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Review Article

Microbes: Role in Industries, Medical Field and Impact on Health

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Abstract

Microbes have ecological interactions with almost all life forms. Likewise, humans invariably engage in host-microbial interactions that could induce short-term or long-term effects. They are used in pharmaceutical industries for the synthesis of chemical compounds. Nowadays, chemical industries using the bacteria to synthesis the industrial products like. Some important features of bacteria in food industries remain unclear. This review highlighted the role of bacteria in industries for synthesis of compounds in medical as well as industrial point of view but some of the bacterial species have great impact on the human health thus causing serious diseases in human. Lactic acid bacteria (LAB) is used to produce cheese, yoghurt, kefir and kimchi. Acetic acid bacteria (AAB) is used in traditional manufacturing of vinegar. Bacteria are used to create multiple antibiotics such as streptomycin from the bacteria streptococcus. Another important role in pharmaceuticals is the use of microbes for the medically important studies, such as bacteriorhodopsin. *Escherichia coli* is used for commercial preparation of riboflavin and vitamin K.E. coli is also used to produce D-amino acids such as D-p-hydroxyphenylglycine, an important intermediate for synthesis of the antibiotic amoxicillin.

Keywords: Microbes, Vaccines, antibiotics, Drugs, Medical Field, Industries.

1. INTRODUCTION

Microbes are found everywhere as a source of beneficial as well as harmful for human as they are used for synthesis of compounds in different industries and other useful products. While on the other hand, they are also causing diseasing in human at different rates. Hence, they are used for making yogurt, cheese, wine and bread. They are causing different diseases like tuberculosis that causes lungs to damage than normal as air cannot properly enters into lungs due to blockage of air passage ways. They are also causing severe infections when develop resistance against the antibiotics that are used to treat them. As the bacterial pathogens grow with environment, they start developing resistance against variety of drugs [1-4].

Microbes are used in different industries for manufacturing the vinegar and different types of alcohol due to their activity at the maximum rate. They are used in pharmaceutical industries for the synthesis of chemical compounds also in pharmaceutical studies. Nowadays, chemical industries using the bacteria to synthesis the industrial products like. In this way, they are helpful in industrial point of view due to great impact for manufacturing of compounds. Sometimes, they are used in combination with other organisms in order to perform the dual functions with algae as mutualism. This relationship helpful in agricultural fields that ultimately leads to provide the large variety of agricultural products [5-8].

There are certain gaps in literature using different strains of bacterial species and their role in the medical fields. Some important features of bacteria in the food industries remain unclear. This review highlighted the role of bacteria in industries for synthesis in medical as well as industrial pout of view but some of the species have great impact on the human health thus causing serious diseases in human[9]. There is need to designed such kind of strategy to target the harmful species of bacteria as well as pathogens in order to control their lethal effects on the human populations. As most of pathogens replicate rapidly due to strong binding to the cells of human. As the environment exhibits loss of pathogens in which some of them beneficial and some of them are harmful. Discovery of novel antibiotics leads to control the resistance caused by different bacteria [10, 11].

Microbes are found everywhere as human have great chances of exposure and hence more chances of bacterial infections. Microbes are ubiquitous and have ecological interactions with almost all life forms. Likewise, humans invariably engage in host-microbial interactions that could induce short-term or long-term effects. Some bacterial pathogens infections not easily treated with small dose of antibiotics. Combinations of drugs need to kills them. Cells of human body have ability to fight against the pathogenic microbes. That's ten times more than our own body cells. Microbes are involved in processes like our metabolism, and help keep us healthy by fighting off harmful intruders, for example. New discoveries and applications hold promising opportunities for the future. Pathogens cannot show enough binding to human cells if their cell membrane can be broke through the action of chemical agents such as antibiotics and other potential drugs [12-13].

