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A Spotlight on Activities of Bacteria

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Review Article

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ABSTRACT

Micro-organisms have been in environment for at least 3,500 million years and were the only life forms on Earth. Microbes affect every form of life on earth. With other types of Microbes, Bacteria plays major role in enhancing many activities. This evaluates outlines how bacterium is rising in today's life. The review report also highlights the beneficial activities of bacteria in terms of enzymatic, and in the diagnosis of diseases.

INTRODUCTION

Bacteria are single-celled tiny microbes that lack a nuclear membrane, are metabolically active and can be found everywhere. The organism exists in free-living forms. They are ubiquitous and have a remarkable capacity to adapt to changing environments. The importance of bacteria cannot be overstated [1,2]. Major progress in bacteriology over the last decades within the progress of many strong vaccines as good as of other vaccines that are less effective or have side effects. Most diseases now known to have a bacteriologic cause have been recognized for hundreds of years. Verifiably, bacteria have been the reason for most of the serious diseases of human progress [3,4].

BENEFICIAL ACTIVITIES OF BACTERIA

Plant Growth Promoting Bacteria

Many microbes promote plant growth and many microbial products stimulate plant growth. The dominant species found in the rhizosphere is a microbe from the genus *Azospirillum* [5,6]. Plant growth promoting rhizobacteria is found at root surfaces in the rhizosphere which improves the extent or quality of plant growth directly or indirectly [7,8].

Plant rhizosphere is a known ecological niche for various types of soil micro-organisms due to rich nutrient availability. They play a major role to increase plant growth promotion and soil fertility, for the development of sustainable agriculture [9-11]. Promotion of plant growth by plant growth promoting rhizobacteria is a well-known phenomenal activity and this growth is due to certain species of rhizobacteria. It has been studied that inoculation with bacteria like *Azospirillum*, *Azotobacter* and *Rhizobium* enhanced the plant growth for their ability to fix nitrogen [12-16].

Lactic Acid Bacteria

Lactic acid bacteria have been utilized as starter culture within the production of fermented dry sausages and different meat-derived commodities. These cultures are usually designed to meet food safety, shelf-life and economic feasibility criteria [17-19]. Apart from these traditional properties, novel starter cultures should take into account the risks posed by the biogenic amines in food, and the development and spreading of bacterial resistance to antibiotics [20]. Moreover, "functional starters" protect customers from harmful bacteria either with a fast acidification or by the production of bacteriocins. Exceptionally selected cultures may also provide probiotic benefits, and, if properly modified, they may also be encouraged with nutraceutical traits [21-26].

Bacillus subtilis strains have several beneficial attributes, which included biocontrol, plant growth promotion, sulphur oxidation, phosphorus solubilization and production of industrially important enzymes. *Bacillus* spp. is best known to produce α-amylases, and have wide application in industrial processes, particularly in starch industry [27-32].

Soil Bacteria

Soil bacteria is been used for crop production for many years and plays an important role in various biological cycles. Soil bacterium is very useful for plant growth, referred as plant growth promoting rhizobacteria (PGPR), colonize the plant root which promotes plant growth [33-37]. Bacteria and plant interactions within the rhizosphere are the determinants of soil fertility and plant growth. Symbiotic nitrogen-fixing bacterium of the genera *Azorhizobium*, *Mesorhizobium, Sinorhizobium*, *Allorhizobium*, *Rhizobium* and *Bradyrhizobium*. PGPR have the potential to contribute to sustainable plant growth promotion [38-41].

Probiotic Bacteria

Probiotic bacteria are live microbial feed supplement that confer a good health to the host by improving its intestinal balance. The various useful effects of specific probiotic strains could also be translated into different health claims [42,43]. Probiotic bacteria, belongs to *Lactobacillus* and *Bifidobacterium*, confer variety of health benefits to the host as well as vitamin production. Currently there is a scope of growing interest in probiotics within the scientific community, with the food industry and consumers [44-47].

One International expert group of International Life Sciences Institute has evaluated the published evidence of the functionality of different probiotics in areas of human application such as Metabolism, infections, allergy and chronic intestinal inflammatory and functional disorders [48-53]. Most probiotics do not permanently adhere in the intestine, but metabolize and grow during their passage through the intestine [54].

Based on the genome analysis and physiological studies, *lactobacilli* cannot synthesize folic acid. It usually needs folic acid for growth. *Lactobacillus plantarum* constitutes uniqueness among *lactobacilli*, since it's capable of folic acid production in presence of para-aminobenzoic acid (pABA) [55-59]. But many folate-producing strains are designated within the genus *Bifidobacterium*, with a good variability within the extent of vitamin discharged within the medium. Most of them belong to the species *B. adolescentis* and *B. pseudocatenulatum*, however few folic acid producing strains are found within the alternative species [60,61]. Rats fed a probiotic formulation of folic acid-producing bifidobacteria exhibited inflated plasma folate level, confirming that the aliment is made in vivo and absorbed. In an exceedingly human trial, an equivalent supplement raised folic acid concentration in fecal matter [62-64]. The utilization of folate-producing probiotic strains will be thought to be a replacement perspective within the specific use of probiotics. They might expeditiously confer protection against inflammation and cancer, each exerting the helpful effects of probiotics and preventing the folic acid deficiency that's related to premalignant changes within the colonic epithelia [65-67].

