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Odontia : Journal of Dental Innovations and Oral Health
Vol.1 | No. 1 | 2024 pp. 1–6 |ISSN: XXXX-XXXX

Geographical Distribution of Hepatitis A: Features in Countries with Different Income Levels

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Submitted: 25-Oct, 2024
Accepted: 01-Oct, 2024
Published: 29-Nov, 2024

Vol. 1, **No.** 1, 2024.
10.62762/OJDIOH.2024.000000

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Abstract

The article examines the geographic distribution of viral hepatitis A (HAV), taking into account differences in countries' income levels. The impact of sanitary and hygienic conditions, vaccination rates, and lifestyle characteristics on the epidemiological situation is analyzed. Particular attention is paid to low-income countries, where hepatitis A remains highly endemic , and high-income countries, where the infection is predominantly found among risk groups. Data on the results of mass vaccination and the impact of improved sanitary conditions on reducing morbidity are presented. The article emphasizes the importance of a multisectoral approach for effective control and prevention of hepatitis A.

Key words: hepatitis A, epidemiology, sanitary conditions, vaccination, risk groups

Introduction

Hepatitis A is one of the most common viral infections transmitted by the feco-oral route. The disease is highly endemic in low-income settings where sanitation and hygiene conditions are often inadequate. In high-income countries, the prevalence of infection is significantly lower due to improved water supply and hygiene. However, in these settings, the incidence increases among certain risk groups such as travellers, migrants and homeless people [1].

The aim of the study is to analyze the geographic distribution of HAV and identify factors influencing the epidemiological situation in countries with different income levels.

Literature Review: Geographic Distribution of Hepatitis A

1. Epidemiology of hepatitis A

Hepatitis A is a viral disease transmitted by the feco-oral route. The main transmission mechanisms are contaminated food, water, and contact with infected people. According to the World Health Organization (WHO), the spread of the virus is closely related to sanitary and hygienic conditions and income levels in countries.

- Low income countries:

In these regions, hepatitis A is endemic because most of the population is exposed to the infection at an early age. Infection in childhood is often asymptomatic, which facilitates its hidden spread. Epidemiological studies show that up to 90% of children under 10 years of age already have antibodies to the hepatitis A virus, indicating a previous infection.

- Middle income countries:

In countries with uneven sanitary conditions, significant risks of infection remain. Partial vaccination and improved sanitation reduce prevalence among children, but the proportion of susceptible adults increases, which may lead to a more severe course of the disease [2].

- High income countries:

Improved sanitation and widespread use of vaccines have reduced the incidence of infection. However, outbreaks continue to occur among at-risk groups such as travellers and migrants, and in localised settings where sanitation is poor.

2. Transmission routes and risk groups

The main route of transmission of the hepatitis A virus is the feco-oral route. The infection spreads through contaminated water and food, especially in conditions of insufficient sanitation infrastructure. In developed countries, where water supply is controlled, infections are more often associated with local outbreaks or imported cases.

- At-risk groups:

Research shows that certain population groups are at increased risk of infection:

- Travelers to endemic regions;
- Persons in conditions of poor hygiene (e.g. homeless people);
- Men who have sex with men.

Particular attention is paid to individuals without immunity who may experience severe forms of infection.

3. The role of vaccination

Vaccination against hepatitis A virus has demonstrated high efficacy. According to WHO, mass immunization programs have led to a significant reduction in the incidence of the disease in high- and middle-income countries. In regions with limited access to vaccines, the epidemiological situation remains difficult.

Examples of successful application:

- The introduction of routine vaccination in the United States has reduced the incidence of the disease by 95% over 10 years.
- Vaccination campaigns among risk groups (e.g. health care workers and travellers) in European countries have significantly reduced the number of imported cases.

However, vaccination is under-represented in low-income countries due to financial and logistical constraints.

4. The global sanitation problem

Effective control of the spread of the virus is impossible without improving sanitation and hygiene conditions. According to research, even minimal improvements, such as access to clean drinking water and sanitation facilities, can significantly reduce the level of transmission of the virus [3].