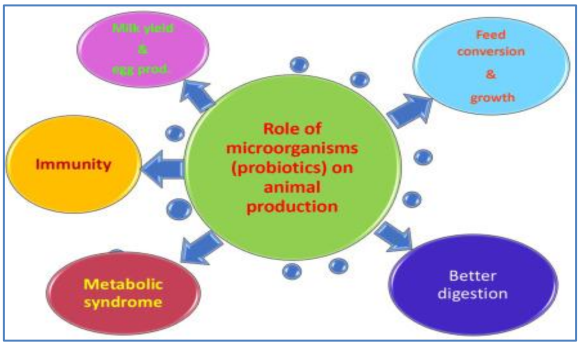

Fig-1: Shows the different roles of microorganisms in animal body

2.1 Role of Microbes in Different Industries

Different methods are used for diagnosis of microbes at cellular and molecular level. Each method specifically designed in order to target the specific microbes. Although molecular methods like polymerase chain reaction, Sanger sequencing, and fluorescence in situ hybridization techniques brought a deeper insight into the composition of the intestinal microbiota, it turned out that many members of the microbiota cannot be cultivated with current laboratory methods. These laboratory investigation of the procures helpful to diagnose the infections caused by different microbes [14-17].

Different useful species of bacteria are sued for synthesis of compounds such as lactic acid bacteria (LAB) are used to produce cheese, yoghurt, kefir and kimchi. These bacteria are involved so much to other food products. The budding yeast Saccharomyces is used to make bread, beer, cider and wine. Acetic acid bacteria (AAB) are used in traditional manufacturing of vinegar. These bacteria playing significant role in food products, cosmetics at low cost and high rate of production. The other reason of using these bacteria is the less toxicity induced due to which cells cannot go through the cell division. It resulted the failures of differentiated cells [18-20].

Baculoviruses are the viruses that potentially infected the most of insects. These infected insects then enters into the living cells and ultimately damage them by replicating with uncontrolled division. These viruses are involved in the activating the chitinase enzyme the damaged the living cells and turned them into dead cells by disruption the cellular and molecular processes. The virus replicates by budding from cell to cell, and it makes the infected insect move to the top of the plant towards the light. There is need to deigned the antiviral drug that target the cells of baculoviruses at the molecular and cellular level and inhibiting their growth once these viruses entered into the cells[21-23].

Fig-2: Shows the baculoviruses attack on leaves

2.2 Role of Microbes in Pharmaceutical industry

Bacteria are used to create multiple antibiotics such as streptomycin from the bacteria streptococcus. Another important role in pharmaceuticals is the use of microbes for the medically important studies, such as bacteriorhodopsin. Microbes are also used in pharmaceutical industries for synthesis of chemical drugs, chemical compounds and other compounds. It also leads to discovery of cell mechanisms allows pharmacists to discover antimicrobial drugs that would prevent an escalating number of communicable diseases. It also insures the drug therapies target the opportunistic microbes without harming its human host [24-27].

Bacteria also playing important role in manufacturing of different hormones thus helpful to control the lethal diseases. The most important principle used for preparation of hormones using is the genetic engineering. Bacterial cells are transformed and used in production of commercially important products. Examples include production of human insulin that is used to treat diabetes and human growth hormone also called somatotrophin used to treat pituitary dwarfism [28-30].

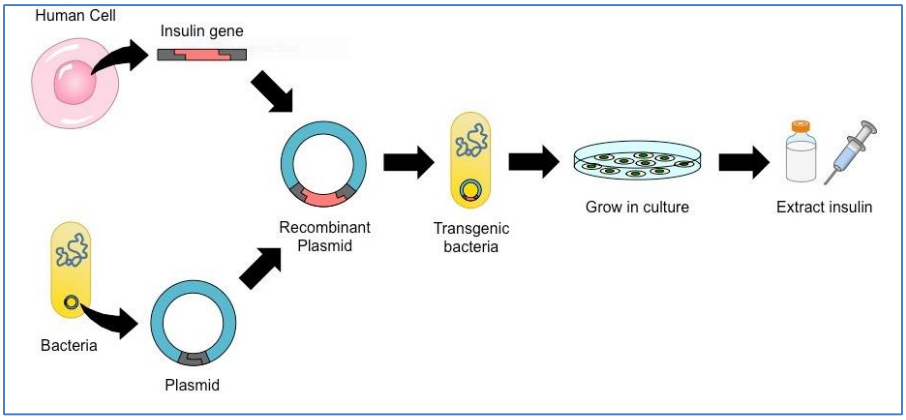

Fig-3: Shows production of human insulin from bacterial cell via genetic engineering approach

