salivary gland dysfunction appears due to progressing lymphocytic infiltration in salivary acini, which in turn leads to inflammatory reaction causing acinar atrophy and proliferation of connective tissue. Sometimes such pathological changes originate in the minor salivary glands and may result in early symptoms of xerostomia, which are less intense than those in cases when the major salivary glands are affected. Sjögren's syndrome tends to afflict persons at the ages of 40 to 50 years, with the ratio of women to men commonly ranging from 5:1 to 17:1. Quite often secondary Sjögren's syndrome is misdiagnosed (1, 2, 7, 9, 25, 29, 34–36, 42), and this leads to inadequate treatment and impairment of patient's quality of life.

In the course of the present study, no sources were found indicating any recent research in Lithuania on prevalence of xerostomia and its correlation with other factors among patients with rheumatic diseases. The aim of the present study was to fill this gap, as well as to review current modalities of treatment administered for xerostomia in our country (and in Hospital of Kaunas University of Medicine (HKUM) in particular). Furthermore, it was a matter of great importance for us to present xerostomia as an existing problem, which has either been mostly ignored or has not received adequate solutions yet.

Rheumatic diseases being most xerogenic, patients afflicted by them were predominantly chosen for our study (1, 2, 4, 7, 9, 25, 29, 32, 35, 36, 42) with expectation to reveal the correlation between xerostomia, age, sex, and xerophthalmia, which could be helpful in diagnosing secondary Sjögren's syndrome.

The aim of the present study was to analyze the prevalence of xerostomia and its correlation with age, sex, and xerophthalmia, as well as to evaluate modalities of treatment administered for xerostomia to inpatients with rheumatic diseases during the period of 1998 to 2004 in the Department of Rheumatology of the HKUM.

Materials and methods

Inpatients' archival case records from the Department of Rheumatology of the HKUM (for the years 1998 to 2004) were selected for thorough analysis. This selection was based on four main diseases – rheumatoid arthritis (AR), systemic lupus erythematosus (LES), scleroderma (SC), and systemic sclerosis (SS) – which in comparison to other rheumatic diseases were known to be most conducive to xerostomia, i.e. secondary Sjögren's syndrome (1, 2, 4, 7, 9, 25, 29, 32, 35, 36, 42). The numbers of inquiries per disease were as follows: AR – 207, LES – 165, SC – 109, SS – 2 (too small for further statistical analysis). The total initial number of inquiries was 516; all selected in chronological sequence. It should be noted that the number of inquiries was an important statistical parameter for our study, in the course of which all the HKUM case-records of rheumatologic inpatients for the period of 1998–2004 with LES, SC, SS and for the period of 2003–2004 with AR were analyzed. We found that 25 patients were using xerogenic medications (tranquillizers, sedatives, etc.) and discovered 8 cases of seropositive or reactive arthritis – all of which were excluded from further analysis (33 cases in total). The analyzed population consisted of 12.6% of men and 87.4% of women (1:7 ratio). Their mean age was 51.9±0.7 years; for men it was 54.3±1.8 years (n=61) and for women – 51.5±0.7 years (n=422) (P<0.05) (t test, t=0.168).

Table 1 shows the categorization of the analyzed population according to disease and sex.

It demonstrates that the mean age of patients with

Table 1. **Distribution of the analyzed population according to disease and sex**

Disease	Men, %	Women, %	Ratio	Mean age, mean±SD, years
Rheumatoid arthritis	17.9	82.1	1: 4.5	56.3±0.906
Systemic lupus erythematosus	9.1	90.9	1:10	43.2±1.109
Scleroderma	8.3	91.7	1:11	56.8±1.193

Mean age in patients with LES is lower than that in other disease groups (χ^2=6420.4; df=3, P<0.001).

