

A Relative Study On Green Chemistry Approach, Environment and Pandemic Covid-19

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ABSTRACT - The COVID -19 pandemic has globally killed people all over world. As a matter of urgency, a research study has promptly focused on remedial and preventive measures. It has been observed that environmental factors such as climate change and pollution that have more or less directly favored the pandemic. **Directly or indirectly the pandemic has affected the environment. This research work reveals how green chemistry approach sustains the deteriorating environment. As a resident of Raipur Chhattisgarh a survey in Raipur and other cities in Chhattisgarh state, has been taken by the scholar to see the air quality and Covid-19 cases.** It has been observed that Chhattisgarh state today faces several challenges in air pollution and Environmental factors and improving the health status of its people. Keeping all these things in mind, a study was carried out to get an overview of the public health and environment scenario in Chhattisgarh state. The type of research carried out is descriptive and cross-sectional. Since Indian Government recommended the public to minimize face to face interaction, amidst Nationwide Lock-down following to the covid guidelines the work was carried out on line with help of social media Groups like whatsapp gp. , authorities of health department. The projected sample size was 1246 people, based on the prevalence of diseases being 33 percent and an absolute error of 5%. It is found that direct and indirect, environmental, psychological effects or pollutants are all-encompassing and would have promoted such kinds of health diseases now and in the future. it has been observed that **Green chemistry reduces pollution by minimizing or eliminating the hazardous material out of the environment waste such as chemical feedstock, reagents, solvents, sanitizers, medical waste PPE kits, masks, gloves, covid test kits.etc...** Molecular diagnostics- the molecular techniques like reverse transcription polymerase chain reaction RT-PCR, is an effective method to detect Covid virus in patients. **Innovative techniques and remedial preventive methods of green chemistry, and pollution control will make bench mark decision making future strategies. to protect environment and life.**

Keywords COVID-19, Environmental , Pandemic, Green chemistry, Lock-down, SARS-CoV, Biosensors., POC-Point of - Care, RT-PCR.

I. INTRODUCTION

This study has presented a critical review of the existing studies on the environmental causes and consequences of COVID-19. We have explored the issue by looking on both sides of the coin; that is, the impact of COVID-19 on the environment and the impact of environmental indicators on COVID-19 transmissions and mortality. Before Vaccination COVID-19 continues to be a challenge to global public health. The newly emerging SARS-related corona virus designated as SARS-CoV-2 is the third highly pathogenic *Betacoronavirus* to infect human populations in the twenty-first century. SARS-CoV-2 emerged in Wuhan, China in late December 2019 and has spread to every continent on the planet. The World Health Organization declared the outbreak a Public Health Emergency of International concern on 30 January 2020. declared Covid -19 a Pandemic on 11 March 2020. A pandemic is an epidemic of an infectious disease which wide spread worldwide affecting substantial number of individuals or take off on human health and environment.

Virus outbreaks resulted fatal and very dangerous for the environment, human and animal health, and the ecosystem .

The research has quickly focused on remedial and preventive methods, as well as vaccines. This undervalues environmental issues such as climate change and pollution, both of which have aided the epidemic in many ways. Chhattisgarh's industrial cities, such as Bhilai, Raigarh, and Korba, are much more polluted, resulting in a higher number of Covid19 positive cases and mortality cases.

Green Chemistry uses new scientific answers to real-world environmental challenges to prevent pollution at the molecular level. Green chemistry is the development of chemical products and processes that reduce or eliminate the use of hazardous compounds. 1. Green chemistry, also known as sustainable chemistry, is a branch of chemistry that focuses on environmental issues, minimizes pollution, reduces the negative effects of chemical goods and processes on human health and the environment, and reduces, if not eliminates, danger from existing products

and processes, resulting in source reduction. A technique qualifies as a green chemistry technology if it lowers or eliminates the usage of harmful chemicals to clean up environmental pollution. Replacing a hazardous sorbent [chemical] used to capture mercury from the air for safe disposal with an effective but nonhazardous sorbent is one example. Because the hazardous sorbent is never created when the nonhazardous sorbent is used, the remediation approach fits the criterion of green chemistry. Raipur city pollution adds 55% to the atmosphere, while industry, bio-mass burning, and building contribute to chronic respiratory and skin disorders among the population. It needs urgently to control pollution.

