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An overview of human infections / Review Article

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Abstract : Microbes of all kinds spread around us, whether they are viruses or bacteria, and perhaps some may wonder about the difference between a virus and bacteria, especially after the spread of the Corona virus pandemic, which caused some concepts to be confused and to treat the virus as if it were a bacterial infection, which called on doctors to try to correct misconceptions, explaining the difference between viruses and bacteria, methods of treating both viruses and bacteria are transmitted to humans

Keywords: Human Infections, Pathogenic, Virus and Bacteria

A review Article Problem: A bacterial or viral infection can cause a variety of symptoms, including a cough, headache, a runny nose, and exhaustion, can be associated both cold (viruses), sinus infections (bacteria origin). Other symptom like fever or body aches and the length of the sickness may also be considered by the doctor. In addition, laboratory tests are performed to identify whether the condition is caused by a virus, bacterium, or another pathogen.

A review Article Objective: Infection has a significant impact on human health worldwide, and despite extensive efforts to produce simple therapies that might prevent harmful behavior modification, it remains a difficult undertaking. Information, education, and advice can assist people in recognizing symptoms of infection and seeking treatment more quickly. Factors such as a lack of general knowledge and training among healthcare professionals continue to impede the widespread and successful implementation of these therapies.

The method of the article: A basic blood test can detect both bacterial and viral illnesses. Bacterial illnesses are distinguished by a rise in normocytosis and leukocytes, while lymphocytes are reduced. If a virus is present in the body, the number of lymphocytes increases, while the number of white blood cells and normal cells decreases

INTRODUCTION

Bacteria produce bacterial infections; viruses cause viral infections. Antibiotics are used to kill or restrict the growth of bacteria, but they cannot treat viruses. Antivirals assist the



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body get rid of certain viruses. Bacteria are single-celled creatures. These organisms may exist in a variety of environments [1]. They also live on and inside the human body; the main cases of bacteria are harmless, and some are beneficial. For example, some microorganisms in the intestines aid in the digestion of meals. However, microorganisms can cause disease. Bacteria passed from the anus, for example, can lead to a urinary tract infection. Bacteria can be spread to people by other people, food, or the surrounding environment [2]. Tuberculosis, Salmonella, and Tetanus are some of the diseases that these bacteria can cause. Antibiotics are drugs that kill germs or hinder the components that allow bacteria to exist and thrive. There are hundreds of antibiotics available. However, bacteria have genetic mechanisms that allow them to withstand antibiotics. Antibiotic-resistant bacteria are those that continue to be active and alive after antibiotic therapy has ended. If the microorganisms that cause the disease develop antibiotic resistance, disease treatment may become more difficult in the future. Antibiotic resistance may result in a lengthier illness for a person. Some people may even die from infections that are typically treated with medications. Antibiotics differ from other types of medications; how a person uses an antibiotic can affect how effective that antibiotic is for that person in the future; among the people who may be more dependent on antibiotics than others are people planning to have surgery, undergoing cancer treatments, having undergone an organ transplant, undergoing dialysis, and people with diabetes [3]. Viruses are composed of genetic material (RNA or DNA) encased in protein. The virus needs a host organism, which could be a human, a plant, or an animal. The virus spreads through the host's body, infecting its cells. It then takes control of the host's cell machinery and uses it to reproduce the virus [4].

Covid-19 is caused by infection with the coronavirus known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), chickenpox is caused by infection with the varicella zoster virus, and HIV disease is caused by infection with the human immunodeficiency virus. The common cold is caused by a variety of viruses, the most common of which is rhinovirus. Antiviral drugs treat viral illnesses. These drugs typically prevent the virus from reproducing itself. It might also prevent it from entering or leaving the cell [3]. Many antiviral are designed to target viruses rather than host cells. As a result, antiviral frequently rely on an infected person's immune system to eradicate the infection [5]. Some antiviral aim to improve the immune system's efficiency. More than 70 antiviral medications are used to treat a variety of human disorders, some with serious consequences. For example, when antiretroviral medication was utilized to treat HIV infection, the death rate reduced by 47% between 1996 and 1997. Viruses have the innate ability to withstand the effects of antivirals. However, this resistance is more likely to arise in those with a weakened immune system response permits the virus to multiply at a faster rate and for a longer period. This raises the risk of the virus obtaining resistance, and that have evolved the ability to resist antiviral have altered the treatment of several diseases, including the treatment of genital herpes and HIV; in 2008, they also influenced the



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treatment of the influenza virus [6].

