

S. Akhmedova**PERFORMANCE RESULTS
OF THE IMPROVED WORKING
CLASSIFICATION OF SUPERFICIAL
MYCOSES OF THE SKIN IN CARRYING
OUT THEIR CLINICAL
AND EPIDEMIOLOGICAL MONITORING**

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Abstract. Performance results of the improved working classification of superficial mycoses of the skin in carrying out their clinical and epidemiological monitoring. Ahmedova S. The results of testing of the improved working classification of superficial mycoses of the skin and its appendages (SMS) in the Republic of Azerbaijan for the period of 2012-2016 are presented. Given the variety of classifications of fungal skin diseases, many years of clinical experience have shown that none of them fully meets the requirements of a practicing physician. The author has developed and improved the classification of mycoses of the skin and its appendages, which will facilitate the diagnosis and the appointment of therapy, since this classification takes into account the tissue and topographic localization of the mycotic process, which greatly facilitates the diagnosis by dermatovenerologists, and will also reveal the true prevalence of mycotic pathology. Based on the traditional form No. 9, among 246 cases of superficial mycoses of the skin and its appendages identified in the city of Baku for the period of 2012-2016, the largest number of patients (79.44±2.6%) were diagnosed with mycoses of the scalp – 32, 52±1.21%, smooth skin mycoses – 30.08±1.28 multi-colored lichen – 14.80±1.01, which corresponds to the frequency of occurrence of these forms of SMS at the age of 11-20 years (44.01±3.1%) and 0-10 years (39.08±3.1%), leaders in the age line of groups with SMS in Baku. A reliable statistical difference was revealed in the detection of superficial mycoses of the skin and its appendages in the city of Baku during the study period. Based on the developed working classification, the nosological structure of the incidence of SMS in the city of Baku for the period 2012-2016 is represented by the following – 1919 episodes: mycoses of the scalp – 675 patients (35.17±1.1%); mycoses of smooth skin – 638 patients (33.25±1.1%); multi-colored lichen – 264 patients (13.76±0.8%); combined mycoses of smooth skin and scalp – 134 patients (6.98±0.6%); onychomycoses – 97 patients (5.05±0.5%); purulent-infiltrative form of mycoses – 66 patients (3.44±0.4%); skin candidiasis – 19 patients (0.99±0.2%); feet of the mycoses – 19 patients (0.99±0.2%); inguinal epidermophytosis – 7 patients (0.36±0.1%). The prevalence of nosologies preserved in the largest number of patients (1578 patients – 82.23±0.9%), mycoses of the scalp – 35.17±1.1% (675 patients), smooth skin mycoses – 33.25±1.1% (638 patients), multicolored lichen – 13.76±0.8 (264 patients). The greatest number of patients with SMS was also detected in the age group of 11-20 years (42.12±3.1%) and 0-10 years (40.32±3.1%). The data of a comparative analysis of the results of the developed and improved classification of superficial mycoses of the skin and its appendages with the data of the traditional reporting form, made it possible to expand the scope of the analyzed nosologies and increase the objectivity of statistical data for assessing the epidemiological situation in the study region.

Реферат. Результати апробації вдосконаленої робочої класифікації поверхневих мікозів шкіри при проведенні їх клініко-епідеміологічного моніторингу. Ахмедова С. Викладаються результати апробації вдосконаленої робочої класифікації поверхневих мікозів шкіри (ПМШ) та її додатків в Азербайджанській Республіці за період 2012-2016 рр. Наведено дані порівняльного аналізу її результатів з даними традиційної звітної форми, що дозволяють розширити рамки аналізованих нозологій, підвищити об'єктивність

