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Viral Infection and Types of Infection

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Abstract

Epidemiology is the study of the distribution, the dynamics, and the determinants of diseases in populations. The risk of virus infection and/or clinical disease is determined by characteristics both of the virus, and the levels of innate and acquired resistance in the community [1]. Virus transmission is affected by behavioral, environmental, and ecological factors. Knowledge of these factors contributes to evidence-based policy decisions as to how best to control and prevent virus diseases. Considerable use of genome sequencing of isolates now provides useful information as to the identification of outbreak sources as well as informing the design and testing of candidate vaccines [2].

Epidemiology is the study of the distribution, the dynamics, and the determinants of diseases in populations. The risk of virus infection and/or disease in a human population is determined by the characteristics both of the virus, and of susceptible individuals and of the host population such as innate and acquired resistance. In addition, virus transmission is affected by behavioral, environmental, and ecological factors. Virus epidemiology aims to meld these factors using quantitative measurements to provide a rational basis for explaining the occurrence of virus diseases and for directing disease-control measures, in particular the identification of outbreak sources and how best to implement prevention strategies [3]. Epidemiology can also help to clarify the role of viruses in the etiology of diseases, understanding the interaction of viruses with environmental determinants of disease, determining factors affecting host susceptibility, clarifying modes of transmission, and the testing of vaccines and therapeutics on a large scale. Epidemics are peaks in disease incidence that exceed the endemic baseline or expected rate of disease. The size of the peak required to constitute an epidemic is arbitrary and is related to the background endemic rate and the rate of clinical to sub-clinical infection [4]. Sometimes a few cases of a disease that arouse anxiety because of their severity, for example encephalitis, will be loosely termed an “epidemic” whereas a few cases of influenza will not, but the term strictly implies unusually wide and rapid spread of infection within the population.

Keywords: Virus survival, viral shedding, routes of transmission, viral infections, epidemiological investigations, mathematical modeling

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Viral Infections

Respiratory viral infections

Respiratory viral infections affect the nose, lungs and airway. They spread by inhalation of droplets containing virus particles. Frequent hand-washing, covering your nose and mouth while coughing or sneezing, and avoiding contact with infected people helps prevent the spread of respiratory infections [5]. Avoiding touching your nose, mouth or eyes and disinfecting hard surfaces also helps.

Rhinovirus

This most commonly causes the common cold, along with 200 other viruses. Symptoms like coughing, sneezing, headache and sore throat usually last for two weeks [6].

Seasonal influenza

This affects a significant percentage of the population world

over. The symptoms are more severe than the common cold and include body aches and severe fatigue.

Respiratory syncytial virus

This virus can cause upper respiratory (like colds) as well as lower respiratory tract infections (pneumonia). It can be severe in the elderly and among toddlers and infants.

Skin infections (Viral)

Viral skin infections show symptoms like rashes or bumps. These viruses are caused by skin-skin infection, though some are air-borne too. Using shared towels, communal swimming pools all put you at risk to catch these viral infections [7].

Molluscum Contagiosum

This causes small bumps that are flesh-coloured in children aged 1-10 years. However, it can infect people of any age. The bumps usually disappear after 6-12 months without treatment

Herpes simplex virus-1

This virus causes cold sores. It's transmitted through saliva by kissing or sharing food or drinks from an infected person. HSV-2 causes genital herpes.

Varicella-Zoster Virus (VZV)

This virus causes chickenpox which causes symptoms of itchy, oozy blisters, fever and fatigue. This is preventable by the vaccine that is 98% effective. People infected with chickenpox are at risk for shingles at an older age, which is caused by the same virus.

Sexually transmitted infections (STI)

Sexually transmitted viral infections spread through contact with body fluids or blood. The risk of spreading these infections can be reduced by abstaining from sex, or having a monogamous sexual relationship or having intercourse with someone who does not have a sexually transmitted infection. Using a condom reduces the risk, though doesn't completely eliminate the possibility of getting a sexually transmitted infection. Minimizing the number of sexual partners and avoiding intravenous drugs are other ways to reduce the Human Papillomavirus (HPV) is a common STI. Different subtypes of HPV exist [8]. While most cause genital warts, others can increase the risk of cervical cancer. Vaccination can help against most cancer-causing strains of HPV.

Hepatitis B

This causes inflammation of the liver and is transmitted through contaminated body fluids. Some people don't show any symptoms when infected, while others can have nausea, vomiting, Jaundice. Hepatitis B is a chronic infection that can lead to liver cancer [9]. The vaccine against this virus is 90% effective.

Genital herpes

This is caused most often by HSV-2, and rarely HSV-1. This cannot be cured and leads to recurring painful sores. Antiviral medication offers some relief.

Human Immunodeficiency Virus (HIV)

This virus affects cells of the immune system. Progression of the disease reduces the body's ability to resist diseases or infections, leading to Acquired Immune Deficiency Syndrome (AIDS) [10].

Treatment (viral infections)

Many viral infections resolve on their own and don't require treatment. Other times, viral infections are dealt with by symptom relief alone. Some medications work directly on viruses, known as antiviral medications. They act by inhibiting the production of virus particles, preventing multiplication of viral DNA, or viral particles from entering host cells. Different antiviral medications are used for the treatment of chicken-pox, HIV, HSV-1, HSV-2, Hepatitis B and influenza.

Conclusions

Smallpox, caused by variola virus, is a devastating disease with high case-fatality and transmission rates. Inoculation with vaccinia virus is highly protective against natural infection with variola virus. Vaccination, together with the restricted host range and vigilant surveillance efforts, enabled a worldwide containment and inoculation program to eliminate smallpox globally more than 20 years ago. The last case of naturally occurring smallpox was in Somalia in 1977. Known tissue collections containing live variola virus material were subsequently consolidated in two international repositories in the United States and Russia. Scientific research on live variola virus requires maximum containment facilities. As a consequence, little research on variola has been done since eradication. During that same period, scientific knowledge about the molecular pathogenesis of many viral infections has become considerably more sophisticated through studies of the immunology, virology, molecular genetics, structural biology, and molecular pharmacology of infection. While such investigations enable effective diagnosis, treatment, or prevention of many other viral infections, increased knowledge of variola infection has been limited largely to the cloning and complete sequencing of two strains of variola major from the Asian subcontinent, partial sequencing of one strain of variola major, and one strain of variola minor from Latin America. In addition, a few genes of other strains have been sequenced. Since the eradication of smallpox, virologists have come to realize that disease-causing viruses are efficient pathogens because of a broad spectrum of mechanisms that can defeat or alter innate defenses or immune system responses. The technologies that have been developed to investigate these phenomena have advanced dramatically in the past 20 years and will almost certainly become even more powerful in the future. As a consequence of these capabilities, novel approaches to biomedical research have emerged. Techniques have been developed to render viruses safer to use in laboratory studies and to provide new animal models with which such studies can be performed. Because variola virus is the only uniquely human orthopoxvirus, it offers the potential for understanding aspects of human biology that may have considerable biomedical significance. Thus variola virus, once considered an agent of human pestilence, may in the future be viewed as a potential source of knowledge and of reagents to

support advances in cell biology and immunology. In particular, research using variola virus could assist in understanding the inflammatory response, which is a key process of cell-mediated defense.

Acknowledgement

None

Conflict of Interest

None

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