1-1 Types of bacterial infections:

Bacterial infections are divided into several types, including the following according:

A- A Skin infections are most likely caused by a variety of Gram-positive bacteria of *staphylococci*, *streptococci*, but the common bacterial skin infections include:

1-Cellulitis, This resulted in a crimson infection that was most likely warm to the touch. Cellulitis is most common on the legs but can arise anywhere on the body.

2-Folliculitis, is an infection of the scalp's hair follicles that generates red, swollen, pimple-like lumps. Inadequately maintained pools or hot tubs can host bacteria that cause folliculitis..

3-Impetigo, This causes blisters in preschool children. The bullous form of impetigo produces enormous blisters, whereas the non-bullous version has a yellow, scaly look.

4-Boils, are profound skin problems that start in the hair follicles. They are solid, red lumps that develop into pus beneath the skin.

Bacterial skin infections are treated with oral or topical antibiotics, depending on the strain causing the infection. [7].

B-Food poisoning: Bacterial infections are one of the primary causes of foodborne disease. Symptoms of food poisoning include nausea, vomiting, diarrhea, fever, chills, and stomach discomfort. Raw meat, fish, eggs, poultry, and unpasteurized dairy products may all contain bacteria that can cause disease. Bacteria causing food poisoning include according [8]:

1-Campylobacter jejuni, causes diarrhea, which is frequently accompanied by cramps and fever..

2-C. botulinum, is a potentially lethal bacterium that produces a severe neurotoxin..

3-Escherichia coli, auses bloody diarrhea that can be accompanied with nausea, vomiting, fever, and abdominal cramps

4-Listeria monocytogenes, causes fever, muscle pain, and diarrhea. Pregnant women, the elderly, babies, and others with weakened immune systems are most vulnerable to this disease.

.5-Salmonella, This infection is caused by food poisoning and has severe stomach pain, diarrhea, and vomiting as symptoms. Salmonella bacteria, which is located in the intestines, is the cause of this infection, most typical route of transferring it is through poorly cooked poultry.

6-Escherichia coli: This bacteria produces pain in the stomach and intestines, and in most cases its symptoms go away without treatment; nevertheless, in some cases it reaches severe levels that may lead to death, and its spread is prevalent owing to infected or uncooked vegetables..

7-Helibacter pylori, This bacteria can cause stomach ulcers or persistent gastritis. These bacteria's activity is induced by a change in the digestive system as a result of a change in its environment caused by smoking or high acidity, which predisposes to this type of bacterial



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infection.

C-Sexually transmitted diseases: Many sexually transmitted diseases (STDs) are caused by dangerous microorganisms. Even when there are no symptoms, these diseases can cause substantial damage to the reproductive system. Common sexually transmitted diseases caused by bacterial infections include the following [9]:

1-Chlamydia, *Chlamydia trachomatis* is an organism that causes infection in both men and women. Chlamydia raises the risk of pelvic inflammatory disease in women..

2-Gonorrhoea, sometimes known as "the clap" or "the drip," is caused by *Neisseria gonorrhoeae*. Men and women may be affected. It also raises the likelihood of pelvic inflammatory disease in women. *Treponema pallidum* is the bacteria that causes.

3-Syphilis, which can infect both men and women. Untreated, syphilis can be extremely dangerous and even lethal.

4-Bacterial vaginosis, is a condition in which disease-causing bacteria overgrow in the vagina.

Other types of bacterial infections according [10].