статистичних даних, об'єктивно оцінити епідеміологічну ситуацію в досліджуваному регіоні. Автор розробив і вдосконалив класифікацію мікозів шкіри та її додатків, яка полегшить діагностику і призначення терапії, оскільки ця класифікація враховує тканинну і топографічну локалізацію грибкового процесу, що значно полегшує діагностику, яку проводять дерматовенерологи, а також виявляє справжню поширеність мікотичної патології. Таким чином, серед 246 випадків ПМШ, виявлених у місті Баку за період 2012-2016 рр. на основі традиційної форми № 9, найбільша кількість пацієнтів (79,44±2,6%) зареєстрована з діагнозами: мікоз волосистої частини голови – 32,52±1,21%, мікоз гладенької шкіри – 30,08±1,28%, різнокольоровий лишай – 14,80±1,01%, що відповідає частоті цих форм ПМШ в 11-20 років (44,01±3,1%) і 0-10 років (39,08±3,1%), лідируючих у віковій лінійці груп з ПМШ по м. Баку. Виявлена на основі розробленої робочої класифікації нозологічна структура захворюваності на ПМШ у місті Баку за період 2012-2016 рр. представлена таким чином: мікоз волосистої частини голови – 675 пацієнтів (35,17±1,1%); мікоз гладенької шкіри – 638 пацієнтів (33,25±1,1%); різнокольоровий лишай – 264 пацієнти (13,76±0,8%); поєднаний мікоз гладенької шкіри і волосистої частини голови – 134 пацієнти (6,98±0,6%); оніхомікоз – 97 пацієнтів (5,05±0,5%); гнійно-інфільтративна форма мікозу – 66 пацієнтів (3,44±0,4%); кандидоз шкіри – 19 пацієнтів (0,99±0,2%); мікоз стоп – 19 пацієнтів (0,99±0,2%); пахова епідермофітія – 7 пацієнтів (0,36±0,1%). Як і у випадку з традиційною звітної формою №9, у найбільшій кількості пацієнтів (+1578 пацієнтів – 82,23±0,9%) відзначений мікоз волосистої частини голови – 35,17±1,1% (675 пацієнтів), мікоз гладенької шкіри – 33,25±1,1% (638 пацієнтів), різнокольоровий лишай – 13,76±0,8 (264 пацієнти). Найбільшу кількість хворих з ПМШ також виявлено у віковій групі 11-20 років (42,12±3,1%) і 0-10 років (40,32±3,1%). Дані порівняльного аналізу результатів розробленої і вдосконаленої класифікації поверхневих мікозів шкіри та її додатків з даними традиційної звітної форми дозволили розширити область аналізованих нозологій та підвищили об'єктивність статистичних даних для оцінки епідеміологічної ситуації в досліджуваному регіоні.

Dermatomycoses are superficial fungal infections that affect the skin, hair and nails of people and animals [6, 4]. The main etiological agents of dermatomycoses are dermatophytic fungi of the genera *Trichophyton*, *Microsporum* and *Epidermophyton*, and the main yeast belongs to the genera *Candida*, *Malassezia* and *Trichosporon* [4, 10]. Male and female patients of all ages suffer from this pathology. This disease is rarely life-threatening, but it has its negative consequences of an emotional, social and professional nature on the status of the patient [1]. Onychomycosis is the most common infection with a frequency of 80-90% in Europe, usually caused by *Trichophyton rubrum* [1]. According to recent data, the prevalence of fungal infections is increasing due to an increase in the number of aging population and patients with a weakened immune system [11]. In tropical and subtropical countries such as India, superficial fungal infections are more common due to the fact that heat and humidity are the most suitable conditions for the growth of fungi [8]. Differences in the distribution of dermatomycoses worldwide justify the conducting of epidemiological studies, which will contribute to a better understanding of the nature of mycological skin infections [9]. Studies conducted in different years in the Republic of Azerbaijan to identify the prevalence, characteristics of the clinical and mycological course of dermatomycoses showed that, due to climatic and geographical features, the occurrence of *Malassezia furfur* in this region is much higher than other pathogens [3-6]. Most dermatologists of the CIS countries, including the Republic of Azerbaijan,

adhere to the classification of fungal diseases by A.M. Arievidh (1966), improved by N.D. Sheklakov (1976), taking into account the WHO terminology of nosological forms of diseases and their causative agents (1975) [5]. Classifications of other foreign authors (T. Fitzpatrick et al. (2012), M. Recken et al. (2014), I. Bologna et al. (2014) are based on the fact that nosological forms of dermatophytosis are classified according to the localization of the pathological process. Despite the variety of classifications of fungal skin diseases, many years of clinical experience of the author has shown that none of them fully meets the requirements of a practicing physician, and therefore the development of an improved classification of dermatomycoses, which will reveal the true prevalence of pathology is relevant.

The aim of the study was to test the improved working classification of superficial mycoses of the skin, to conduct a comparative analysis of its results with the data of the traditional reporting form.

