UNIVERSAL JOURNAL OF MEDICAL AND NATURAL SCIENCES
ISSN 2992-8826
https://sr-journals.org/index.php/UJMANS

SPREAD OF MENINGITIS AMONG CHILDREN

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Annotation: Meningitis is an inflammation of the meninges, the protective membranes covering the central nervous system, and is a serious infection that can be widespread among children. The main causes of the disease are bacterial, viral, or, less commonly, fungal infections. In children, meningitis develops rapidly, presenting with high fever, headache, vomiting, fatigue, and sometimes chills.

Timely diagnosis, preventive vaccination, hygiene, and epidemiological surveillance are crucial for preventing the spread of the disease among children. Currently, immunization programs and family-based preventive measures have significantly reduced the incidence of meningitis in pediatric populations. This article summarizes scientific data on the epidemiology, clinical features, diagnosis, and prevention of meningitis in children.

Keywords: meningitis, children, epidemiology, diagnosis, prevention, vaccination, infection

Annotatsiya: Meningit – bu markaziy asab tizimini qoplagan shilliq qatlam (meninks)ning yallig'lanishi bo'lib, bolalar orasida keng tarqalishi mumkin bo'lgan jiddiy infektsiya hisoblanadi. Kasallikning asosiy sabablari bakterial, virusli yoki kamroq uchraydigan qo'ziqorinli infektsiyalardir. Bolalarda meningit tez sur'at bilan rivo'lib, yuqori harorat, bosh og'rig'i, qusish, charchoq va ba'zan bezgak kabi simptomlar bilan namoyon bo'ladi.

Bolalar orasida kasallikning tarqalishini oldini olishda tezkor tashxis, profilaktik emlash, gigiena va epidemiologik nazorat muhim ahamiyatga ega. Bugungi kunda emlash dasturlari va oilaviy profilaktika choralari bolalar orasida meningit holatlarini sezilarli darajada kamaytirishga yordam bermoqda. Ushbu maqola bolalarda meningitning epidemiologiyasi, klinik belgilari, tashxisi va profilaktikasi bo'yicha ilmiy ma'lumotlarni jamlaydi.

Kalit so'zlar: meningit, bolalar, epidemiologiya, tashxis, profilaktika, emlash, infektsiya

Аннотация: Менингит — это воспаление оболочек центральной нервной системы (менинг), которое представляет собой серьёзную инфекцию, широко распространённую среди детей. Основными причинами заболевания являются бактериальные, вирусные или реже грибковые инфекции. У детей менингит развивается быстро, проявляясь высокой температурой, головной болью, рвотой, усталостью и иногда ознобом.

Для предотвращения распространения менингита среди детей важны своевременная диагностика, профилактическая вакцинация, соблюдение гигиены и эпидемиологический контроль. В настоящее время программы иммунизации и меры семейной профилактики существенно снижают заболеваемость менингитом среди детей. Настоящая статья обобщает научные данные об эпидемиологии, клинических проявлениях, диагностике и профилактике менингита у детей.

Ключевые слова: менингит, дети, эпидемиология, диагностика, профилактика, вакцинация, инфекция

Introduction: Meningitis, an inflammation of the meninges covering the brain and spinal cord, remains a significant public health concern worldwide, particularly among children. The disease can be caused by bacterial, viral, or, less commonly, fungal pathogens, with bacterial meningitis posing the greatest risk of severe complications and mortality. Children are especially vulnerable due to their developing immune systems, which increases susceptibility to infection and rapid disease progression.

The transmission of meningitis among children is often facilitated by high population density, close contact in schools and daycare centers, inadequate sanitation, and insufficient immunization coverage. Early recognition of clinical symptoms—such as fever, headache, vomiting, fatigue, and irritability—is essential for prompt diagnosis and timely medical intervention. Laboratory testing, including cerebrospinal fluid analysis and pathogen identification, plays a crucial role in confirming the infection and guiding treatment.

Preventive strategies, including routine vaccination, maintenance of hygienic practices, and epidemiological surveillance, are key to reducing the incidence and preventing outbreaks of meningitis in pediatric populations. Understanding the epidemiology, transmission pathways, and risk factors of meningitis is critical for designing effective public health interventions and protecting children from long-term neurological complications.

