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

Учесталост и дистрибуција шуге у Војводини, Србија, 2006–2015

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

Учесталост и дистрибуција шуге у Војводини, Србија, 2006–2015

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 the Vojvodina.

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 of 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 cold months of the year with peak activity throughout December (14.4/100,000; 95% CI: 12.2-16.6).

Conclusions 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

САЖЕТАК

Увод/Циљ Шуга представља велики дерматолошки и јавно-здравствени проблем широм света.

Циљ рада био је да се процени тренд, узрасно специфична и сезонска дистрибуција шуге у Војводини.

Методе Истраживање епидемиолошких карактеристика шуге у Војводини дескриптивном студијом у десетогодишњем периоду (2006 –2015) са 21 996 болесника.

Резултати Просечна вредност стопе инциденције шуге је 113,9 на 100 000 становника са евидентним растућим трендом инциденције у свим узрасним групама, а нарочито у узрасту 15–19 година. Највиша стопа инциденције (323,9 на 100.000 становника) је регистрована међу децом млађом од 14 година. Већина случајева шуге регистрована је током хладних месеци у години са пиком активности током месеца децембра (14,4/100.000; 95% *CI*: 12,2–16,6)

Закључак Висока учесталост шуге са све израженијим трендом раста у Војводини указује да се више пажње мора посветити овом проблему.

Кључне речи: шуга; епидемиологија; надзор; контрола инфекције

INTRODUCTION

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

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

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

In our country, from 1975 to 2015, the registration of the scabies was required, but from 2016 scabies is no longer subjected to mandatory reporting [8, 9].

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The burden of scabies is reflected and through the potential of 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 the neglecting of the disease, in 2012 The International Alliance for the control of scabies (IACS) was formed. 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 as 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.

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 2 million. Vojvodina is bordered by Croatia to the west; the Romania to the east; the Hungary to the north and the 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 a 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. Data for this study were obtained from the communicable disease registration in the Institute of Public Health of Vojvodina in the 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]. In accordance with the Law, the aggregate notification of scabies contains data on the number of all reported cases classified by age groups (0-4, 5-9, 10-14, 15-19, 20-59, and ≥60 years old) during a one-week period, but do not contain information on the gender of affected people.

This aggregate registration of scabies covered only the patients who completed their first medical examination due to scabies and who were diagnosed by doctors at the primary health care level (medical examinations carried out in general medical units, occupational medicine, dispensary for skin diseases, public health care and dispensaries for child, school children, students and youth).

The diagnosis of scabies is usually based on the clinical signs and symptoms with characteristic localization of the pruritic papules, or with known epidemiological link to the person who had a similar clinical feature among the close contacts.

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Confirmation of diagnosis by microscopic parasite identification is only utilized among clinical atypical cases. The participation of microscopically confirmed cases in the total number of reported cases of scabies retroactively could not be determined.

We conducted a retrospective data collection using only registration form of patients, and the approval of an ethics committee was not required.

Statistical analysis

Incidence rates were calculated using the annual number of registered cases as a numerator and the number of inhabitants in Vojvodina according to the two Censuses for Republic of Serbia (2002. and 2011. year) as a denominator and multiplied by 100,000 inhabitants.

Numerical data are presented through the arithmetic mean, median, minimum, maximum value and the standard deviation. The normality assumption was checked using the Kolmogorov-Smirnov test, along with the skewed statistics. Examining the differences between age specific incidence rate, appropriate parametric test such as one - way ANOVA was used to Post Hoc test - Bonferroni. Line chart as well as linear regression was used for estimated how and does age specific incidence rate changes over examined period. Results were expressed throughout equation of regression: y=at+ b, where "a" is the beta coefficient of regression, "t" is the time and "b" is the intercept of regression. The winter period (cold months of the year) was coded as "1" (October-March), while the summer period (warm months of the year) coded as "2" (April-September). To determine if there is a significant difference in incidence rate of scabies between summer and winter period throughout 10 years period the most appropriate statistical test was Mann-Whitney U, while date (incidence rate of scabies per month) was skewed (p - value of K-S test was 0.024). The results were considered a statistically significant when the p -value of the all applied models was <0.05 and corresponded 95% confidence interval (95%CI) did not include 1. Data were analysed using statistical package SPSS version 21 and Microsoft Excel.