MATERIALS AND METHODS OF RESEARCH

The study was conducted in 2012-2016 according to the current documentation of the Republican Dermatovenerologic Dispensary (outpatient cards, medical records, notices, traditional reporting form No. 9 "On patients with STD, fungal skin diseases and scabies", approved by the State Statistical Committee of the Republic of Azerbaijan from August 14, 2009 No. 29/5, January 30, 2012 No. 6/09) and in parallel with this, on the basis of an improved working classification proposed by the author. In 2012-2016, total 246 cases of visiting a doctor in the

city of Baku and 9298 cases in the Republic of Azerbaijan (traditional reporting form No. 9) for SMS were noted. All patients were distributed by sex, age, nosological structure and severity of the disease.

Since 2011, Azerbaijan has been using a new classification of form No. 9, which is based on the topographic localization of SMS, and therefore, the detection of dermatomycoses has clearly increased. In the stead of two points: 1. Trichophytosis, 2. Microsporia, used until 2010 inclusively, points based on topographic localization of the following sample were proposed: superficial mycoses of the skin, mycoses of the scalp, beard and mustache, mycoses of the nail plate (onychomycoses), mycoses of smooth skin, multicolored lichen (keratomycoses), skin candidiasis. But this classification is not completely informative, due to the fact that the following has not been distinguished: mycoses of folds, mycoses of the trunk, mycoses of the upper and lower extremities, mycoses of the hands, mycoses of the feet, proposed in the new, full version of the working classification of superficial mycoses of the skin, developed by the author.

A statistical research method was used, a statistical analysis of the prevalence of dermatomycosis was carried out according to the data of current and archival documentation (form No. 9, outpatient cards, case histories, notifications).

The results of the traditional reporting form No. 9 were compared with the results obtained on the basis of the modified by the author SMS working classification with adjusted sections 1001/2110 of Reporting form No. 9 of the Ministry of Health of the Republic of Azerbaijan. This classification takes into account the tissue and topographic localization of the mycotic process, which greatly facilitates the diagnosis by dermatovenerologists.

Absolute indices were accompanied by frequency intensive indices (p%) and their standard errors ($\pm mp\%$). To assess the statistical difference between the sampling ratios, the parametric Student's t test was used. The calculations were performed on the MS EXCEL-2019 spreadsheet.

To assess the difference between the sampling ratio of quantitative data, we used the parametric Student's t test, and the average difference between the samples, pairwise related options – the Student's t test. The calculations were carried out on the MS EXCEL spreadsheet and the SPSS-20 statistical package.

Working Classification (nosological structure of SMS):

- *Multi-colored lichen B36.0;*
- *Mycoses (dermatophytosis B35.1, candidiasis B37.2);*

- *Mycoses (dermatophytosis B35.0) of the hairy part of the scalp and face;*
- *Mycoses (dermatophytosis B35.4, candidiasis B37.2) of smooth skin of the face, trunk;*
- *Mycoses (dermatophytosis B35.6, candidiasis B37.2) of the folds;*
- *Mycoses (dermatophytosis B35.2, candidiasis B37.2) of the hands;*
- *Mycoses (dermatophytosis B35.3, candidiasis B37.2) of the feet;*
- *Mycoses (candidiasis) of the mucous membranes of the oral cavity (B37.0) and urogenital organs (B37.3; B37.4).*

The obtained digital data were subjected to statistical processing by medical statistics methods, taking into account modern requirements. The methods of variational (mean values of the obtained samples (M), their standard deviations (σ), standard errors (m), minimum (min) and maximum (max) values of the series) and discriminant (sampling ratio (p), their errors (mp) of analyzes. To assess the difference between quantitative data, the parametric Student's t test was used, and the average difference between samples, pairwise related options – Student's t test and discriminant analyses.

The calculations were carried out on the MS EXCEL spreadsheet and the SPSS-20 statistical package.

RESULTS AND DISCUSSION

In the course of the studies, it was found that in Baku for the period of 2012-2016, 246 cases of the studied pathology were recorded. In 2012, the lowest number of cases of SMS was noted – 25 (10.2 \pm 1.9%). In subsequent years, a steady increase in the incidence rate was noted; the highest peak was recorded in 2016 – 68 (27.64 \pm 2.8%; $t=5.1$; $p<0.001$) cases (Fig. 1).

Analysis of the distribution of patients by gender showed a 2-fold prevalence of men – 160 (65.04 \pm 3.04%) cases compared with women – 86 (34.96 \pm 3.04%; $t=7.16$; $p<0.001$) cases.