Bacteria can harm practically every part of the body. Other types of bacterial infections are:

1. Bacterial meningitis is a serious infection of the brain's lining.

2-Otitis media, infections caused by bacteria or viruses, are frequent in newborns and young

3-Urinary tract infection: A bacterial infection affecting the bladder, urethra, kidneys, ureters.

4-Respiratory include sore throats, bronchitis, sinusitis, bacterial pneumonia, and tuberculosis.

Bacterial infection happens when bacteria are transmitted to an individual. Transmission can occur via another infected person, the surrounding environment, or by consuming food or drink contaminated with bacteria. Any person is susceptible to infection, especially if their immune system is compromised or if they are using a combination of immune-suppressing medicines [11].

Bacterial infections affect everyone, whether they are children or adults, at any age and in every area of the body, including the skin, intestines, and lungs, *etc.* Pain is regarded as one of the primary indications of bacterial infection, albeit the kind and location of the pain differ. Depending on where the infection is, the discomfort could be in the skin, while breathing, or in the abdomen. Bacterial infections are frequently accompanied by nonspecific symptoms such as fever, tiredness, and trembling. Local symptoms associated with bacterial infections may include discomfort, swelling, and redness. Organ weakness, such as reduced kidney function outward Local symptoms, such as those on the skin, are easily visible; however, some internal diseases, such as respiratory infections, cannot be seen yet are frequently accompanied by a cough of thick mucus [12].

There are many ways through which a bacterial infection can be diagnosed, including



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doctor can diagnose a bacterial infection based on the symptoms and severity, as each bacterial infection has its own characteristics in terms of symptoms and severity, and bacterial infections can be verified by analyzing liquid samples in a laboratory before a specific antibiotic is recommended in what is known as a bacterial culture, urine samples can check the type of bacterial infection, X-ray imaging studies may be used if the pus collection is within or close to an organ and is not visible [13]. Bacterial infections usually go away on their own, but there are some that require treatment and take longer to clear up. The following are some of the therapeutic methods used to treat bacterial infections. according [14].

A-Antibiotics: The choice of the type of antibiotic for treatment depends on the type of bacteria causing it, although most antibiotics work with many types of bacteria, but not with all types. Antibiotics are given in many ways, which can be taken orally, or topically in the form of ointments on the surface of the skin or eyes, and by intravenous injection when using antibiotics, be careful not to stop before completing the full dose, and not to use topical antibiotics anywhere in the body, such as using an antibiotic for the skin on the eyes.

B-Comprehensive care: A person suffering from a bacterial infection needs some painkillers and anti-inflammatory drugs to get rid of the swelling caused by the bacterial infection. It is preferable to use fever-reducing medications in the event of a fever. Antitussive medications can also be relied upon when a cough accompanies the bacterial infection. Intravenous fluids must be used if the infection causes the infection. Bacteria cause dehydration.

C-Cleaning wounds: When a bacterial infection causes an abscess, it must be treated either simply if it is on the surface of the skin, or with surgical intervention if it is deep inside the body.

1-2 Viral infections

The virus is made up of nucleic acids (DNA or RNA) that have been coated with protein. It requires a living cell to reproduce. Viral infections can produce a wide range of symptoms, from none (or unexplained) to serious illness. Patients can become infected with viruses through ingestion or inhalation, insect bites, or sexual activity. The nose, throat, and upper respiratory tract are the most common sites of viral infections, but they can also affect other organs like the neurological, digestive, and reproductive systems. Antiviral drugs can either limit viral replication or boost the immune response to viral infection [15], An infectious organism that reproduces by invading living cells. It binds to the host cell, enters it, and then releases its DNA or RNA. The virus's genetic material, commonly known as deoxyribonucleic acid (DNA) or RNA, carries the information required to replicate the virus. The virus's genetic material instructs the cell to reproduce the virus. The infected cell typically dies because the virus prohibits it from carrying out its normal duties. When a cell dies, it releases new viruses which infect surrounding cells [16].