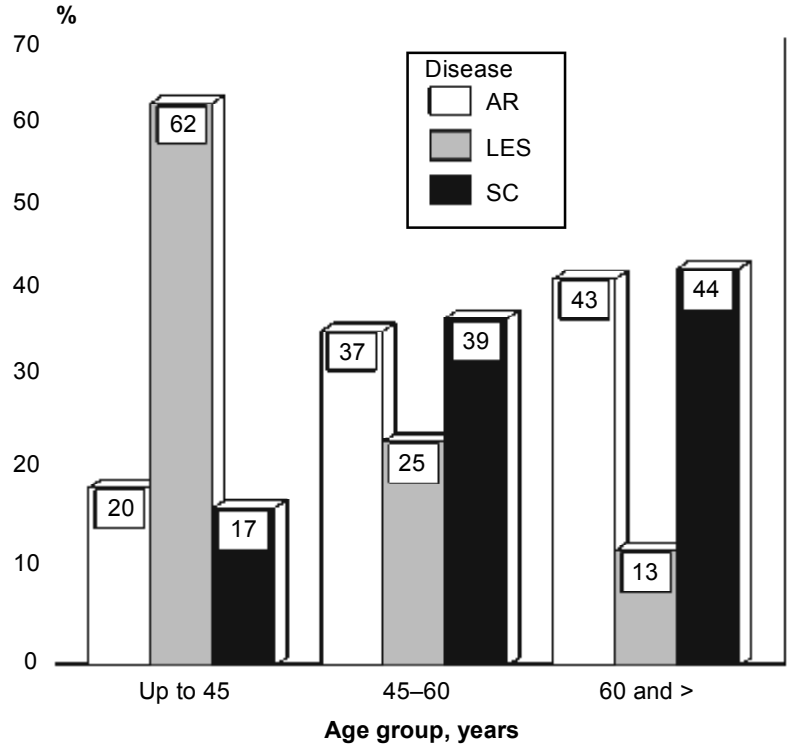

Fig. 1. **Distribution of patients by age and rheumatic disease**
AR – rheumatoid arthritis; LES – systemic lupus erythematosus; SC – scleroderma.

LES is lower than that of patients with other selected diseases (AR, SC, and SS) (P<0.001; df=3).

For the purpose of our analysis, the patients were divided into three groups according to their age: group 1 – up to 45 years, group 2 – 45 to 60 years, group 3 – more than 60 years (Fig. 1).

The fields in our questionnaire were name and surname, sex, case record number, age, disease, xerostomia (administered treatment), xerophthalmia (administered treatment). A patient was considered xerostomia-positive when oral dryness, dry tongue, salivary deficiency, and xerostomia were indicated in his/her case record. A patient was considered xerophthalmia-positive when ocular dryness, keratoconjunctivitis sicca, lacrimal deficiency, and xerophthalmia were indicated in his/her case record. The present study was approved by the Ethics Committee for Biomedical Research at Kaunas University of Medicine.

Statistical analysis. The obtained data were analyzed and compared using the SPSS software, version 10.0 for Windows. Student's t test coefficient between variable parameters such as mean values of age in different groups was calculated. χ^2 correlation coefficient between age groups, sex, xerostomia, and xerophthalmia was also calculated. All the data were expressed as a mean±standard deviation (SD). Values of P<0.05 were considered significant, P<0.01 – very significant.

Results

All of the selected cases were included in further analysis. A more exact breakdown of the analyzed population into categories by age and disease is presented in Table 1.

Xerostomia was recorded in 14.5% (n=67) of all patients. Our evaluation of its prevalence revealed a 1:3 men-to-women ratio (M:W = 1:3). The mean age of xerostomia-positive patients was 55.9±1.4 years, while that of xerostomia-negative patients was 51.2±0.7 years (P=0.013, df=48).

Table 2 shows the prevalence of xerostomia in respect to the variables of disease and sex. In order to determine sex-related differences in the prevalence of xerostomia among patients in each disease group, a men-to-women ratio was calculated for the prevalence of xerostomia (expressed in percentage). It is remarkable that there were significant sex-related variations in the prevalence of xerostomia between different disease groups. The highest prevalence of xerostomia was found in the group of patients with SC. However, there were no xerostomia-positive cases among men with SC at all.

