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DYNAMICS OF HELMINTHIASIS MORBIDITY IN THE REPUBLIC OF KARAKALPAKSTAN OVER A FIVE-YEAR PERIOD

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Abstract: Helminthiasis remains one of the important parasitic diseases affecting public health worldwide, particularly in regions with ecological, sanitary, and socio-economic challenges. The Republic of Karakalpakstan, characterized by specific climatic and environmental conditions, continues to experience cases of helminthic invasions among the population. This article analyzes the dynamics of helminthiasis morbidity in the Republic of Karakalpakstan from 2020 to 2024 based on official epidemiological indicators. The study evaluates the number of examined individuals, invasive cases, and the prevalence of specific helminthic diseases including hymenolepidosis, enterobiasis, teniarhynchosis, giardiasis, and echinococcosis. Statistical analysis demonstrated a gradual increase in the number of examined individuals from 61,986 in 2020 to 99,077 in 2024. During the same period, the total number of invasive cases increased from 667 to 3,374. Enterobiasis and hymenolepidosis represented the most common forms of helminthiasis. A particularly significant increase in enterobiasis cases was observed in 2024. The study highlights the importance of epidemiological surveillance, sanitary-hygienic measures, and preventive strategies in reducing the spread of helminthic diseases. The findings indicate that despite improvements in diagnostic screening, helminthiasis continues to represent a significant medical and social issue in the region. The article emphasizes the need for comprehensive preventive programs, health education, and improved sanitary infrastructure to reduce infection rates and improve population health outcomes.

Keywords: Helminthiasis, Karakalpakstan, epidemiology, enterobiasis, hymenolepidosis, parasitic diseases, invasion, public health, dynamics, morbidity.

Introduction

Helminthiasis represents a group of parasitic diseases caused by helminths that infect the human body and produce significant pathological changes. According to the World Health Organization, soil-transmitted helminth infections affect approximately 1.5 billion people globally, particularly in tropical and subtropical regions with poor sanitary conditions [1]. Helminthic invasions remain among the most common neglected tropical diseases and continue to pose major public health challenges worldwide [2].

The epidemiology of helminthiasis is closely associated with environmental, climatic, socio-economic, and sanitary-hygienic factors. Regions with limited access to clean water, inadequate sanitation systems, and low levels of hygiene demonstrate higher infection rates [3]. Children are especially vulnerable to helminthic infections because of their behavioral characteristics and weaker immune protection [4].

The Republic of Karakalpakstan is characterized by unique ecological conditions associated with the Aral Sea crisis, desertification, and water scarcity. These environmental problems significantly affect population health and contribute to the spread of infectious and parasitic diseases. Helminthic diseases in the region remain relevant because of the persistence of environmental contamination, insufficient sanitary awareness, and difficulties in preventive healthcare implementation.

The present study aims to analyze the dynamics of helminthiasis morbidity in the Republic of Karakalpakstan over a five-year period from 2020 to 2024. The article evaluates epidemiological indicators and identifies major trends in the prevalence of specific helminthic

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diseases. The research also discusses possible contributing factors affecting the observed epidemiological changes and emphasizes preventive strategies necessary for reducing disease burden.

Globally, helminthic diseases continue to create substantial health and economic consequences. Studies indicate that intestinal helminths contribute to malnutrition, anemia, impaired cognitive development, and reduced work productivity [5]. WHO recommends regular epidemiological monitoring and preventive chemotherapy in endemic regions as effective control measures [6]. Therefore, regional epidemiological analyses are important for developing evidence-based public health strategies.

Methodology

The study was based on retrospective statistical analysis of epidemiological data concerning helminthiasis morbidity in the Republic of Karakalpakstan from 2020 to 2024. The primary data source consisted of official annual indicators reflecting the number of examined individuals and registered cases of helminthic invasions.

The analyzed indicators included:

- Number of examined individuals;
- Total invasive cases;
- Hymenolepidosis cases;
- Enterobiasis cases;
- Teniarhynchosis cases;
- Giardiasis cases;
- Echinococcosis cases.

Comparative analysis methods were used to evaluate annual changes in morbidity rates and identify epidemiological tendencies. Descriptive statistical methods were applied to assess growth dynamics and prevalence structures. Percentage growth rates were calculated to determine changes during the study period.

The data were systematized and interpreted in accordance with modern epidemiological principles. Comparative interpretation was also conducted using international scientific literature on helminthiasis epidemiology and global trends [7].

The methodological approach focused on identifying patterns in the spread of helminthic diseases and evaluating the effectiveness of diagnostic screening activities in the region. No experimental interventions or patient-identifying information were used in the study.

Results

The analysis demonstrated a continuous increase in the number of examined individuals over the five-year period. In 2020, the number of examined individuals was 61,986, while by 2024 this indicator had increased to 99,077. This growth reflects expanded diagnostic and epidemiological surveillance activities in the Republic of Karakalpakstan.

The total number of invasive cases also increased substantially. In 2020, 667 invasive cases were registered. This number increased to 1,293 in 2021, 1,469 in 2022, 1,658 in 2023, and reached 3,374 cases in 2024. Thus, the number of invasive cases increased more than fivefold during the observation period.