Viruses are classed as DNA or RNA viruses based on whether they replicate utilizing one or



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both. Herpesviruses are DNA viruses. RNA viruses include both retroviruses like AIDS (human immunodeficiency virus) and coronaviruses like SARS-CoV-2, which causes COVID-19. RNA viruses, particularly retroviruses, are prone to mutation, which refers to the entire set of genetic instructions. As a virus spreads, the requirements for its survival may vary. Some viruses infect cells without killing them; instead, they alter their biological function. Infected cells may lose control of normal cell division and develop cancer, while hepatitis B or C can induce persistent infection. Chronic hepatitis might continue several years or decades. In many cases, it is extremely mild and does not cause significant liver damage. However, it eventually causes cirrhosis (severe scarring of the liver), liver failure, and possibly liver cancer [17].

Patterns of viral infection: The most common diseases are: Respiratory system infections: The most common respiratory infections are those of the nose, throat, upper airway, and lungs, as well as respiratory illnesses such as sore throats, sinusitis, colds, influenza, pneumonia, and coronaviruses. Infants, the elderly, and people with lung or heart conditions are more likely to develop severe symptoms of respiratory infections [18]. Other viruses concentrate on certain parts of the body, such as the digestive tract (viruses cause gastroenteritis) and the liver. Encephalitis is caused by an infection of the brain with nervous system viruses such as rabies or West Nile. Warts and other skin lesions aren't always the sole things that cause skin damage. Many viruses that affect other regions of the body, such as chickenpox, cause skin rashes, generally infects a variety of body systems. include *enteroviruses* (such as *coxsackie* viruses and *echoviruses*) and *cytomegalo* viruses [19].

Spread of viruses: It spreads in numerous ways. This may include both ingestion and inhalation. Mosquitoes, certain species of flies, and ticks all serve as infection vectors. Sexually transmitted infections spread during intercourse. Infected blood can be spread through blood transfusions [20].

New human viruses are occasionally created by viruses that ordinarily infect animals (such as SARS-CoV-1 and SARS-CoV2). This happens when animal hosts have intimate contact with vulnerable humans. Many viruses that were formerly restricted to a few regions around the world are now prevalent these viruses include chikungunya, Crimean-Congo hemorrhagic fever, Japanese encephalitis, and Rift Valley disease. The West Nile virus, Ross River virus, Zika virus, and jumping sickness virus are all spreading because, on the one hand, climate change has increased the number of regions where mosquitoes carrying viral infections can breed. On the other side, travelers may become infected and then return home, where they are exposed to mosquito bites, spreading the virus to others. [21].

Virus prevention: The body has several protection mechanisms against viruses, including physical barriers such as the skin, which prevents simple entry, and immune systems that target the infection. When a virus infects the body, the immune system is triggered. These reactions start with white blood cells known as lymphocytes and monocytes, which learn to target and destroy the virus or infected cells. If the body survives



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the virus attack, some white blood cells remember the invading agent and can respond more quickly and effectively to subsequent viral infections, Vaccination may cause a response. Some viruses alter the DNA of their host cells, contributing to the development of cancer. Some viruses, such as herpes and HIV, keep their genetic material in the host cell and remain inactive for a lengthy period of time (latent infection). When a cell is damaged, the virus can multiply and cause illness [22].

For diseases that occur in epidemics (such as influenza), the prevalence of similar ailments may help doctors identify a specific infection. Laboratory diagnosis is crucial for distinguishing between various viruses causing similar symptoms such as: Covid-19 (SARS-CoV2) and influenza, Regarding other infections, Blood tests and culture (the laboratory cultivation of bacteria from blood samples, body fluids, or other material gathered from the affected area) may be carried out. Polymerase chain reaction (PCR) techniques may reproduce large volumes of virus genomes. Polymerase chain reaction (PCR) techniques allow clinicians to identify viruses quickly and precisely. A blood test may be used to identify viral antibodies or antigens. Blood tests may also be used to determine the presence of virus-specific antibodies. (Antibodies are proteins created by the immune system to help defend the body from attack. This is usually done rapidly, especially when the illness poses a substantial threat to public health or when symptoms are severe [23]. An electron microscope, which has great magnification and crisp clarity, is sometimes used to examine a sample of blood or other tissue. Vaccines and other precautions can be used to prevent viral infections. Immunization protects the body from diseases caused by particular types of germs or viruses. Immunization is the process whereby the body's defenses are reinforced [24].