Our study also revealed that xerostomia was treated only in 17.7% (n=12) of all xerostomia-positive cases. Treatment for xerostomia was administered to 12.5% of AR patients (n=3), and it was as follows: bearberry tea (1 case), sour diet (2 cases). Less than

Table 2. **Prevalence of xerostomia according to disease and sex**

Disease	Total, %	Men, % (n)	Women, % (n)	Ratio
Rheumatoid arthritis	11.6	5.4 (2)	12.9 (22)	1:2.4
Systemic lupus erythematosus	9.1	6.7 (1)	9.3 (14)	1:1.4
Scleroderma	28.4	0 (0)	28.4 (31)	–

See Fig. 2 for graphical expression of distribution of xerostomia according to age and disease.
See Fig. 3 for graphical expression of distribution of xerophthalmia according to age and disease.

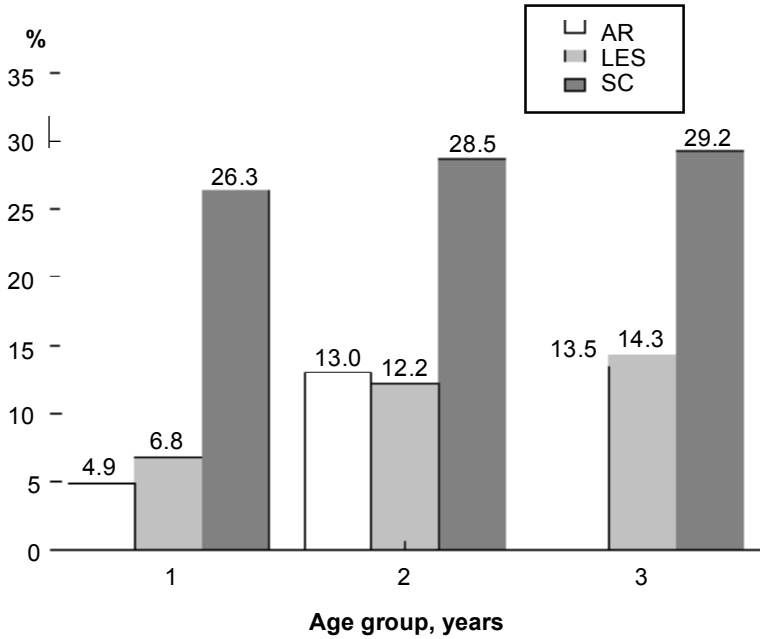

Fig. 2. **Distribution of patients with xerostomia by age and rheumatic disease**
AR – rheumatoid arthritis (χ^2=2.26; *df*=2, *P*=0.32);
LES – systemic lupus erythematosus (χ^2=1.82; *df*=2, *P*=0.40); SC – scleroderma (χ^2= 0.05; *df*=2, *P*=0.97).

one-third of LES patients (26.7%, n=4) received only sour diet (in all cases), and 16.1% of SC patients (n=5) were treated with pilocarpine (1 case), fuchsine (safranin-O) and vitamin B for cracks at the corners of the lips (1 case), artificial saliva (1 case), and sour diet (2 cases).

Xerophthalmia was diagnosed in 13.7% of all patients examined (n=66). There were 4.9% (n=2) of the xerophthalmia-positive cases among men, and 14.1% (n=24) of cases among women, which shows 2.5 times higher prevalence of xerophthalmia among women. The majority (85.7%) of all xerostomia-positive patients were also xerophthalmia-positive (P<0.01, χ^2=360.225, *df*=1).

Table 3 shows prevalence of xerophthalmia in respect to differences in disease and sex.

The highest prevalence of xerophthalmia was found in the group of patients with SC. In patients with other diseases, a similar distribution of xerophthalmia was observed even within different age groups.

Fig. 3 shows the prevalence of xerophthalmia caused by different diseases in relation to respective age groups.

It should be noted that there was a marked sex-related difference in the prevalence of xerophthalmia among AR and LES patients – there were significantly more xerophthalmia-positive women than men in these two groups. Moreover, there were no xerophthalmia-positive men with SC at all.

Fig. 3 shows that the older the analyzed age group was, the higher was the prevalence of xerostomia and xerophthalmia, but the difference was too small to be statistically significant.