Cancer fighting bacteria

The past many years have seen revived interest within the treatment of cancer with live microorganisms, supported the observation that some bacteria show selective replication or advantageous accumulation within the tumour microenvironment [68]. Advantageous replication offers good potential to amplify the therapeutic result of the bacteria while excluding tissues from toxicity. Abundant of the present analysis supposed to achieve selective replication at intervals, and lysis of, tumour cells has targeted on viruses, however recent observations in murine models with facultative anaerobic bacteria [69-71].

With the various effector genes that would be engineered into bacterial hosts, therapies may well be extended to concurrent administration of same or totally different bacterium that contains separate gene products [72,73]. Demonstration of the central idea of selective intratumoral accumulation of bacterium in cancer patients is expected to steer to a huge and novel repertoire of therapeutic choices for the treatment of pathologic process illness [74].

Study has located that special bacteria are associated with human cancers. Their role, however, continues to be unclear. Few evidences link some species to carcinogenesis whilst others show up promising in the diagnosis, prevention or treatment of cancers. The difficult relationship between microorganism and people is validated by *Helicobacter pylori* and *Salmonella typhi* infections [75]. Few Researches have shown that *H. Pylori* can purpose gastric cancer or MALT lymphoma in some individuals. In distinction, exposure to *H. Pylori* seems to reduce the danger of esophageal cancer in others. *Salmonella typhi* illness has been related to the progress of gallbladder cancer; nevertheless S. Typhi is a promising service of therapeutic agents for bladder, colon and melanoma. For this reason bacterial species and their roles in exact cancers show up to differ among one-of-a-kind individuals. Many species, nevertheless, share a principal characteristic: incredibly website online-special colonization. This critical factor could lead to the progress of non-invasive diagnostic exams, progressive treatments and melanoma vaccines [76-80].

There are a few danger motives for gallbladder melanoma. The fundamental related hazard reasons include cholelithiasis, weight problems, reproductive reasons, and environmental exposure to particular chemical substances, congenital developmental abnormalities of the pancreatic bile-duct junction and continual infections of the gallbladder [81-83]. The interaction of genetic susceptibility, lifestyle reasons and infections in gallbladder carcinogenesis remains to be poorly understood; nevertheless a hyperlink has been principally proposed between power bacterial infections of the gallbladder and *Salmonella typhi* [84-87].

Proof is mounting that unique species of microorganism or their toxins could certainly have a protecting or curative position in some cancers. Explanations that might suggest a protective role of a bacterial species incorporate, colonization lowers the danger of a particular melanoma, removal or absence of colonization raises the danger, introduction of the bacteria or its toxins therapies or motives remission of the cancer [87-91].

Bacteria in today's era

New technologies in science and medicine, as well as improved living standards, have initiated to a fast increase in life expectancy, and subsequently a rise within the elderly population. The Bacteria Is major for preservation of host health, nutrients and protection against invading organisms [92]. Although the colonic microbiota is comparatively stable throughout adult life, age-related changes within the duct tract, similarly as changes in diet and host system reactivity, inevitably have an effect on population composition [93-97]. Recent studies indicate shifts within the composition of the Bacterial species, which may cause detrimental effects for the older host. Multiplied numbers of facultative anaerobes, in conjunction with a decrease in useful organisms like the anaerobic *lactobacilli* and *bifidobacteria*, amongst alternative anaerobes, are reported. These changes, together with a general reduction in species diversity in most microorganism teams, and changes to diet and biological process physiology, might end in multiplied putrefaction within the colon and a greater susceptibility to disease [98,99]. Therapeutic methods to counteract these changes are recommended in elderly people. These include dietary supplements containing prebiotics, probiotics and a mixture of those, synbiotics. Restricted feeding trials show promising results with these supplements, though additional longer-term investigations area needed to substantiate their use in older health care fields [100].

CONCLUSION

It has been researched that the outline which was given of the bacterial life of Nature may serve to give some adequate idea of these organisms and correct the imprecise impressions in regard to them which are widely prevalent. The review concludes that Bacteria play an awfully primary section in Nature than they do as our enemies. Most of the vast multitude we must regard as our friends. Over the past few years, we've seen more and more work coming out with utilizing bacteria in different aspects as the biofuels production process or dealing with turning waste to energy or storing vigor. New researches are looking in to making use of bacteria to store energy specifically having them eat electrons and turn it to methane, which can be burned with 80% efficiency [101]. Supposedly this concept is just a few years from being scaled to commercial production.

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