Genetic engineering uses principles in combination with biological sciences such as biochemistry, microbiology, biotechnology have been made revolutionized is the manipulation of genes. It is also called recombinant DNA technology. In genetic engineering, pieces of DNA (genes) are introduced into a host by a variety of techniques, one of the earliest being the use of a virus vector. The foreign DNA becomes a permanent feature of the host, and is replicated and passed on to daughter cells along with the rest of its DNA. This principle used for transfer of DNA into different species, synthesis of novel hormones, discovery of genes [31].

Escherichia coli are used for commercial preparation of riboflavin and vitamin K. These are involved in nutritional supplementation used to treat the deficiency of different diseases either due to vitamins and minerals which are required for proper growth in small quantities and regulate the body processes. This bacterial also lives in intestine of human when it active, it damages the digestive tract and causes the diarrhea and other problems associated with digestive system. E.coli as useful for manufacturing of chemical compounds while on the other hand also causes problems [32].

Bacteria are important in the production of many dietary supplements. E.coli is also used to produce D-amino acids such as D-p-hydroxyphenylglycine, an important intermediate for synthesis of the antibiotic amoxicillin which can be used to treat the infections such as skin, ear and urinary tract. Amoxicillin acting as antibiotic controlling the number infections and excess dose leads to cellular toxicity and hence disruption occurs to cell membrane due to accumulation of toxins release by them. Toxins that produced also affected the liver that acting the major organ of the human [33-34].

2.3 Medically Important Microbes

Microorganisms showing agonist as well as antagonist interactions when they enter into enter into the human body. Sometime they provide benefit while on the other hand, they have different harmful effects. Different microorganisms found in the human oral cavity are called as the oral microflora, oral microbiota or oral microbiome. The oral microbiome includes the species of actinobacteria, bacteroidetes, chlamydiae, chloroflexi, euryarchaeota, firmicutes, fusobacteria, proteobacteria, spirochaetes, streptococcus, synergistetes and tenericutes. For example, interaction between Streptococcus gordonii and Actinomyces naeslundii are both agonist and antagonist in nature. Both these microbes are involved in biofilm production. These microbes working under different pH and temperature conditions. Changes in pH and temperature leads to activities performed in these bacteria [35]. Some microbes are used to clean the environment in different ways. Some of them are used at industrial level with lost cost and high production rate. Microbes display a huge range of metabolic abilities and some are able to degrade or detoxify pollutants, such as petroleum such as crude oil or pesticides, and can be used in bioremediation that is the most significant to clean the polluted sources and even environment are even able to breakdown plastics [36].

2.4 Role of Bacteria in Medicine

Cholera and plague are most common bacterial infections that affected the human populations all around the world. Some bacteria are used in pharmaceutical industries for manufacturing of medicines as potential source of biological target. Bacterial diseases have played a dominant role in human history.

Widespread epidemics of cholera and plague r educed populations of humans in some areas of the world by more than one-third. Bacterial pneumonia was probably the major cause of death in the aged. Perhaps more armies were defeated by typhus, dysentery, and other bacterial infections than by force of arms. There is need to control the growth of bacterial pathogens through medicine that activate the immune system to fight against the bacterial pathogens [37].

Antibiotics are used to treat the infections caused by bacteria. But lots of bacterial species have developed resistance against the antibiotics due to changing environment. With modern advances in plumbing and sanitation, the development of bacterial vaccines, and the discovery of antibacterial antibiotics, the incidence of bacterial disease has been reduced. Bacteria have not disappeared as infectious agents, however, since they continue to evolve, creating increasingly virulent strains and acquiring resistance to many antibiotics. There is need to designed antibiotics according to the binding, affinity to bacterial cell membrane [38].

CONCLSUION

As cholera and plague are most common bacterial infections that affected the human populations all around the world. Microbes can be used in controlling of different diseases as beneficial in one aspect as well as harmful. There is need to discovery of novel drugs from microbes that helpful to control the different diseases. Bacterial toxins also needed to solve as major problem for public health issues.

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