Our study showed that xerophthalmia was treated in 84.8% (n=56) of xerophthalmia-positive cases. In the AR group, 84.6% (n=22) of patients received treatment: artificial tears and eye drops (15 cases), and only eye drops (7 cases). In the LES group, 93.3% (n=14) of patients received treatment: artificial tears

Table 3. **Prevalence of xerophthalmia according to disease and sex**

Disease	Total, %	Men, % (n)	Women, % (n)	Ratio
Rheumatoid arthritis	12.6	5.4 (2)	14.1 (24)	1:2.6
Systemic lupus erythematosus	9.1	6.7 (1)	9.3 (14)	1:1.4
Scleroderma	22.9	0 (0)	100 (25)	–

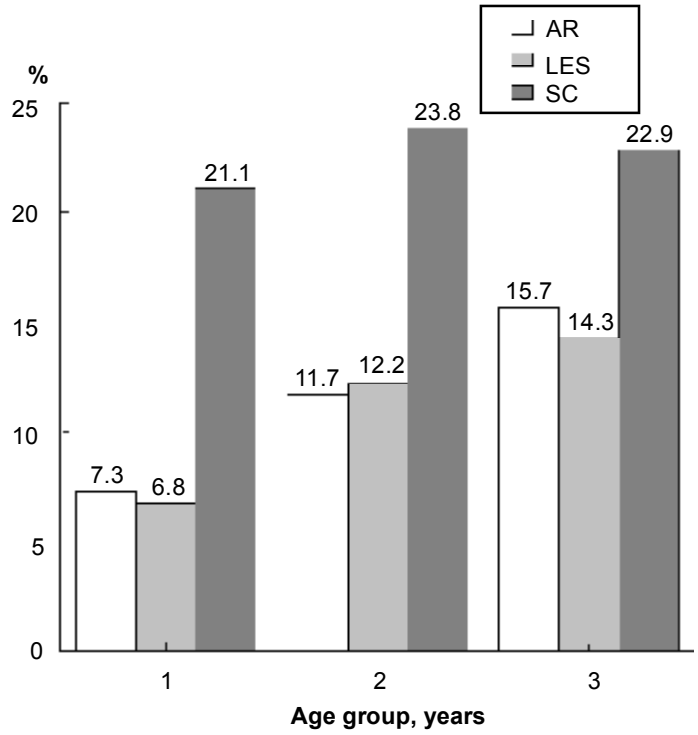

Fig. 3. **Distribution of patients with xerophthalmia by age and disease**
AR – rheumatoid arthritis (χ^2=1.89; *df*=2, *P*=0.38);
LES – systemic lupus erythematosus (χ^2=1.82; *df*=2, *P*=0.40); SC – scleroderma (χ^2=0.05; *df*=2, *P*=0.97).

and eye drops (10 cases), and only eye drops (4 cases). In the SC group, 80.0% (n=20) of patients received treatment with artificial tears and eye drops (15 cases) or only eye drops (5 cases).

Our study has shown that frequency and quality of treatment administered for xerostomia were markedly different from those of treatment administered for xerophthalmia.

Discussion

For the purposes of our study, we divided all rheumatic patients into separate disease groups. Then we investigated correlations of those diseases with age and sex pertaining to emergence of xerostomic symptoms. Our results proved to be either identical or very similar to those found in relevant medical publications (1, 2, 4, 7, 9, 25, 29, 32, 35, 36, 42). In addition, new data on current prevalence of xerostomia in Lithuania and on specifics of its treatment were obtained.

Most of the patients in our study were women (see Table 1). We calculated ratios of sex distribution in separate disease groups. In SC group, the ratio of women to men was the highest – 11:1, and in AR group – the lowest, 4.5:1 (Tables 2 and 3).

We divided our patients into three age groups: group 1 – up to 45 years, group 2 – 45 to 60 years, and group 3 – more than 60 years. We found that younger patients were mostly in LES group (Fig. 1). In other disease groups, the distribution of patients by age was almost equal, and all these diseases were more prevalent in older patients.

Our study has confirmed that symptoms of xerostomia and xerophthalmia are quite often diagnosed in rheumatic patients. We have established a distinct correlation of higher prevalence of xerostomia with a respective rheumatic disease and female sex. We

could not find any significant difference in the prevalence of sicca symptoms between younger and older age groups.