In the distribution of patients with SMS by age, it was found that the largest proportion was in the age group of 11-20 years old, the second place – patients in the age group of 0-10 years old, then in the decreasing order – 21-30 years old, 31-40 years old, 41-50 years old, 51-60 years old, 61-70 years old.

The average age of patients is 14.1 \pm 0.3 years, with an age range from 1 year to 77 years. Among 246 cases of MVP, the peak incidence occurred in two age groups: 11-20 years old – 108 (43.9 \pm 3.2%), and 0-10 years old – 96 (39.02 \pm 3.1%), the smallest number of diseases was noted in the age group of 61-70 years and older – 1 (0.45 \pm 0.41%).

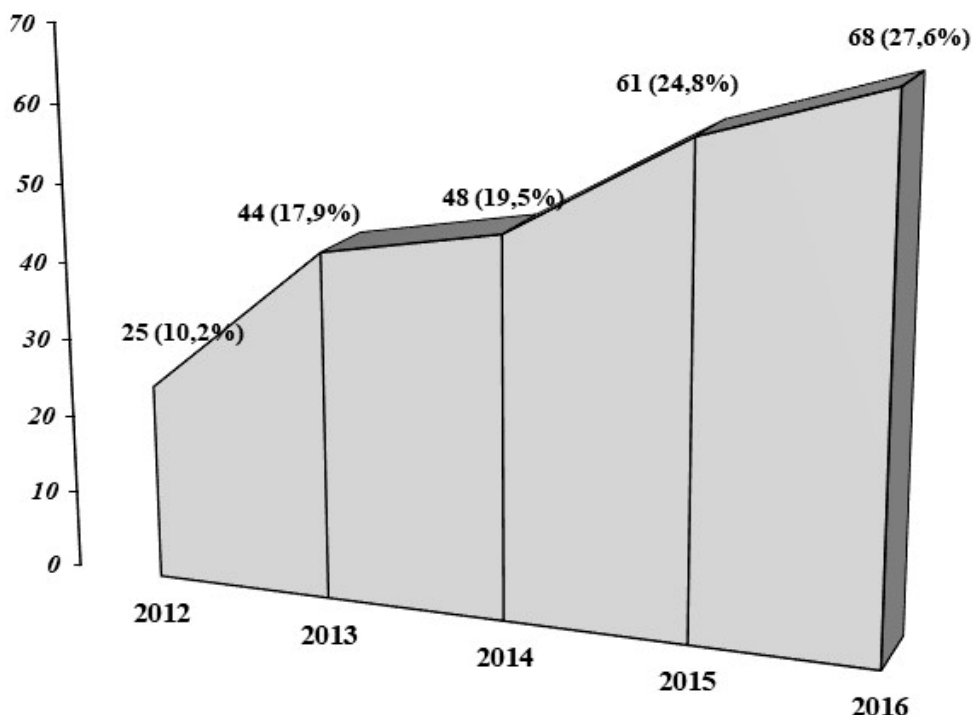


Fig. 1. The dynamics of the incidence of SMS in Baku for the period of 2012-2016 (based on the traditional reporting form No. 9)

Continuing the clinical analysis of SMS in the city of Baku for the period of 2012-2016 the predominant number of patients were with diagnoses of mycoses of the scalp – 80 (32.52±1.21%), mycoses of smooth skin – 74 (30.08±1.28%). The remaining pathologies were distributed as follows: multi-colored lichen – 36 (14.63±1.01%), combined mycoses of smooth skin and scalp – 19 (7.72±0.67%), onychomycoses – 10 (4.07±0.53%), purulent-infiltrative form of mycoses – 9 (3.65±0.52%), skin candidiasis – 7 (2.85±0.44%), foot mycoses – 6 (2.44±0.41%), inguinal epidermophytosis – 5 (2.03±0.39%), (Fig. 2).

Thus, among 246 cases of SMS detected in the city of Baku for the period of 2012-2016 based on traditional form No. 9, the largest number of patients (79.44±2.6%) were diagnosed with mycoses of the scalp – 32.52±1.21%, smooth skin mycoses – 30.08%±1.28, multi-colored lichen – 14.80%±1.01, which corresponds to the frequency of occurrence of these forms of SMS at the age of 11-20 years (44.01±3.1%) and 0-10 years (39.08±3.1%), leaders in the age line of groups with SMS in Baku.

