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A REVIEW ON CHARACTERIZATION OF MICROORGANISM FROM SEWAGE WASTE

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ABSTRACT

Household, commercial, and urban wastes all fall into the category of sewage waste. Various microorganisms have been discovered in sewage, some of which have yet to be described. Many pathogenic microorganisms are present in the waste, increasing the risk of pollutant contamination to humans and their surroundings. Environmental regulations have become more strict in recent years, with an emphasis on health, economy, and pollution reduction. The emission of different organic and inorganic compounds into the atmosphere causes pollution. Domestic agricultural and industrial water are among the pollutant sources. Environmentally and in terms of public health, efficient wastewater collection and treatment is crucial. The financial methods for sewage/wastewater standard use various approaches to reductions in wastewater water amounts and organic matter with the primary objective of wastewater management to preserve the environment and to address public health and socioeconomic problems. Many water bodies have been polluted as a result of anthropogenic sources such as domestic and agricultural waste, as well as industrial activities. To minimize biological activity, avoid or slow the release

of harmful chemicals into the atmosphere, and reduce odour output, sewage solid waste must be stabilised prior to discharge.

Keywords: Sewage waste, Microorganisms, Environment, Wastewater, Anthropogenic

INTRODUCTION

A constant supply of clean water is needed for the establishment and maintenance of a wide range of human activities. Aquatic life and irrigation for agricultural production provide useful food from water supplies **[1]**. However, most water supplies around the world are contaminated by liquid and solid wastes created by human settlements and industrial activities. As a result of rapid global population growth, water would become one of the most scarce commodities in the twenty-first century. In 2020, cities will house the vast majority of the world's population over 1.38 billion people. The problems associated with providing public services and water sector facilities, such as fresh water supplies and sanitation services, are at the heart of the urbanisation phenomenon **[2]**. Currently, engineers, planners, and politicians face significant challenges in providing housing, health care, social services, and access to basic human needs infrastructure such as clean water and effluent disposal. Water consumption has increased at a rate that is more than three times that of global population growth, resulting in widespread public health issues, limiting economic and agricultural development, and negatively impacting a wide range of ecosystems **[3]**. Water is one of the most important requirements of human life. Contaminated water creates inconvenience in people's everyday lives, whether as a consequence of human activity or as a natural phenomenon. Cleaning, cleaning, and retail activities both generate large quantities of wastewater. As demonstrated by river contamination, these activities continue to pose a danger to the ecosystem and the population. Sewage/ Wastewater is effectively the community's water supply because it has been contaminated by a number of sources **[4]**. Sewage is graded based on its flow rate, physical state, chemical, radioactive, and bacteriological content. Sewage is biodegradable to some degree, but much of it degrades in the atmosphere. However, the process is slow, and untreated sewage can pollute the environment and spread diseases. Sewage produces a number of chemical and medicinal agents. Untreated sewage is

believed to be the source of antibiotic resistance in some germs dubbed "super-bugs" **[5]**. Wastewater is characterized as a mixture of liquid or water carrying wastes removed from households, schools, commercial, and industrial establishments, as well as any groundwater, surface water, or storm water that may be present.

NATURE OF SEWAGE

Sewage/Community wastewater refers to wastewater discharged from domestic premises such ashomes, institutions, and commercial establishments **[6]**. It's organic because it contains carbon compounds like human waste, paper, and vegetable matter, and it's 99.9% water and 0.1 percent solids. The area also has industrial wastewater in addition to municipal wastewater. Many industrial wastes are organic in nature and, like sewage, can be treated physic-chemically and/or biologically **[7]**. Prior to the late 1800s, the most common method of disposing of human waste was to use an outdoor privy, with the majority of the population defecating in the open. After Louis Pasteur and other scientists demonstrated that sewage-borne bacteria were responsible for many infectious diseases, sewage treatment systems were implemented in cities **[8]**. Attempts to treat sewage in the early 1900s typically involved buying large farms and spreading the sewage over the ground, where it decayed due to the action of microorganisms. The land was soon discovered to be sick.' Later attempts included directly discharging wastewater into bodies of water, but this resulted in substantial loss in water quality **[9]**. These efforts depended heavily on land and water bodies' self-cleaning capacities, and it was quickly realized that nature could not function as an infinite drain. If it does, water will be used. When it becomes contaminated, as in containing a variety of pollutants, it can become sewage or waste water, as well as a breeding ground for a variety of microorganisms capable of spreading a variety of illnesses. Untreated water obtained from a variety of sources, including domestic sources, hospitals, and markets, is referred to as sewage water. Depending on the region, sewage water may contain a variety of substances in solution or solid form **[10]**. Organic and inorganic waste, nutrients, toxic chemicals, oils, and a variety of other elements can all be found in sewage water. Even though sewage contains a lot of waste, microorganisms can survive by using organic and inorganic waste. These microorganisms will have distinct characteristics when

compared to bacteria that grow in other environments **[11]**.