Xerostomia is more frequently diagnosed in women than men. In most cases, xerostomia becomes apparent in older age concomitantly with rheumatologic diseases and is often accompanied by xerophthalmia. This allows us to draw the conclusion that female sex and xerophthalmia could serve as reliable indicators of possible xerostomia in rheumatic patients.

The prevalence of xerostomia varies in different rheumatic disease groups investigated by us.

However, while most published studies reported that the prevalence of xerostomia in these disease groups was 15% for AR, 30% for LES, 32% for SC (2, 25, 41, 43, 44); our findings are as follows: AR – 11.6%, LES – 9.1%, SC – 28.4%. The comparison of the above results demonstrates a significant discrepancy in the LES group, which is rather difficult to explain. Perhaps, it is due to the fact that the population of our patients in LES group was considerably younger than that of other disease groups. It is quite possible that in the case of equal age distribution, the results would become similar (15–17, 39).

We could not establish a significant reliable direct dependence of sicca symptoms on age (Fig. 2 and Table 3). The prevalence of sicca symptoms increases with age, but it is too low to be relevant. Still there is a distinct increase in the prevalence of sicca symptoms after the age of 45. The question could be raised here, what are the main factors influencing sicca symptoms: the age of the patient or the duration of a rheumatic disease? However, this is beyond the scope of the present study.

Likewise, a higher prevalence of sicca symptoms was found in women. Men afflicted with rheumatic diseases only seldom displayed these symptoms (Tables 2 and 3).

It is evident that the level of sex hormones and age are factors that exert a considerable influence on the exocrine glands and can evoke the sensation of dryness by affecting patients' psychological state. Age per se has no influence on the functioning of major salivary glands, and ageing alone does not cause their dysfunction (14, 15, 43, 45, 46). However, comorbid diseases and intake of medications should be pointed out as the main factors, which arise with advanced age and increase the risk of developing sicca symptoms. Aging may also lead to aggravated forms of general diseases, especially of those pertaining to the immune system (e.g. rheumatic diseases) (43, 44). It is hard to identify precisely a single or main etiological factor causing xerostomia; therefore, this kind of research is liable to various conjectures and errors.

Xerostomia was treated only in 12 cases (17.7%) out of the total (n=70) of the examined population complaining of oral dryness. In comparison, xerophthalmia was treated in 56 (84.8%) of all (n=66) diagnosed cases.

Only in 2 cases out of the 12, in which patients were treated for xerostomia, the administered treatment was almost correct from the odontological point of view: artificial saliva and pilocarpine were prescribed. In all other cases, the treatment was sour diet (8 cases), bearberry (*Arctostaphylos uva-ursi*) tea (1 case), vitamin B plus fuchsine for lubrication of the corners of the lips (1 case). This clearly demonstrates that the majority of the treatment tactics were both insufficient and inadequate for fully restoring the quality of patients' lives. The treatment with vitamin B and fuchsine (safranin-O) can be evaluated only as prophylaxis against possible appearance of candidiasis at the corners of the lips, but not as a valid solution for the problems arising in the oral cavity. To the best of our knowledge, bearberry tea is a folk remedy against urinary tract infections, which due to its antibacterial and sympathomimetic qualities can have a positive effect on the oral cavity and the salivary glands in case of xerostomia as well. Unfortunately, when used for periods longer than three weeks, it produces acute symptoms of intoxication (47). We have not been able to find any articles quoted in foreign databases on the use of bearberries for treating xerostomia.

Our study has revealed that in Lithuania only a small percentage of xerostomia-positive patients receive treatment, and in most cases this treatment is completely inadequate (1–3, 22, 26, 27, 42).

Our findings show that symptoms of ocular and oral sicca were closely related. The majority (85.7%) of xerostomic patients were also xerophthalmia positive ($P<0.01$). This points to the characteristic feature of rheumatic patients – generalized exocrinopathy (43, 48).

One of the shortcomings of our study was that no clinical tests were performed to examine the functioning of the salivary and lacrimal glands. Likewise, the patients were never directly, individually, and purposefully questioned about their sicca symptoms, their need for treatment, or efficiency of the treatments administered to them. In our opinion, such purposeful questioning would only determine more exactly the

influence of sex and age on xerostomia and would reveal even a higher prevalence of sicca symptoms in rheumatic patients (15–17, 21–25).

