Frequency and distribution of scabies in Vojvodina, Serbia, 2006–2015

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SUMMARY

Introduction/Objective Scabies is a major dermatological and a public health concern worldwide. The aim of this study was to evaluate the trend of scabies, the age-specific incidence and seasonality of scabies in Vojvodina Province, Serbia.

Methods We investigated the epidemiological characteristics of scabies in Vojvodina (northern region of Serbia). We carried out a descriptive study over a 10-year period (from 2006 to 2015) and covered 21,996 patients.

Results The average incidence rate of scabies was 113.9/100,000 inhabitants with the evident increasing trend among all age groups, and especially among patients 15–19 years old. The highest incidence rate (323.9/100,000 inhabitants) was registered among children younger than 14 years. Most cases of scabies were registered during the cold months of the year, with peak activity throughout December (14.4/100,000; 95% CI: 12.2–16.6).

Conclusion A high frequency and increasing trend of scabies in Vojvodina indicates that more attention should be paid to this problem.

Keywords: scabies; epidemiology; surveillance; infection control

INTRODUCTION

Due to high morbidity, scabies is a major dermatological and a public health concern worldwide [1, 2]. Scabies occurs globally each year, leading to about 300 million cases [3]. Although scabies is considered a ubiquitous parasitism, the highest incidence rates of scabies have been registered in tropical regions [4, 5]. Taking this into consideration, the World Health Organisation has recognized scabies as one of 17 most neglected tropical diseases since 2013 [6]. In developing countries, the highest prevalence of scabies is evident among children with an average prevalence of 5–10% [7].

Low socioeconomic standard and overcrowding have contributed to the spreading of infestations. Therefore, the epidemic is more likely to occur in different collectives and refugee camps [5].

Despite the fact that scabies can be a major public health concern, in most European countries it is underappreciated, as the burden of scabies by country is unknown [4].

In our country, registration of scabies was required from 1975 to 2015, but scabies has no longer been subject to mandatory reporting since 2016 [8, 9].

The burden of scabies is also reflected in potential disease complications by secondary bacterial infections, most commonly caused by Streptococcus pyogenes and Staphylococcus aureus, with the possibility of invasive skin infection occurrence, or even sepsis [1].

Due to the global sub-registration and neglecting of the disease, the International Alliance for the Control of Scabies (IACS) was formed in 2012. IACS is a scientific forum consisting of experts from five continents with the main goal of scabies control through establishing quality monitoring of the disease through an advisory role of specialists in different areas, especially in countries with high prevalence of the disease [1].

The main goal of this study was to evaluate the trend of scabies, the age-specific incidence and seasonality of scabies in the Autonomous Province of Vojvodina (Vojvodina).

METHODS

Study area and population

Vojvodina is located in the northern part of the Republic of Serbia (situated at the crossroads between Central and Southeast Europe), with a population of almost two million. Vojvodina is bordered by Croatia to the west, Romania to the east, Hungary to the north, and Bosnia and Herzegovina to the southwest. It has a multi-ethnic and multi-cultural identity, with some 26 ethnic groups and six official languages. Overall, the climate is moderate continental with a mean maximum temperature in July (the average monthly temperature is 21.4°C) and mean minimum temperature during January (the average monthly temperature is -1.3°C) [10].
Collection of data

A retrospective, observational study was conducted. The data for this study were obtained from the Communicable Disease Registration of the Institute of Public Health of Vojvodina in a 10-year period (from 2006 to 2015) [11]. Since 2005, individual registration (medical record) of scabies cases has been replaced by the aggregate reporting [8].

Statistics for Windows, version 21 (IBM Corp., Armonk, NY, USA), and MS Office Excel (Microsoft Corporation, Redmond, WA, USA).

RESULTS

Trend of scabies in Vojvodina

During the observed period, a total of 21,996 cases of scabies were reported. The annual incidence rates of scabies ranged from 86.8/100,000 (2006) to 154.8/100,000 inhabitants (2015). In the study period, an increasing trend of the incidence rate of scabies was reported (Figure 1).

Differences in incidence rate of scabies according to age group

Table 1 shows the incidence rate of scabies by age groups. The average values of the age-specific incidence rates in patients aged 0–4, 5–9, and 10–14 years old were the highest and approximately equal (331.4/100,000, 338.3/100,000, and 302.2/100,000, respectively). A slightly lower average of incidence rate was registered among the adolescents (230.8/100,000). The lowest value of age-specific inci-

Table 1. Descriptive statistics for the incidence rate of scabies according to age group throughout the analyzed 10-year period