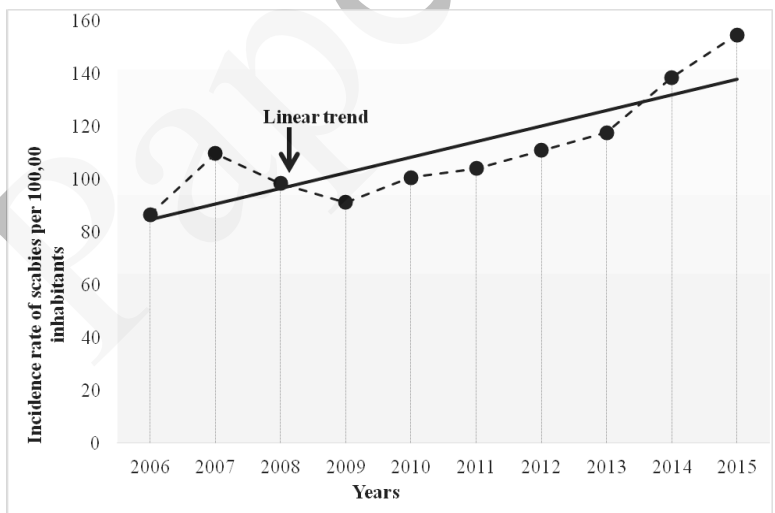

Figure 1. Incidence rate of scabies in Vojvodina, 2006–2015.

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 disease was reported (Figure 1).

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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 incidence rate was registered among patients in the oldest age group

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

Age group (year)	Census 2002 y.	Census 2011 y.	Mean incidence rate of scabies	SD	95% CI for mean Incidence rate of scabies		Minimum incidence rate	Maximum incidence rate	ANOVA	
					Lower bound	Upper bound			F	*p*
0–4	92584	88727	331.4	42.5	301.0	361.9	262.5	413.6	64.80	0.000
5–9	107834	94809	338.3	63.7	292.7	383.9	267.1	470.4		
10–14	121796	93934	302.2	60.7	258.8	345.7	228.3	415.2		
15–19	137777	109832	230.8	77.6	175.3	286.3	125.6	355.1		
20–59	1127742	1087781	68.8	16.5	57.1	80.6	52.1	107.9		
≥60	444268	456726	45.1	14.7	34.5	55.6	33.5	81.9		

(45.1/100,000). One - way analysis of ANOVA (multiply comparison - Bonferroni test), did indicate 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 first three observed age groups (0–4, 5–9 and 10–14) did not show the 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 group 20-59 and above 60, coding them as one group.

The incidence rates of scabies obtained statistically, were significantly different (p=0.000) among the 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

Table 2. Differences of incidence rates of scabies according to the three age groups throughout ten-year period.

Age group (year)	Mean incidence rate	Minimum incidence rate	Maximum incidence rate	95% confidence interval for mean		ANOVA	
				Lower bound	Upper bound	F	*p*
0–14	323.9	228.2	470.4	302.7	345.1	157.8	0.000
15–19	230.8	125.5	355.0	175.3	286.2		
≥ 20	56.9	33.5	107.9	47.8	66.0		

(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 annual incidence rate for 10-year study period (2006–2015), using the equation of linear regression (independent variable was time - year). In the subgroup analysis of trend

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(0–14, 15–19, and older than 20 years), there were determined a statistically significant differences at the p level <0.05 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 was y=23.6t+100.9; p=0.000, while among patients older than 20 years 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 statistical significant level, grew in 0-14, 15-19 and in patients above 20 years old (Figure 2).