However, we consider the initial patients' complaints and competence of the rheumatologists who had compiled the anamneses as valid enough for us to conclude that the results of our study are essentially correct. We believe that the data collected in the course of three years on all the hospitalized rheumatic patients with the referenced diseases are quite comprehensive and indicative of the actual xerostomia-related problems, which afflict patients with oral sicca symptoms caused by other diseases as well.

Summarizing, with some displayed characteristics of rheumatologic inpatients, we maintain that women suffering from rheumatic diseases in advanced age should be warned about high probability of developing symptoms of oral and ocular dryness with all the ensuing complications. Treatment of oral and ocular dryness in rheumatic patients has not received adequate and sufficient attention yet (33). Further studies should focus in detail on prevalence and treatment of xerostomia, as well as on level of discomfort experienced by patients with other diseases, which are conducive to oral dryness. We believe that the problem of xerostomia is rather new in Lithuania, since we have failed to find any records of clinical studies on it conducted in our country.

Conclusions

1. The prevalence of xerostomia is several times higher in women than men.
2. Xerostomia is significantly related to xerophthalmia in patients with rheumatic disorders.
3. Treatment of xerostomia, unlike that of xerophthalmia, is both insufficient and inadequate.

Kserostomijos paplitimo ir gydymo aspektai reumatologinėmis ligomis sergančių hospitalizuotų pacientų tarpe

Žygimantas Guobis, Nomeda Basevičienė, Pajauta Paipalienė, Irena Niedzelskienė, Giedrė Januševičiūtė[1]

Kauno medicinos universiteto Dantų ir burnos ligų klinika, [1]Odontologijos fakultetas

Raktažodžiai: kserostomija, kseroftalmija, reumatologinės ligos, kariesas, gydymas.

Santrauka. *Darbo tikslas.* Kserostomija yra daugelio ligų sukeliamas simptomas, dėl kurio ypač pablogėja pacientų gyvenimo kokybė. Neretai kserostomija būna subjektyvaus pobūdžio. Kartu su kserostomija pacientui dažniausiai burnos ertmėje nustatomas intensyvus ėduonis, gleivinės eritema bei kandidozė. Mokslinėje literatūroje nerasta tikslių duomenų apie kserostomijos paplitimą Lietuvoje tarp pacientų, sergančių reumatologinėmis ligomis.

Metodai. Iš KMUK archyvo atsitiktiniu būdu buvo atrinktos pacientų, gydytų KMUK Reumatologijos klinikos stacionare tarp 1998–2004 metų, ligos istorijos. Pasirinkus keturias reumatologines ligas, kurios dažniausiai sukelia kserostomiją, pacientai buvo suskirstyti į ligų grupes. Pagal jas buvo užpildytos 483 anketos. Tyrimų anketą sudarė straipsnio autoriai. Pacientai dar buvo suskirstyti grupėmis pagal amžių bei lytį.

Rezultatai. Iš vyresniųjų pacientų grupės duomenų buvo nustatyta, kad, žmogui senstant, kserostomija ima smarkiau reikštis. Nustatėme, jog moterys dažniau serga reumatologinėmis ligomis (1:7), ir moterims yra didesnė tikimybė susirgti kserostomija ir kseroftalmija nei vyrams (iki 2,5 karto). Kserostomija ir kseroftalmija neretai pasireiškia išvien: buvo nustatyta statistiškai reikšminga jų koreliacija (p=0,01). Paaiškėjo, jog gydymas buvo skirtas tik 17,7% kserostomija nusiskundusių pacientų, tuo tarpu net 84,8% kseroftalmija nusiskundusių pacientų buvo nuo jos gydomi.

Išvados. Kserostomija dažniau pasitaiko tarp vyresnio amžiaus reumatologinėmis ligomis sergančių pacientų, ypač tarp moterų. Reumatologinių ligų atveju kserostomija itin susijusi su kseroftalmija. Kserostomijos gydymas Lietuvoje yra nepakankamas ir nešiuolaikiškas.

Adresas susirašinėti: Ž. Guobis, KMU Dantų ir burnos ligų klinika, Eivenių 2, 50009 Kaunas
El. paštas: zygimantasg@yahoo.com

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