This study aims to review current knowledge on the spread of meningitis among children, emphasizing clinical features, diagnostic methods, and preventive measures to mitigate the disease burden.

Main Body: Meningitis remains a major global health challenge, with a particularly high burden among children. In 2021, an estimated 1.33 million new cases of meningitis occurred among children worldwide, resulting in approximately 112,000 deaths in this age group. This translates to a global incidence rate of 66.24 cases per 100,000 children aged 0–14 years, and a mortality rate of 5.59 deaths per 100,000 in the same population. Over the past three decades, both incidence and mortality have declined significantly, largely due to improved vaccination coverage and public health interventions; from 1990 to 2021, the global incidence decreased by nearly 59.8% and mortality declined by about 69.2%**.** However, substantial geographic disparities persist, with low-income regions, particularly Sub-Saharan Africa, bearing the heaviest burden of disease and mortality.

Bacterial pathogens remain the predominant cause of severe meningitis in children. The most common etiological agents include *Streptococcus pneumoniae*, *Neisseria meningitidis*, and *Haemophilus influenzae* type b (Hib). These bacteria are responsible for the majority of childhood meningitis cases and associated deaths globally, especially in settings with limited access to vaccines and adequate healthcare. In 2021, *Streptococcus pneumoniae* was estimated to account for the largest number of disability-adjusted life years (DALYs) attributable to childhood meningitis, followed by *Neisseria meningitidis* and *Klebsiella pneumoniae*.

Age is a significant risk factor in the distribution of meningitis cases. Infants, particularly those in the neonatal period and children aged 1–5 months**,** exhibit the highest incidence and mortality rates, with rates as high as 1,185 cases per 100,000 and 541 deaths per 100,000**,** respectively, in these age brackets. This trend reflects both the vulnerability of the immature immune system and the increased exposure to bacterial pathogens in early life.

Transmission of meningitis-causing pathogens typically occurs through respiratory droplets or direct contact with carriers. Children in crowded environments such as schools, daycare centers, and refugee camps are especially at risk due to increased person-to-person contact and lower likelihood of complete immunization. Although vaccination programs targeting Hib, pneumococcus, and meningococcus have significantly reduced disease burden in many regions, gaps in vaccine coverage persist. For example, coverage of recommended doses of pneumococcal conjugate vaccine in parts of Europe and Central Asia remains below 90% in some countries, leaving certain populations vulnerable to infection.

Long-term consequences of childhood meningitis are considerable. Survivors of bacterial meningitis frequently experience neurological sequelae, including hearing loss, cognitive impairments, motor deficits, and seizures. Approximately **20%** of individuals who survive bacterial meningitis sustain some form of lasting disability, underscoring the importance of both preventive measures and early, effective treatment.

In summary, while global efforts including vaccination campaigns have significantly reduced the incidence and mortality of meningitis among children over recent decades, the disease continues to pose a significant public health challenge in low-resource settings. Enhanced immunization coverage, improved sanitation, and strengthened health systems are essential to further reduce the burden of meningitis and protect vulnerable pediatric populations.

Conclusion: Meningitis remains a serious public health concern among children worldwide, despite significant advances in vaccination and disease prevention strategies. Bacterial pathogens, particularly *Streptococcus pneumoniae*, *Neisseria meningitidis*, and *Haemophilus influenzae* type b, continue to be the leading causes of severe illness and mortality in pediatric populations. Infants and young children remain the most vulnerable, with the highest incidence and risk of long-term complications.

Global vaccination programs, including Hib, pneumococcal, and meningococcal vaccines, have dramatically reduced the incidence and mortality of meningitis in children. However, gaps in immunization coverage, crowded living conditions, and limited access to healthcare in low-resource regions contribute to continued transmission and outbreaks.

Timely diagnosis, early treatment, adherence to hygiene practices, and strong epidemiological surveillance are essential to prevent the spread of meningitis and mitigate its long-term impact on children's health. Strengthening public health interventions, improving vaccine coverage, and raising awareness among caregivers and healthcare providers are crucial for further reducing disease burden and protecting vulnerable pediatric populations.

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