MICROORGANISM IN SEWAGE WASTE

Bacteria, archaea, yeast, fungi, algae, and protozoa are among the microbial populations present in sewage. They will survive in harsh conditions such as hot springs and freezing temperatures inside the rock. However, 80 to 90% of them are still unidentified as microorganisms, despite the fact that these biological species are considered to play an important role in maintaining a healthy biosphere. Bacteria and fungi are the most common organisms found in solid waste **[12]**. For its development, this microorganism uses waste components. In waste water, bacteria from the *Coliforms, Clostridia, Enterococcus, Lactobacilli, Micrococci, Proteus, Pseudomonas, Streptococcus*, and *Staphylococcus* families are commonly present. These bacteria may produce toxins that cause a variety of diseases, or they may produce industrially important bioactive molecules **[13]**. Human exposure to bacteria in waste-contaminated water usually occurs when raw sewage is combined with fresh water or when the skin is exposed to contaminated water when swimming, bathing, or other activities. Oral exposure causes gastrointestinal problems diarrhoea, *E. coli* infections, hepatitis A, giardiasis, amoebic dysentery, cholera, and so on, while dermal exposure causes skin problems **[14]**.

CHARACTERIZATION OF MICROORGANISM IN SEWAGE

In characterization of microorganisms some colonies may be coloured, some colonies may have circular shape and others are irregular. The various kinds of bacteria will produce colonies that look different. The colony characteristics are called morphology shape, size, pigmentation, etc. Most colonies of bacteria look white, cream or yellow and have a fairly circular shape. There are many microbes that develop pigmented colonies. This type of coloured material is water soluble or insoluble. There are numerous of *E.coli, Pseudomonas,* and *Staphylococcus* microbes present in sewage water. *E.*coli are gram negative bacteria found in waste water. They are large, smooth, and moist in the colony. *Pseudomonas* are gram-negative bacteria with large, flat colonies. Colony with greenish yellow pigmentation. *Staphylococci* are gram-positive bacteria with a rough colony that is greenish yellow.

WASTE COMPONENTS

Sewage is a watery mixture of various wastes from the residential, public, and industrial sectors. This source is primarily responsible

for the properties and composition of sewage, as well as its life. Organic and inorganic matter in various states of dissolution, suspension, and colloidality make up sewage. Bacteria, bacteria, protozoa, and other diseases can all be present in sewage. Poisonous or similar chemicals that have penetrated the environment as a result of industrial discharges can also be found in sewage. For any sewage treatment facility to be installed, the nature of sewage must be understood. Wastewater is characterized as liquid waste that is discharged by residential, commercial, industrial, and/or agricultural properties and may contain a wide range of contaminants and concentrations **[15]**. One of the most important things on the earth is water. Both plants and animals need water in order to survive. Without water, there would be no life on Earth. It covers roughly 71% of the Earth's surface and is essential for all known life forms. Freshwater, on the other hand, makes up just 2.5 percent of the overall volume of water on the planet. Massive amounts of wastewater are generated as a result of rapid urbanization and industrialization, which is increasingly being used for irrigation in urban and peri-urban agriculture. As a result of industrialization and urbanization, it is becoming increasingly polluted, and the risk of polluted water usage and sanitation issues is increasing day by day in most industrialized countries. Water scarcity is having a major negative impact on global economic development, human livelihoods, and environmental health **[16]**.

