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# **Analysis of the course of rheumatoid arthritis depending on the climatic and geographic zones of Uzbekistan**

## **Analiza tijeka reumatoidnog artritisa ovisno o klimatskim i geografskim zonama Uzbekistana**

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### **Summary**

The aim of this study was to evaluate the features of rheumatoid arthritis (RA) as well as other health problems and treatment necessities in various climatic and geographic zones of Uzbekistan. The data on 2013 patients with a confirmed diagnosis of RA were collected retrospectively. The results showed that the Khorezm and Surkhandarya regions dominated by indicators of disease activity and severity, such as a more expressed progressive course; in addition, marked

alterations in the reproductive system, especially in women, were observed as well. In contrast, patients from the Namangan and Tashkent zones were characterized by relatively better parameters of interest. In conclusion, the differences in climatic and geographic zones in Uzbekistan may be important for patients with RA. More in-depth studies are needed to get a more accurate insight into the possible influence of climate and environmental factors on RA.

### **Keywords**

rheumatoid arthritis; severity; geographic zones; inheritance; comorbid conditions

### **Sažetak**

Cilj ove studije bio je istražiti osobine reumatoidnog artritisa (RA) te druge zdravstvene probleme i potrebe za liječenjem u različitim geografskim i klimatskim zona-

ma Uzbekistana. Retrospektivno su sakupljeni podaci o 2013 bolesnika s potvrđenom dijagnozom reumatoidnog artritisa. Rezultati su pokazali da su regije Horezm

i Surkandarja dominirale glede pokazatelja aktivnosti i težine bolesti kao što je, primjerice, progresivniji tijek. Također je utvrđeno da su u žena češće znatnije promjene reproduktivnog sustava. Nasuprot tome, pacijenti iz zona Namangan i Taškent obilježeni su relativno boljim

parametrima od interesa. U zaključku, razlike u klimatskim i geografskim zonama u Uzbekistanu mogu biti važne za bolesnike s RA. Potrebne su nove, detaljnije studije da bi se dobio točniji uvid u mogući utjecaj klimatskih i okolinskih čimbenika na RA.

## Ključne riječi

reumatoidni artritis; težina bolesti; geografske zone; naslijeđe; pridružene bolesti

## Introduction

Rheumatic diseases (RD) present a serious health and social problem, and therefore remain in the spotlight for both public health professionals and practical physicians. A population-based study carried out using questionnaires among the Dutch population older than 25 years found that the prevalence of RD was 40.8 % among men and 48 % among women (1). A similar research conducted among the Spanish population older than 20 years also determined the dominance of RD, at a percentage of more than 34 % (2). Despite the fact that the prognosis for rheumatoid arthritis (RA) has been improved with the help of modern therapeutic methods, the morbidity and mortality rates remain very substantial (3). Among inflammatory rheumatic diseases RA is the one that represents the major burden for the patient as well as for society. The organization of both preventive measures and high-quality healthcare for patients with RA is not possible without knowledge about and consideration of envi-

ronmental factors, life circumstances, as well as traditions of the affected population. Consequently, there is a need for addressing this problem using the experience of many sciences, such as medicine, ecology, demography, hygiene, and epidemiology. This inevitably includes as the object of study a quite large area, in which there are a variety of components of the geographical environment - both natural and social, related by certain spatial patterns.

So far, in Uzbekistan there have been no studies in patients with RA integrating medical and geographical research, which would take into account the various areas of our country. The unmet needs in that area should be addressed.

Therefore, the aim of this study was to conduct a comparative analysis of the manifestation of RA in various climatic and geographic zones of Uzbekistan, in particular in the Namangan, Khorezm, and Surkhandarya regions, as well as in the city of Tashkent, the country's capital.

## Materials and methods

A comparative analysis was conducted based on retrospective data from outpatient records and extracts from clinical records of RA patients.

A total of 2013 patients with documentary evidence of RA were included in the study. The diagnosis was made by a treating rheumatologist. Based on their place of residence, the patients were conditionally divided into groups by four geographical zones: zone I - Tashkent city (n=461), zone II - Surkhandarya region (n=498), zone III - Khorezm region (n=550), and zone IV - Namangan region (n=504). The patients' age ranged from 14 to 62 years. The analysis included data obtained about the respondents' birthplace and place of residence, the

place of emergence of the disease and its course, the reproductive health, risk factors, and treatment of each patient, including the need for hospitalization over the previous 5 years. In the analysis, the following indicators were used: the percentage of cases with positive clinical changes, the percentage of patients with long-term remission (more than 6 months), the percentage of patients requiring hospitalization, the percentage of patients that frequently visited the doctor with health problems (2 times or more per month for a year), and the percentage of patients with comorbid conditions. The obtained data were subjected to statistical analysis using standard descriptive and non-parametric tests.

