Impact of COVID-19 on Nature vis a vis Microbial Diversity with resilience of sustainability and welfare for future prospects

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***Abstract*: It is imperative to assess the impact of COVID-19 in all around the world in respect to the tiny creatures and native inhabitants considered as omnipresent microbial consortium. Since the outbreak of the pandemic most of anthropogenic activities were reduced in terms of emission of pollutants in soil, water and air all over the world. The naturally present microbial consortium have been flourished and nature's heal which lead to sustained in own ways. A part from human life threats, socio-economic losses and mass destruction of infrastructures, the environmental restoration have been improved for better health and life leading towards sustainable future prospects of more than seven billion dreams on this only inhabited planet along with plants, animals and microbes. Considering the value of healthy natural resources as ancient heritage to solve the modern enigmas it is the right time to awake and do all cutting edge efforts to maintain the nature's health. Microbes are foe causing various adverse impacts and friends as increase the sustainability of the environment with vital benefits to all living entities. Presently the microbial studies need to be explored from unexplored. The aim of this review article is to emphasize on the amelioration of scientific understanding of microbial ecology which are the most diverse and abundant group of organisms on this planet. This article has strut of exhaustive information. It has been clear that self nurturing of nature via COVID-19 explored as good strategy of environment in global context at every level.**

Keywords: COVID-19, Microbial Consortium, Diversity, Anthropogenic activities, Pollution, Environment.

Introduction

The mega diverse rich as well as the low vegetation having countries have got the exposure to grow and develop the ethnic living creatures as plants, wildlife and microbes in diverse niche. Microbes are petite living organisms found in almost every habitat in nature including geological environments such as agricultural soil, rhizosphere, effluents, organic matters and all possible habitats. During the time of lock down in past two years the most of the transportation, industrial activities and ambitious anthropogenic activities were adversely affected in terms of economic loss but in another way elevated the natural resource growth, development and own way exploration. Due to indecent industrialization the microbial diversity has been decreased by percolation of the pollutants in soil, water and air. In terms of biomagnifications via leachates and direct effluents from tanneries and other heavy metals based industries are being curse for microbial diversity reduction. The microbes assist in several ways for all form of life as being indicator of pollution, various roles in different biogeochemical cycles in form of PGPR, VAM and in restoration of gaseous elements in atmosphere playing vital role like decomposer. Microbial consortiums constitute a massive and mysterious reservoir of resources likely to provide innovative applications useful to human sustainability. They have excellent ability to regulate heavy metal accumulation by plants and reducing the risks associated with the various kinds of pollutants like herbicides, insecticides, chemical fertiliser, Xenobiotics and other stubborn toxic materials performing biotransformation. Microbial population including diversity, long term movement and genetic structures are affected by the toxicity with altering the nucleic acid, cell membranes disruption, inhibiting enzyme mobility with the rate of reaction. The microbial diversity in true sense can be maintained by wise use of organic inputs in agricultural land following the innovative state-of-the-art for crop productivity which may shape the better health and life with sustainable development. Biodiversity reveals as variation and coexistence with richness of living beings with important components and factors like fertile soil, variety of foods. It also purifies our air and water with mitigation of variety of toxicity. According to The State of the World's Forests report on land, the most important ecosystems and biodiversity refuges are forests, which are home to most of Earth's terrestrial biodiversity: 80% of amphibian species; 75% of bird species, and 68% of mammal species. Microorganisms represent the richest repertoire in chemistry and molecular diversity in nature, providing the basis for ecological processes such as biogeochemical cycles and food chains, as well as maintaining vital relationships among themselves and with superior organisms (Hunter-Cevera 1998). The refractory and insistent nature of heavy

metals leads to severe threat to environment supremacy and life. The native microbial populations in natural sink especially agricultural soils in most parts of the world are being adversely affected by the increasing concentration of metals. (Sanjay *et al*, 2017). The functional diversity is very important in ecological assessments of microorganisms within the ecosystem, mainly because little is known about the relationship between the structural and functional diversity of these microorganisms. However, there is a consensus that microbial diversity is directly related to ecosystem stability (Yamanaka *et al.* 2003). For millennia the diverse microbes have yielded important biological products such as antibiotics, drugs, enzymes, herbicides and growth promoters useful to humans (Fatima, *et al*, 2010).

Pollution and Global burden of Diseases affecting the health

In connection to tracking the progress of SDGs goals the database of 2022 highlights to focus tangible steps to reduce the various kind of pollution levels apart from the major steps. As per the recently released Lancet Planetary Health Journal report 2022 pollution continues to be the biggest environmental health hazard, resulting in millions of premature deaths globally every year. In present scenario more than 65 % of deaths have been caused by modern form of pollution like ambient air pollution and toxic chemical pollution over the past twenty years. Globally ninety lakh pollution related premature deaths data in 2019 has been recorded, figure-1 (Lancet Report, 2022).