II. REVIEW OF LITERATURE

1. Although a number of studies have been published on the topic already, there has not been a critical review of studies on the impacts of COVID-19 by and on environmental factors. The current study fills this gap by presenting a critical analysis of 57 studies on the nexus between COVID-19 and the environment, published in nine journals up to May 2020. Majority of the studies in our sample are published in *Science of the Total Environment* (74%), and studies used mostly descriptive statistics and regression as research methods.
2. El Zowalaty ME, Järhult JD. From SARS to COVID-19: a previously unknown SARS-related coronavirus (SARS-CoV-2) of pandemic potential infecting humans—Call for a One Health approach. *One Health*. 2020;9:100124. [Crossref], [Web of Science®], [Google Scholar]
3. a case comparison study by Qiu W, Chu C, Mao A, et al. The impacts on health, society, and economy of SARS and H7N9 outbreaks in China. *J Environ Public Health*. 2018;2018:1–7. [Crossref], [Web of Science®], [Google Scholar].
4. HEARTFUNESS WAY –by KAMLESH. D.PATEL and JOSHUA PULLOCK.–a book on role of yoga and meditation in living with good health healthy life style and clean environment.
5. Green chemistry and pollution prevention act 1990.

RESEARCH OBJECTIVES:

The aim of this study is to review the association between environment, green chemistry and public health in the current Corona virus infection. COVID-19 outbreak has had a substantial impact on many aspects of general life.

To review the remedial and preventive measures can be done with the help of application of innovative technology and Green Chemistry, to save life and environment.

RESEARCH METHODS:

Type of research: descriptive, cross-sectional

We identified four underlying research clusters (as variables) based on a systematic content analysis of the studies. The clusters are: (1) COVID-19 and environmental degradation, (2) Forest and Environment, (3) COVID-19 and air pollution, (4) COVID-19 and climate/metrological factors and, (5) environment, COVID-19 and protection. Participants in the study included: family members, colony members, students, researchers, forest department officials, local laborers, vehicle drivers, and seekers of 'Heartfulness' meditation in Raipur and other cities in Chhattisgarh, as well as the Government of Chhattisgarh. Employees of the Department of Health.

Participants must have Android phones and be able to communicate in Hindi and English to be considered.

The projected sample size was 1246 people, based on the prevalence of diseases being 33 percent and an absolute error of 5%.

Sample size: Concluding the prevalence of diseases to be 33% and absolute error of 5%. The estimated sample size was 1246.

Sampling technique: A non-likelihood snowball sampling strategy with focus on the general population was used. The identified study subjects recruited future subjects from among their acquaintances.

Methodology: Since Indian Government recommended the public to minimize face to face interaction, amidst Nationwide Lock-down following the

Since Indian Government recommended the public to minimize face to face interaction, amidst Nationwide Lock-down following the phone, audio talk, swipe talk, Google studies, authentic news paper news, talk with human doctors and seekers of heartfulness meditation, social media, Instagram, Face book, Emails, latest studies of researchers, WhatsApp, local volunteers, authorities of health department, people representatives, sensitive talk with our near and dears, subject experts.

III. DATA ANALYSIS

It was carried out with the help of the SPSS statistical software version 25.0 and the R programming language. For socio-demographic parameters, descriptive statistics were calculated. The mean and standard deviation of the scale scores were calculated. The invariable relationships between socio-demographic factors and the severity index score were calculated using linear regressions. All tests were two-tailed, with a p0.05 significance level. Item analysis was used to assess the open-ended frequently asked questions for qualitative research.

There were 2046 citizens in Raipur city of different occupation, different sites, different life style. who completed the online questionnaire, they were asked to respond to difficulties what they are facing, feeling due to environment. The mean age of the citizen was 39. and males were 59%, the majority passed higher secondary certificate and were students, 1128 citizen out of 2046 citizens of 'Heartfulness meditation practitioners. These were the most health conscious citizens and they were physically going to work since they were involved in essential services. 57 citizens were traditional healers.