Antiviral medications: Antiviral drugs are prescribed to treat viral infections. There are no antiviral drugs that can effectively treat many viral infections. However, there are a number of medications available to treat influenza infections and one or more herpesvirus infections (see table for some antiviral drugs used to treat herpesvirus infections), as well as numerous novel antiviral drugs for HIV, hepatitis C, hepatitis B, and Ebola.

Many antiviral medicines, including the bulk of HIV drugs, work by reducing viral replication. Because viruses are tiny and multiply inside cells, antiviral medications can only target a limited number of metabolic activities. Bacteria, on the other hand, are very large organisms that frequently multiply outside of cells and possess a variety of metabolic processes that antibacterial medications (antibiotics), treatments are more difficult to develop than antibiotics. Furthermore, unlike antibiotics, which are usually effective against a broad spectrum of bacteria, most antiviral drugs are usually effective against only one virus [25].

2- Conclusions and Recommendations

Through the general view of infection in humans, we notice that there is a difference between viruses and bacteria in terms of transmission. Bacterial infections are transmitted in several different ways, and depend on dealing with an infected person, so they can be



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transmitted through close interaction with an infected person, and this includes touching, kissing, or dealing with liquids. A person is infected when sneezing, coughing, handling feces or urine, or through sexual intercourse or transmission from mother to fetus during pregnancy or childbirth, or dealing with surfaces that contain bacteria such as: a water tap, or a door handle, then touching the face, nose, or mouth, eating food or drinking water contaminated with bacteria. Viruses are infectious microbes that are transmitted from one person to another in the same ways as bacterial infections, through dealing with an infected person, animals, or insects that carry the virus causing the infection, such as: fleas, ticks, or mosquitoes, or touching surfaces contaminated with viruses, dealing with bodily fluids, whether feces, urine, kissing, sneezing, or coughing, transmission of infection from mother to fetus through birth or during pregnancy.

There is a difference between the virus and bacteria in terms of symptoms. Both the virus and bacteria may cause some similar symptoms, which creates confusion and confusion for many, and they believe that this infection is bacterial even though it is a viral infection, but when resorting to a specialist doctor and conducting special examinations, he will be able to determine the type of infection and appropriate treatment for the condition. It may be difficult to differentiate between bacterial and viral infections; Because of the similarity of symptoms and diseases caused by each of them, for example, pneumonia, meningitis, and diarrhea, where a person becomes infected with any of these diseases due to a viral or bacterial infection, doctor can determine whether the patient has a viral or bacterial infection through a physical examination and taking a medical history of his condition. If necessary, the doctor will need to order a blood test or conduct a urine test to confirm the type of infection to determine the appropriate type of treatment for the patient as for the difference between viruses and bacteria in terms of treatment, antibiotics are among the most important medications used in treating bacterial infections, but some people use them incorrectly. Because they believe that antibiotics treat any type of infection, even if it is viral, the excessive use of antibiotics results in bacteria becoming resistant to them. Because bacteria, by their nature, adapt to the surrounding conditions, adapt to medications, and gradually resist them, and this resistance may lead to serious problems, especially when the patient is admitted to the hospital. Antibiotics are ineffective in treating viral infections, so the nature of the infection must be ascertained to use the correct medication, as it treats Viral infections using antiviral medications, which may sometimes not be effective enough to the small size of the virus, its rapid reproduction, and the mutation of its genes, compared to bacteria, the use of antiviral drugs leads to the emergence of drug-resistant microbes as well, there are many vaccinations used to prevent infection with some types of bacterial or viral infections. It is worth noting that these vaccinations do not treat the infection, but rather It works to protect and reduce the chances of infection.

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