HEALTH DIMENSION OF SEWAGE

As a consequence, in today's environment, shielding water from contamination or developing cost-effective remedial methods for its conservation has become a vital requirement. It is estimated that 1.1 billion people worldwide consume polluted water. Water-related diseases account for 21% of all communicable diseases in India, according to the World Bank. More than 535,000 Indians were estimated to have died from diarrhoea in 2004, and while in 2017 the people died with diarrhea are nearly 1.6 million worldwide. Waterborne diseases are a human tragedy that kills millions of people each year, prevents millions more from leading healthy lives, and stymies economic development. About 2.3 billion people worldwide are affected by water-related illnesses. Infectious diseases and illnesses, the majority of which are caused by water, account for 60% of all child deaths **[17]**.

In certain countries, water-related diseases account for a large portion of all illnesses,

affecting both adults and children. In Bangladesh, for example, polluted water and a lack of sanitation facilities are thought to be responsible for three-quarters of all diseases. Water-related illnesses affect one-quarter of all hospital patients in Pakistan Providing clean water and ensuring adequate sanitation facilities will save millions of lives by reducing the prevalence of water-related diseases. As a result, developing countries and aid organizations should priorities finding solutions to these problems.

CHARACTERIZATION OF SEWAGE WASTE WATER

The waste water source influences the waste stream's characteristics. In general, the residential, municipal, commercial, industrial or agricultural source can be classified as. The assumption is that the rate of sewage flow, plus a small allowance for infiltration, equals the average rate of water intake, which in India is 135 liters per person per day. It varies a lot depending on the town's population and other factors. This amount is referred to as Dry Weather Flow D.W.F **[18]**. That is the amount of water that flows into the sewer in dry weather because there is no rain water in it. During the day, the rate of flow varies, with the highest concentration in the morning and the lowest concentration between midnight and early morning. When calculating these sizes, the maximum flow should be three times the D.W.F. Organic matter is the most polluting constituent of sewage in terms of its effects on collecting water bodies. The majority of everything is made up of proteins, sugars, and fats. BOD and COD are two commonly used terms to describe organic matter. The biological stabilisation of organic matter causes oxygen depletion when raw waste is dumped into natural water sources. Suspended Solids are solids that are suspended in the air. They represent the proportion of total solids in wastewater that can be settled by gravity. The percentages of suspended solids that are organic volatile and inorganic fixed can be distinguished. Organic matter is classified into two types: settle able and non-settle able dissolved or colloidal. If the organic fraction of dissolved solids in water is not controlled, it leads to sludge formation and, eventually, anaerobic conditions **[19]**. Sewage from large and small cities is either discharged into a body of water for various uses such as drinking water supply and swimming, or it is discharged on land for drainage, where it comes into contact with humans **[20]**. Those who drink water from sewage discharge outlets, as well as those who work in farming

activities where water is used, are at risk of contamination by pathogenic species primarily bacteria and viruses released by sick people who are carriers of a disease. Because specific detection of pathogenic bacteria is extremely difficult, the coliform community of species is used as a measure of the presence of pathogenic organisms in wastewater **[21]**. Coliform bacteria can be found in human intestines. Every human excretes between 100 and 400 million coliform bacteria per day. The presence of coliform organisms indicates a population of 100 to 400 million coliform bacteria **[22]**. The presence of coliform organisms indicates the presence of pathogenic organisms, whereas the absence of coliform organisms indicates the absence of disease-causing organisms in the environment **[23]**.

CONCLUSION

In this paper we learn about the microorganisms found in sewage wastewater. The microorganisms present in sewage wastewater are discussed in this paper. These information were analyzed in order to determine the bacterial species in wastewater. The typical bacteria that maybe found in sewage water include *Coliforms, Clostridia, Enterococcus, Lactobacilli, Micrococci, Proteus, Pseudomonas, Streptococcus, and Staphylococcus.* These bacteria can produce toxins that cause a variety of diseases. The presence of pathogenic bacteria is indicated by the presence of indicator bacteria such as *E. coli* and *Staphylococcus. Staphylococcus* causes skin infections in humans such as redness, blisters, and swelling. The *Bacillus* can cause gastrointestinal tract infections in both ruminants and humans. *Enterobacter* is a bacterium that can cause a number of complications, including diarrhoea and urinary tract infections. In healthy people, *Pseudomonas* does not cause disease, but it can cause a mild infection. The population increase and the improper management of sewage waste leads to pollution in the environment and harms public health. Relevant waste management should therefore be present and public awareness of the proper disposal of waste should also be created. In order for the diseases and environmental pollution to decrease.

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