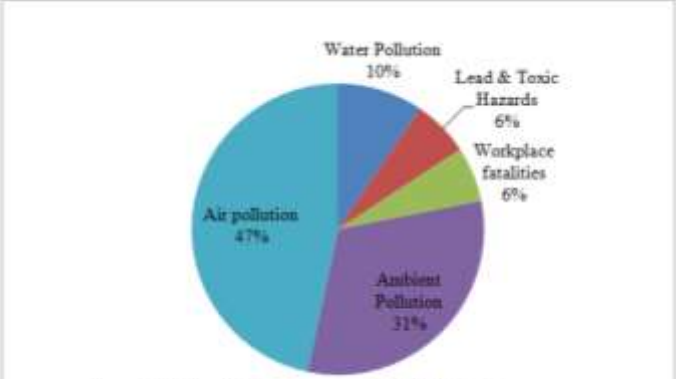

Figure 1: Pollution related premature ninety lakh deaths in 2019

The effect of pollution on disease and disability varied by different criteria as individual's immunity and age. People are more likely to die from exposure to ambient air pollution, lead pollution and occupational pollutants. Maximum pollution related deaths occur in low income and middle income countries. The health impacts of pollution remain enormous and low and middle income countries bear the brunt of this burden. In Indian scenario more than twenty three lakh people had died prematurely due to pollution in 2019. United Nations Environment Programme has identified pollution as one of three key pillars of its 2022–25 strategy, alongside climate change and biodiversity loss. (WHO Report, 2022). Heavy metal pollution in water resources affect the public health directly via contaminated drinking water consumption and indirectly via food and soil contamination through irrigation using contaminated water, such as contaminated river water, treated and untreated industrial and domestic wastewaters (Keisuke et al, 2015). There is a need to strengthen potable water treatment to make it safer especially the hand pumps including successful practices associated with solid waste incineration including proper disposal. The relevant strategies for constantly changing needs of the communities with ameliorated awareness may unleash them to work freely for better tomorrow with environmental sustainability (Sanjay Kumar *et al*, 2017). Several factors may explain the dramatic variation in the correlation between microbial diversity and plant diversity. First, the plant–microbial relationship can vary among different microbial taxonomic groups. For example, based on a site-level analysis, the richness of certain bacterial taxa, such as nitrogen-fixing bacteria, was more closely related to plant diversity than were other taxonomic groups (Liang *et al*. 2016, Zhou *et al*. 2016).

Dominant Microbial Consortium:

The resiliency of the microbial group has omitted in modern era but availing the opportunities during pandemic and getting compulsive favor from anthropogenic side the diversity has improved. The niche has shifted from simple to complex performing biotransformation leading towards the dominance and developing resistance. In unified scaling law that predicts the abundance of dominant species across thirty orders of magnitude to the scale of all microorganisms on earth. By the means of this scaling regulations shared with the lognormal model of biodiversity, we predict that Earth is home to as many as one trillion (10^{12}) microbial species. (Kenneth J, 2016). Several field and microcosm studies have reported shifts in the microbial diversity of periphyton upon exposure to treated wastewater (Carles *et al*., 2021; Peng *et al*., 2018).In the microbial world, thousands of species can exist side by side in a fluid state of evolution. Free living alone bacterial strains snatch up bits of DNA from their neighbors, rapidly acquiring new traits and blurring the lines between species. Adding to the anarchy, the community is in a constant state of war defined by complex and ever-shifting alliances. Some species gobble each other up or spew toxins to kill or incapacitate one another, while others seem to shield each other from aggressors. Conventional rules of biology suggest that competition between species should reduce diversity and lead to the rise of a few distinct, dominant species. In addition, inter-annual temperature variations and anomalies arising from meteorological events such as wind or floods strongly influenced the microbial composition from one year to another, thereby modifying microbial community diversity (Lambert *et al*., 2021; Trombetta *et al*., 2021). Scientist and research persons around the world have begun to study similar ecosystems using a culture-

dependent approach to understand microbial diversity for decades, microbial diversity analysis was carried out by the traditional culture-dependent method; (Baker *et al*., 2001; Liu *et al*., 2016).

Discussion

Diverse life forms of human and other living creatures are having a complex snare of life inter-related, inter-connected and inter-dependent in ecological terms. It has been seen as a fact that Covid-19 pandemic reiterated to realize about the strong linkages between the nature and human health. Due to pandemic the human immigration, emigration and migrations have been slowed down and the nature thrived in full bloom. The coronavirus pandemic has had a significant positive impact on the state of natural environment in terms of its comprehensive growth. There are countless benefits in ameliorating the scientific knowledge and investing in nature based solutions for the holistic wellbeing on the earth. To coexist in healthy environment with prosperity everybody needs to understand a simple truth that people need nature but nature doesn't need people. (Proceedings of the National Academy of Sciences, 2022).

Conclusion

All sectors need to integrate pollution control by implementing innovative plans to address other key threats such as climate, microbial biodiversity, Biosafety, food and agriculture. Microbial consortium is the most abundant biodiversity resource on earth. There is need to use the uniform and appropriate sampling protocols to collect evidences exposure to hazardous metals as lead, cadmium, mercury and chromium as thresh hold limit in soil and study the diversity. There is need to support a stronger stand on pollution in planetary health, one health and energy transition work. A complete understanding is needed for the biological nature of the approaches which include the interaction among soils, contaminants, microbes and plants. The study and exploration of microbial diversity is thus necessary to mitigate the emerging fatal disease evils and to move ahead for prosperity. This time we must not only be more careful of the drastic overuse of chemical and heavy metals in our industries, but also more aware of other toxins and pesticides etc, that we put into the environment. We have to work constantly for avoiding adverse impact on microbial diversity including the safe life for all living entities in all aspects. The development of microbial resources is fundamental resource for the maintenance and conservation of global genetic discovery of new organisms and genes that are valuable for every aspect revealing diversity patterns that can be used for the monitoring and prediction of environmental undulation. At glocal level pollution tracking system need to be revised to represent the effect of pollutants including heavy metals.

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