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>2002 census</th>
<th>2011 census</th>
<th>Mean incidence rate of scabies</th>
<th>SD</th>
<th>95% confidence interval for mean incidence rate of scabies</th>
<th>Minimum incidence rate</th>
<th>Maximum incidence rate</th>
<th>ANOVA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower bound</td>
<td>Upper bound</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0–4</td>
<td>92,584</td>
<td>88,727</td>
<td>331.4</td>
<td>42.5</td>
<td>301</td>
<td>361.9</td>
<td>262.5</td>
<td>413.6</td>
</tr>
<tr>
<td>5–9</td>
<td>107,834</td>
<td>94,809</td>
<td>338.3</td>
<td>63.7</td>
<td>292.7</td>
<td>383.9</td>
<td>267.1</td>
<td>470.4</td>
</tr>
<tr>
<td>10–14</td>
<td>121,796</td>
<td>93,934</td>
<td>302.2</td>
<td>60.7</td>
<td>258.8</td>
<td>345.7</td>
<td>228.3</td>
<td>415.2</td>
</tr>
<tr>
<td>15–19</td>
<td>137,777</td>
<td>109,832</td>
<td>230.8</td>
<td>77.6</td>
<td>175.3</td>
<td>286.3</td>
<td>125.6</td>
<td>355.1</td>
</tr>
<tr>
<td>20–59</td>
<td>1,127,742</td>
<td>1,087,781</td>
<td>68.8</td>
<td>16.5</td>
<td>57.1</td>
<td>80.6</td>
<td>52.1</td>
<td>107.9</td>
</tr>
<tr>
<td>≥ 60</td>
<td>444,268</td>
<td>456,726</td>
<td>45.1</td>
<td>14.7</td>
<td>34.5</td>
<td>55.6</td>
<td>33.5</td>
<td>81.9</td>
</tr>
</tbody>
</table>

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Incidence rate was registered among patients in the oldest age group (45.1/100,000). One-way ANOVA analysis (multiple comparison – Bonferroni test) indicated that the only age-specific incidence rate of scabies, comparing to all other age-specific incidence rates, was in patients aged 15–19 years old (p = 0.000). The incidence rates among the first three observed age groups (0–4, 5–9 and 10–14) did not show a significant difference between them (p > 0.05), and for the rest of the research we considered all three groups as one (0–14 years). For the same reason (p > 0.05), the similar approach was applied for age groups 20–59 and above 60, coding them as one group.

The incidence rates of scabies obtained statistically were significantly different (p = 0.000) among three age groups (0–14, 15–19, and ≥ 20 years old). The highest incidence rate (323.9/100,000) was registered in children 0–14 years old, followed by the incidence rate (230.8/100,000) in adolescents 15–19 years old, and by the incidence rate (56.9/100,000) in patients ≥ 20 years old (Table 2).

### Trend of scabies in Vojvodina according to age groups

The steepest slope of the trend line with the highest coefficient of determination was in patients 15–19 years old, according to the annual incidence rate for the 10-year study period (2006–2015), using the equation of linear regression (the independent variable was time – year). In the subgroup analysis of trend (0–14, 15–19, and ≥ 20 years), statistically significant differences at the level p < 0.05 were determined for each age group. Based on the coefficients of time in the figure of linear trend, the estimated regression equation in patients 0–14 years old was $y = 14.7t + 241.7; p = 0.003$. In patients 15–19 years old, the equation was $y = 23.6t + 100.9; p = 0.000$. Among patients older than 20 years the equation was $y = 3.9t + 40.3; p = 0.012$. These equations and line charts indicate that during the study period, the incidence rate of scabies, at the statistically significant level, grew in 0–14-, 15–19-old patients, and in patients aged 20 years and older (Figure 2).

### Seasonality of scabies in Vojvodina

Incidence rates of scabies in the period from October to March (median = 10.8; mean rank = 82.6) were higher than incidence rates of scabies in the period from April to September (median = 6.0; mean rank = 38.4). These differences were found to be statistically significant (Mann–Whitney U = 471.5, p < 0.01). The lowest average incidence rate of scabies was registered in August (5.0/100,000; 95% CI: 3.7–6.3), but peak activity was registered throughout December (14.4/100,000; 95% CI: 12.2–16.6) (Figure 3).
**DISCUSSION**

The prevalence studies of scabies across the world show that this disease is a major public health problem. Data from 18 published studies in the period from 1971 to 2001 show that prevalence of scabies varied from 0.2–24% [7]. According to the recently published review of 48 publications, prevalence of scabies varied from 0.2–71.4% [4]. The highest prevalence rates of scabies have been found in the countries of tropical climate zones [4, 5, 12, 13]. Because the scabies is not included in the reportable diseases list in most countries, the real burden of scabies in European countries is unknown [3, 4, 7].

According to law, until 2015, scabies in the Republic of Serbia was included on the list of reportable diseases with obligatory monitoring [9]. During the study period, the average annual incidence rate of scabies in Vojvodina was 113.9/100,000 inhabitants.

In a study conducted in France between 2005 and 2009, Bitar et al. [14] reported that the estimated annual incidence rate of scabies was 328/100,000 inhabitants, and scabies has had an increasing trend. In 2011, the prevalence of scabies in homeless people, in those sleeping in shelters or in public places in Paris, was 0.4% and 6.5%, respectively [15].