In the process of conducting retrospective studies on SMS, the authors more than once encountered

certain errors in the diagnosis of mycoses. In medical documents (outpatient records, medical history, registration books, reporting form No. 9), diagnosed mycoses in most cases were associated with diagnoses of trichophytosis, microsporia, epidermophytosis according to the classification of N.D. Sheklakov. Making such diagnoses is possible only when conducting pathological material inoculation on culture media – cultural diagnosis, and the examined patients underwent only microscopic diagnosis, in which only the presence of mycelium, and not the appearance of a pathogenic fungus (Epidermophyton, Trichophyton, Microsporum) was ascertained.

In this regard, it is more convenient for dermatologists-clinicians to use the classification of foreign authors (T. Fitzpatrick et al., M. Recken et al., I. Bologna et al.), where nosological forms of dermatophytes are classified according to the localization of the pathological process.

Based on the foregoing, the author developed a working classification of the SMS, which combined versions of domestic and foreign classifications in separate tables.

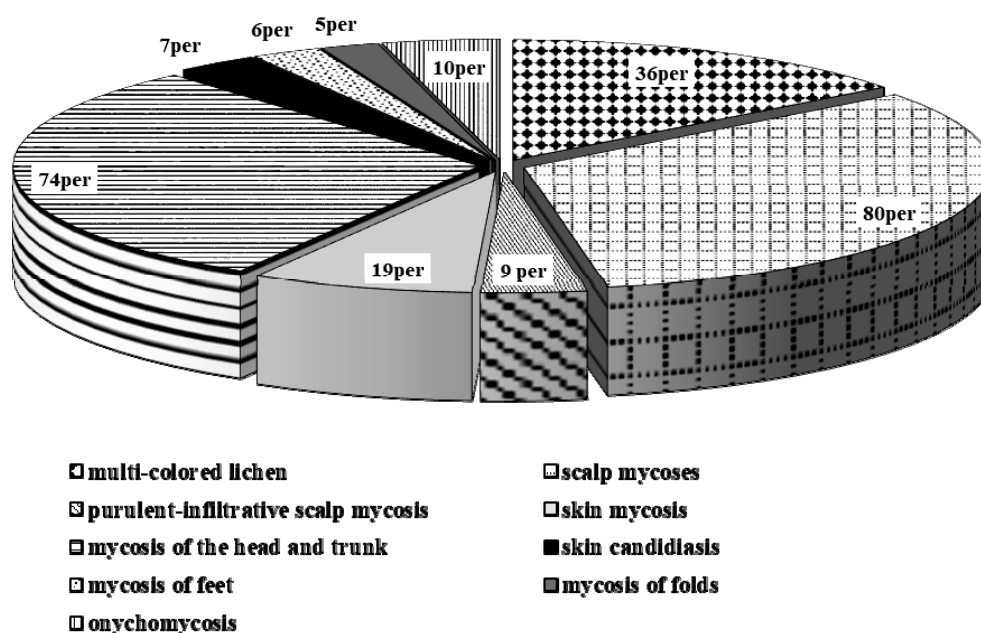


Fig. 2. The nosological structure of the SMS in Baku for the period of 2012-2016 (based on the traditional reporting form No. 9)

Analysis of the data obtained on the basis of the proposed form, revealed the following nosologies of SMS in Baku (Fig. 3).

A reliable statistical difference was revealed in the detection of superficial mycoses of the skin in the city of Baku during the study period. A marked increase in morbidity was noted, the highest was noted in 2016 – 475 (24.75±0.98%) episodes, the lowest – in 2012 – 298 (15.53±0.82%; $t=7.2$; $p<0.001$) episodes.

In the remaining three years (2013-2015), there was an obvious increase in frequency of SMS – 334 (17.40±0.86%), 394 (20.53±0.92%) and 418 (21.78±0.94%) episodes respectively. In total, for the period of 2012-2016, 1919 cases of incidence of SMS were revealed.