Hymenolepidosis represented one of the most common helminthic diseases in the region. In 2020, 326 cases were identified. The number increased to 626 cases in 2021 and further rose to 925 cases in 2022. In 2023 and 2024, 934 and 1,043 cases were registered respectively. These data indicate stable growth in hymenolepidosis prevalence.

Enterobiasis also demonstrated significant epidemiological importance. In 2020, 337 cases were registered. In 2021, the number increased to 663 cases. Although a temporary decline to 542 cases was observed in 2022, the number increased again to 724 cases in 2023 and sharply rose to 2,322 cases in 2024. This substantial increase may indicate intensified transmission, improved diagnostics, or both factors simultaneously.

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Teniarhynchosis remained relatively rare throughout the study period. Annual indicators fluctuated minimally between 2 and 5 cases, suggesting limited prevalence in the region.

Giardiasis cases were absent in official records from 2020 to 2022. However, 66 cases were identified in 2023 and 100 cases in 2024, indicating either improved diagnostic identification or emerging epidemiological significance.

Echinococcosis remained stable with annual registration of 4–6 cases throughout the study period. This stability may indicate persistent endemic circulation without significant outbreaks.

Overall, the results demonstrate a general upward trend in helminthiasis morbidity in the Republic of Karakalpakstan over the five-year period.

Analysis and Discussion

The findings of the present study demonstrate that helminthiasis remains a significant epidemiological issue in the Republic of Karakalpakstan. The increase in the number of examined individuals reflects improved screening and surveillance systems. However, the simultaneous increase in invasive cases suggests that the spread of helminthic infections continues to pose a substantial public health challenge.

International studies indicate that helminthic infections are strongly associated with environmental sanitation, access to safe drinking water, and personal hygiene practices [8]. The Republic of Karakalpakstan experiences ecological difficulties associated with the Aral Sea disaster, which negatively affects water quality and environmental conditions. These ecological challenges may contribute to the persistence and spread of parasitic diseases.

The predominance of enterobiasis and hymenolepidosis corresponds with global epidemiological observations that intestinal helminthic infections are especially common among children and densely populated communities [9]. Enterobiasis transmission is facilitated through direct contact, contaminated surfaces, and insufficient hand hygiene. The dramatic increase in enterobiasis cases in 2024 may reflect both increased diagnostic sensitivity and worsening transmission conditions.

Hymenolepidosis demonstrated a stable increasing trend throughout the study period. Similar epidemiological patterns have been observed in regions with inadequate sanitation and crowded living conditions [10]. Children are especially susceptible to hymenolepidosis because of increased exposure risks in educational institutions and households.

The relatively low incidence of teniarhynchosis and echinococcosis may be explained by differences in transmission mechanisms. Teniarhynchosis is commonly associated with consumption of contaminated meat products, while echinococcosis involves zoonotic transmission pathways [11]. Although these diseases remain less prevalent, their presence indicates persistent epidemiological risks related to veterinary and food safety control.

The appearance of giardiasis cases in 2023 and 2024 may reflect improved laboratory diagnostics rather than a sudden emergence of disease. Giardiasis is frequently associated with contaminated water sources and poor sanitation conditions [12]. Environmental challenges in Karakalpakstan may contribute to the spread of waterborne parasitic diseases.

Global evidence suggests that preventive chemotherapy, sanitary education, and access to clean water are among the most effective strategies for reducing helminthiasis prevalence [13]. WHO recommends regular deworming programs in endemic regions, particularly among children [1]. The increasing epidemiological indicators observed in Karakalpakstan suggest that additional preventive measures may be necessary.

The study findings also emphasize the importance of health education. Many helminthic infections can be prevented through simple hygienic measures such as regular handwashing, food hygiene, and safe drinking water practices [14]. Community-based educational interventions may significantly reduce transmission rates.

Another important factor is the role of socio-economic conditions. Poverty, overcrowding, and insufficient sanitation infrastructure are widely recognized determinants of helminthiasis

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prevalence [15]. Addressing these social determinants is essential for achieving long-term disease reduction.

The study has several limitations. The analysis was based on officially registered epidemiological data and did not include unregistered or asymptomatic cases. Therefore, the actual prevalence of helminthiasis may be higher than reported figures. In addition, the study did not assess age distribution, gender differences, or geographic variations within the Republic of Karakalpakstan.

Despite these limitations, the study provides valuable epidemiological insight into helminthiasis dynamics in the region and contributes to understanding regional public health challenges associated with parasitic diseases.

Conclusion

The epidemiological analysis of helminthiasis morbidity in the Republic of Karakalpakstan from 2020 to 2024 demonstrated a significant increase in both the number of examined individuals and registered invasive cases. Enterobiasis and hymenolepidosis represented the dominant forms of helminthic infections during the study period.

The findings indicate that helminthiasis remains an important medical and social problem in the region. Environmental conditions, sanitary-hygienic factors, and socio-economic determinants likely contribute to the persistence of parasitic diseases. The sharp increase in enterobiasis cases in 2024 highlights the necessity for strengthened preventive and control measures.

Comprehensive public health strategies including epidemiological surveillance, sanitary education, preventive chemotherapy, improved water supply systems, and enhanced sanitation infrastructure are necessary to reduce helminthiasis prevalence in the Republic of Karakalpakstan.

Further research should focus on age-specific prevalence, environmental determinants, and evaluation of preventive intervention effectiveness to improve regional control programs.

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