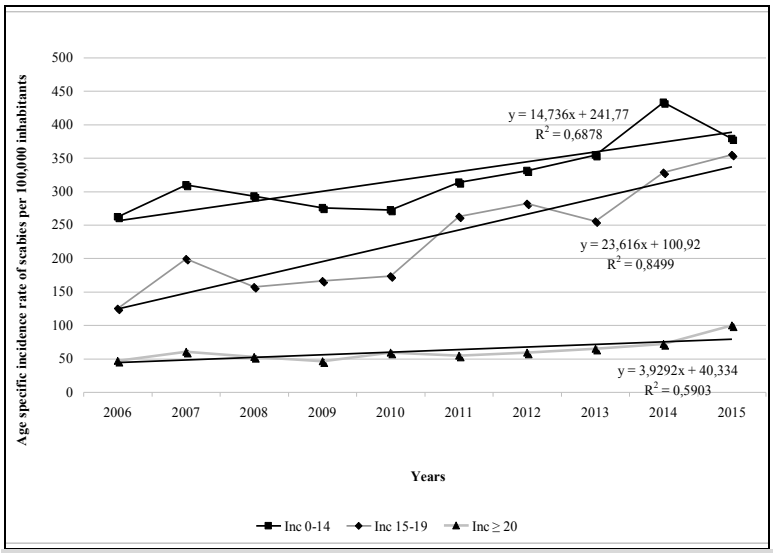
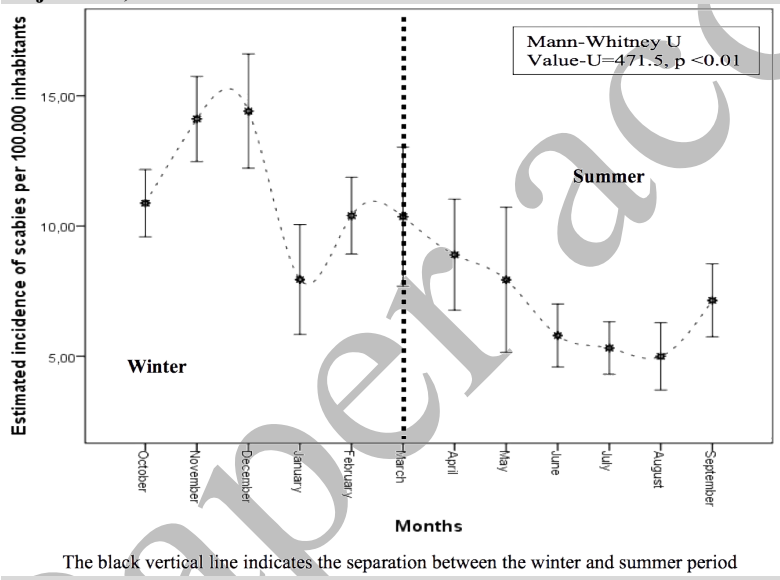


Figure 2. Age specific incidence rate with trend of scabies in Vojvodina, 2006–2015.



The black vertical line indicates the separation between the winter and summer period

Figure 3. Seasonal distribution of scabies in Vojvodina according to 95% CI for mean months' values, 2006–2015.

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 Value-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 ranged from 0.2% to 24% [7]. According to the recently published review of 48 publications, prevalence of scabies ranging from 0.2% to 71.4% [4]. The highest incidence rates of

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scabies have been found in the countries of tropical climate zones [4, 5, 12, 13]. Because the scabies is not included on the reportable diseases list in most countries, the real burden of scabies in European countries is unknown [3, 4, 7].

According to the 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 and al. [14] reported that the estimated annual incidence rate of scabies was 328/100,000 inhabitants, and scabies has had an increasing trend. In the 2011, the prevalence of scabies in homeless people those sleeping in shelters or in the public places in Paris were 0.4% and 6.5% [15].

Unlike the sub-registration of scabies by passive surveillance (applied in Serbia and in most other countries), results of active (sentinel) surveillance of scabies, which applied in England and Wales (with around half a million population) show that the average annual incidence rates of scabies during 1994-2003 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 the 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 sub-registration of the disease. In support to the fact for sub-registration is the additional conducted active surveillance of scabies, and this result show that the rate of scabies was several times higher than the estimated rate with values 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 for patients aged 20 years and older were in the range 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 relation 5.7: 1.

Data of the study carried out in 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 [18], 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 disease not only among younger, but even among the population aged older than 75 years [4].

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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 to 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 contain about 2 million parasites per patient [19, 20]. All of our cases were classified as the 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 as the main cause of this high frequency of disease in this age group. We think that the reasons for the highest increasing trend of scabies among adolescents perhaps are in the manner and lifestyle. According to the data of one 15-year study, which was conducted at the Department of sexually transmitted diseases, scabies infestation has been in relation 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 the 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 the findings of other authors [21, 22].

Possible explanations for these seasonal variations could be related with a 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, that 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 [22-24].

As a basic preventive measure to control of scabies transmission is the exclusion patient 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 sets of data, they indicate the 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 15–19 years' age group considering that this age group is the one with the most intensive increasing trend in the ten year period.

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

NOTE

This investigation was carried out as part of routine activities without additional funding sources.

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