Unlike under-reporting of scabies by passive surveillance (applied in Serbia and in most other countries), results of active (sentinel) surveillance of scabies, applied in England and Wales (with around 500,000 population) show that the average annual incidence rates of scabies during the 1994–2003 period ranged from 233/100,000 (2003) to 470/100,000 (2000) [16].

In contrast to these data, significantly lower incidence rates of scabies were registered in Belgium, although scabies was included on the list of reportable diseases since 1995. In 2005, the incidence rate of scabies was only about 3.8/100,000, which is an obvious result of under-reporting of the disease. In support to the fact of under-reporting is the additional conducted active surveillance of scabies, and this result shows that the rate of scabies was several times higher than the estimated rate of 28/100,000 inhabitants in the general population of Belgium, and a rate of 88/100,000 among the migrant population in this country [17]. However, due to implementation of the heterogeneous methodological approach in the surveillance of scabies, available data from different territories are not comparable [4, 5].

We found that the highest age-specific incidence rates of scabies were among children younger than 14 years, and the lowest rates for adults. The average age-specific incidence rates of scabies among adolescents (15–19 years old) and patients aged 20 years and older were in the ratio of 4:1, while the incidence rates in children aged up to 14 years compared to patients the same age group (≥ 20 years) were in the ratio of 5.7:1.

Data of a study carried out over a nine-year period for approximately 8.5% of the United Kingdom show that patients 10–19 years old had the highest infestation rates with slightly lower incidence among males than in females [18]. Similar to the results of the mentioned study, we found that the highest age-specific incidence rates were registered in childhood. In addition, the most evident increasing trend of scabies was among patients aged 15–19 years old. Similar results were obtained in other studies with a significant occurrence of the disease not only among younger, but even among the population aged older than 75 years [4].

In our territory, due to certain reporting procedures on scabies, all patients older than 60 years have been classified into one age group, and we could not show the trends and disease characteristics in the oldest population.

Scabies is usually spread by direct, skin-to-skin contact. In classic scabies, where 10–15 parasites are present on the skin, contaminated environment has no significant role in the transmission of these infestations, as opposed to crusted (“Norwegian”) scabies, which is highly contagious and contains about two million parasites per patient [19, 20]. All of our cases were classified as classic scabies infections.

Overall, there is a trend of increasing scabies infestation. High values of age-specific incidence rates among children younger than 14 years can be regarded as a consequence of more efficient transmission through close contact in preschool and school communities. Also, the lack of maturity of children and deficit in education activity, especially in terms of scabies prevention, can be considered the main cause of this high frequency of the disease in this age group. We think that the reasons for the highest increasing trend of scabies among adolescents are perhaps in lifestyle. According to the data of one 15-year study, which was conducted at the Department of Sexually Transmitted Diseases, scabies infestation is related to lifestyle, more frequently detected in the MSM population, and among men who have sporadic sexual relations [21].

Our data showed that the average value of monthly rates of scabies was the highest during the cold months of the year (November and December, 14.1/100,000 and 14.4/100,000, respectively), similar to findings of other authors [21, 22].

Possible explanations for these seasonal variations could be related to closer contact in the population throughout cold months of the year, overcrowded rooms, and longer stay indoors, together with infrequent hygiene and change of clothes during winter months, and by the biological cycle of the mites, which prefer low temperatures for laying the highest number of eggs during the winter months. Our findings are in good agreement with those from previous studies [22, 23, 24].

As a basic preventive measure to control scabies transmission is the exclusion of patients from collectives until complete recovery [1, 5, 25]. Likewise, frequent visits to the doctor, the cost of applied therapy and the patients’ contacts within the family and the collectives, as well as the social stigma, are a significant public health concern [1].

**CONCLUSION**

Although the results of our study come from the limited set of data, they indicate specific epidemiological characteristics of scabies that are recognized in other regions of the world,
especially among the younger population. Further studies are required to be conducted to assess the prevalence of scabies especially among the 15–19 years old age group considering that this group is the one with the most intensive increasing trend in the studied 10-year period.

Although the results of our passive surveillance clearly show that scabies are more common in younger people with an increasing trend of incidence, the future targeted research among the elderly may be focused on the estimation of potential scabies complications. Apart from primary health care doctors, this multicenter study should also include other doctors at secondary and tertiary health care level (cardiologists, rheumatologists, nephrologists).

REFERENCES


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Учесталост и дистрибуциjа шуге у Војводини, Србиjа, 2006–2015

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САЖЕТАК

Увод/Циљ

Шуга представља велики дерматолошки и јавно здравствени проблем широм света. Циљ рада био је да се процене тенденције, узрассно специфична и сезонска дистрибуциjа шуге у Војводини.

Методе


Резултати

Просечна вредност стопе инциденције шуге је 12,2–16,6.

Закључак

Високо је учесталост шуге се све израженијим тенденциjам раста у Војводини указује на то да се више пажње мора посветити овом проблему.