## Results

Our study showed certain differences between patients in four distinct climatic and geographic zones in Uzbekistan (Table 1). In zone III, indicators such as the tendency of progression of the disease over the previous 3 years dominated (80.2 %), while the frequency of cases with a

need for hospitalization in one year was 62 %. In this region there were 67 % patients with a positive rheumatoid factor. Also, 49 % patients had a more aggressive form of the disease, and consequently there were 72.5 % patients that needed more aggressive treatment (cytostatics).

Table 1. **Some indicators of rheumatoid arthritis in different geographical zones in Uzbekistan (n = 2013)**Tablica 1. **Neki pokazatelji reumatoidnog artritisa u različitim geografskim zonama u Uzbekistanu (n = 2013)**

Indicators	Zone I	Zone II	Zone III	Zone IV
	Tashkent city	Surkhandarya region	Khorezm region	Namangan region
Cases with clinical changes for the better	66.7 %	22.5 %	19.7 %	71.5 %
Patients with long-term remission	41.7 %	13.7 %	22.3 %	61.2 %
Patients who needed hospitalization	33.1 %	42.4 %	39.7 %	24.8 %
Patients frequently visiting a doctor	34.0 %	68.5 %	61.5 %	41.0 %
Patients with comorbid conditions	63.0 %	53.7 %	57.0 %	55.0 %

In zone II the disease started at a younger age (57.4 %). Also, in that region women reported more abnormal symptoms of their reproductive system, i.e., changes and problems associated with the menstrual cycle (56 %), while those percentages were 17 % for zone III, and 24 % for zone IV. According to the data from outpatient records in zone II, 36.4 % women had a miscarriage, 26.7 % patients were registered with secondary amenorrhea, while in 73.3 % of the women various types of menstrual irregularities were recorded. Compared with the other two zones, zones I and IV featured a relatively low prevalence of these abnormalities. How-

ever, in these zones in the majority of patients the disease was characterized by a gradual deterioration of the patients' condition against a background of accompanying diseases.

Given the limitation of the design of the study, it was observed that inheritance plays a more important role in some of the zones than in others. For example, in zone III the percentage of patients with a hereditary burden of RA was predominant, with up to 68.4 % having a blood relative with inflammatory disease, while in zone II an upward trend in the incidence of RA was noticed among the next generation (61 %).

## Discussion

Chronic progressive RD cause disability in 2.8 % of the U.S. population and 8 % of the UK population (4, 5). Therefore, the problem of RD is of utmost importance not only in medical but also in socio-economic terms, as the disease leads to an increase in disability rates, resulting in a significant growth of expenditure on health and social services. Therefore, there is a need to address the whole spectrum of the disease. In concordance with this comprehensive approach, in recent years a geographic approach has become increasingly important, enabling the identification of a large group of cause-and-effect relationships (6). It has been generally proven that adverse climatic and geographic factors cause health deterioration in the population. Under the influence of complex environmental factors changes occur in various organs and systems, and functional, morphological, and genetic alterations ensue in the whole organism (6).

According to our research, the course of RA does correlate with unfavorable climatic and geographic factors, as differences that have been identified among the ob-

served zones in Uzbekistan have shown. According to the available literature, certain geographic factors, such as the quality of the soil, impact on the degree of activity and clinical forms of RA (7). This is in accordance with data obtained in this study, especially those for zone III. The results of our study also correspond to the literature data in so far as they indicate that the residence area may play a role in altering the reproductive system in patients with RA (7). The obtained data are in favor of a cause-and-effect relationship of the course of RA depending on the areas of residence in Uzbekistan.

The main strength of our study is the large number of patients, which allowed us to address the complex relationship of geographical area and RA using different variables of interest. The limitations of our study include, but are not restricted to, the retrospective design of the study, missing data on the education level and socio-economic status of the patients as well as more detailed data regarding disease activity and treatment, and differences in the degree of development of the health-care systems in the various regions.

## Conclusions

Our retrospective study demonstrated that the clinical and epidemiological parameters of RA are different in four geographical zones of Uzbekistan. It does not ex-

clude the probability of the impact of climatic and geographic factors on the course of the disease. The inheritance-effect relationship in these zones is suggestive of

the significant role of genetic alterations in humans due to environmental factors. All of this calls for a more fo-

cused and detailed study of the influence of environmental factors on the development and progression of RA.

## Declaration on conflict of interest

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The authors declare that there is no conflict of interest.

## Literature

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