The nosological structure of the incidence of SMS in the city of Baku for the period 2012-2016, revealed on the basis of the developed working classification, represented by the following picture:

- mycosis of the scalp – 675 patients (35.17±1.1%);
- mycosis of smooth skin – 638 patients (33.25±1.1%);
- multicolored lichen – 264 patients (13.76±0.8%);

- combined mycosis of smooth skin and scalp – 134 patients (6.98±0.6%);
- onychomycoses – 97 patients (5.05±0.5%);
- purulent-infiltrative form of mycosis – 66 patients (3.44±0.4%),
- skin candidiasis – 19 patients (0.99±0.2%),
- foot mycosis – 19 patients (0.99±0.2%),
- inguinal epidermophytosis – 7 patients (0.36±0.1%).

As in the case with the traditional reporting form No. 9, the greatest number of patients (1578 patients – 82.23±0.9%) had mycoses of the scalp – 35.17±1.1% (675 patients), mycosis of smooth skin – 33.25±1.1% (638 patients), multicolored lichen – 13.76±0.8 (264 patients). The greatest number of patients with SMS was also detected in the age group of 11-20 years (42.12±3.1%) and 0-10 years (40.32±3.1%).

It should be noted that the improved nosological structure of superficial mycoses of the skin, taking into account the tissue and topographic localization of the mycotic process, can significantly simplify the clinical diagnosis of SMS.

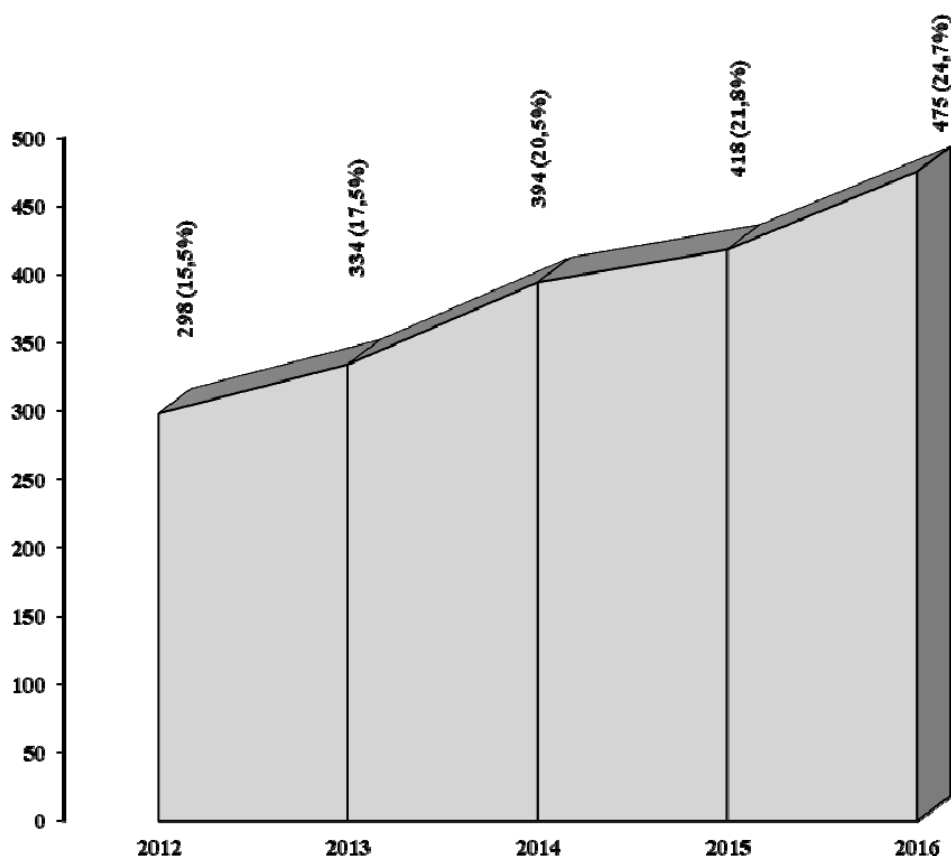


Fig. 3. The dynamics of the incidence of SMS in the Azerbaijan Republic in 2012-2016 (based on the traditional reporting form No. 9)

CONCLUSION

Thus, the results of the comparative analysis showed that the SMS working classification developed by the author (with adjusted sections 1001/2110 of Report Form No. 9 of the Ministry of Health of the Azerbaijan Republic) allows expanding the scope of the analyzed nosologies, increasing the

objectivity of statistical data, and thereby more fully reflect the epidemiological situation in the study region regarding the prevalence of superficial mycoses of the skin.

Conflict of interests. The authors declare no conflict of interest.

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