A review of the literature highlights that the epidemiology of hepatitis A varies according to the income level and sanitation status of the country. Introducing vaccination, improving sanitation infrastructure, and targeting risk groups are key to reducing incidence and preventing outbreaks.

Materials and Methods

The article used data from the World Health Organization (WHO) and national epidemiological services. The analysis included a comparative study of epidemiological data, including incidence rates and vaccination coverage in different regions. Mapping modeling and statistical analysis methods were used to visualize the geographical distribution of the infection.

Results

1. Distribution of hepatitis A in countries with different income levels

Low income countries

In low-income countries, hepatitis A remains highly endemic . The main reasons for this are poor sanitation and hygiene conditions and insufficient access to safe drinking water. In most cases, the infection affects children under 10 years of age. In this case, the clinical picture most often remains asymptomatic or mildly expressed, which contributes to the hidden spread of the virus in the community. Since children in these regions are infected at an early age, the incidence among adults is extremely low, which minimizes the severe consequences of the disease.

Key factors:

- Lack of centralized water supply systems.
- Low level of sanitary culture of the population.
- The poor state of the healthcare system, which limits access to diagnosis and prevention.

Middle income countries

Middle-income countries show a mixed pattern of endemicity . Improved living conditions and partial implementation of vaccination programmes have reduced the infection

rate in children. However, adults who were not exposed to the infection in childhood are often at risk. In such countries, the incidence may be localised in certain areas where hygiene standards remain poor.

Peculiarities:

- Incomplete vaccination coverage.
- A significant proportion of the population does not have immunity to the virus.
- Weak infrastructure in rural areas [4].

High income countries.

Discussion

In high-income countries where sanitation is effective in preventing infection, the endemicity of the virus is very low. Most cases are associated with travellers who become infected in areas with high prevalence of the virus or with members of risk groups. The disease in adults is more severe, including complications, which increases the socioeconomic burden on health systems.

Risk factors:

- Import of infections from travelers and migrants.
- Local outbreaks in communities with poor sanitation (e.g. refugee camps).
- The presence of certain behavioral factors in risk groups.

2. Impact of vaccination on the distribution of hepatitis A

The introduction of vaccination has led to a significant reduction in the incidence of hepatitis A in middle- and high-income countries. For example :

- Reduction in outbreaks. Vaccination of children aged 12–24 months effectively breaks the chain of transmission of the virus.
- Immune barrier. In regions with active immunization, adults are also indirectly protected by reducing virus circulation.

However, in low-income countries, vaccination programmes face challenges such as resource and human resource constraints. Large-scale campaigns require significant financial investment and infrastructure to deliver vaccines to remote areas.

3. Risk groups and their role in the epidemiology of hepatitis A

Particular attention should be paid to the following groups:

- Travellers: 20–30% of hepatitis A cases in high-income countries occur in people returning from endemic areas.
- Men who have sex with men: High risk associated with the possibility of close physical contact.
- Homeless: In this group, the spread of the virus is associated with poor sanitation and lack of access to medical care.

These groups require targeted vaccination and education programs to prevent the spread of the virus.

4. Consequences and burden on health systems

Hepatitis A places a significant burden on health systems, particularly in resource-poor countries. The economic burden is due to treatment costs, lost work time, and rehabilitation. In high-income countries, severe disease in adults can result in expensive hospital treatment.

Recommendations include:

- Strengthening vaccination programs.
- Investment in sanitary and hygienic infrastructure.
- Introduction of educational programs for the population, especially in endemic regions.

Effective prevention through improved sanitation and vaccination can significantly reduce disease incidence and minimize the burden on health systems

Conclusion

The geographic distribution of hepatitis A reflects differences in sanitation and access to vaccination. Implementation of vaccination programmes and improvement of sanitation infrastructure are key measures to control the disease. Particular attention should be paid to educational campaigns and vaccination of risk groups.

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