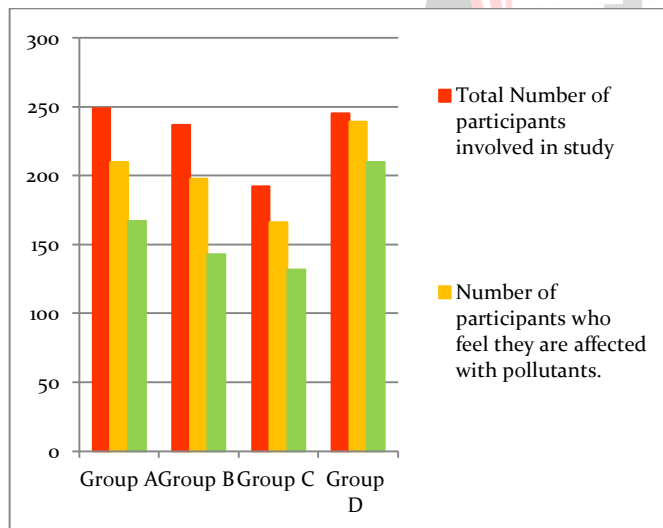
Demographic Characteristics of the citizens:

Mapping the health indicators of Raipur City: A view of public health.

Social Stigma:

Sample WhatsApp group	Total Number of participants involved in study	Number of participants who feel they are affected with pollutants.	Number of participants who feel they affected with pollutants and they are taking precautionary measures.
Group A	249	210	167
Group B	237	198	143
Group C	192	166	132
Group D	245	239	210

TABLE 2: Survey of Social stigma associated with air pollution. And people general awareness.



Evolution of research design parameters:

Daily Covid updates: Monitored following parameters, Following are the Data collected:

Chart 1: Date-wise COVID Positive cases in Top 5 polluted cities of Chhattisgarh from 1st May 2021 to 23rd May 2021.

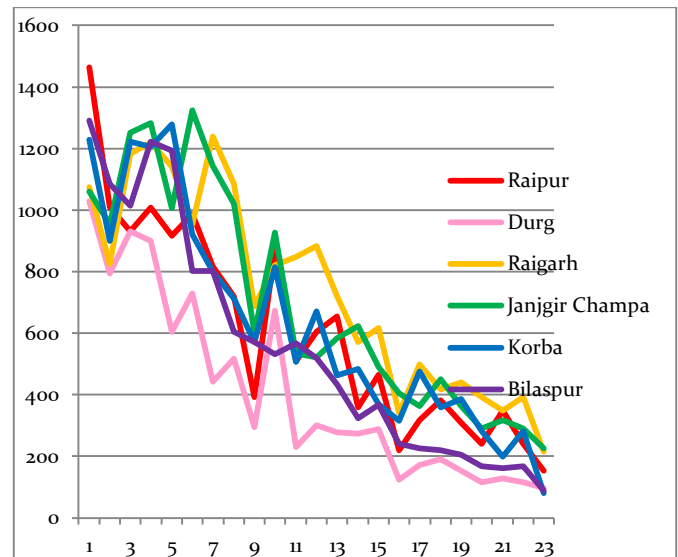


Chart 2: Date-wise COVID Positive cases in least 5 polluted cities of Chhattisgarh from 1st May 2021 to 23rd May 2021.

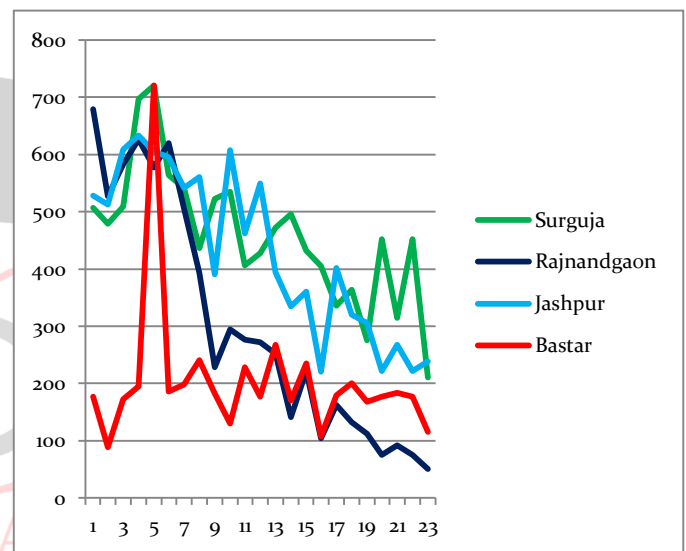


Chart 3: Total death cases in Chhattisgarh from 1st May 2021 to 23rd May 2021

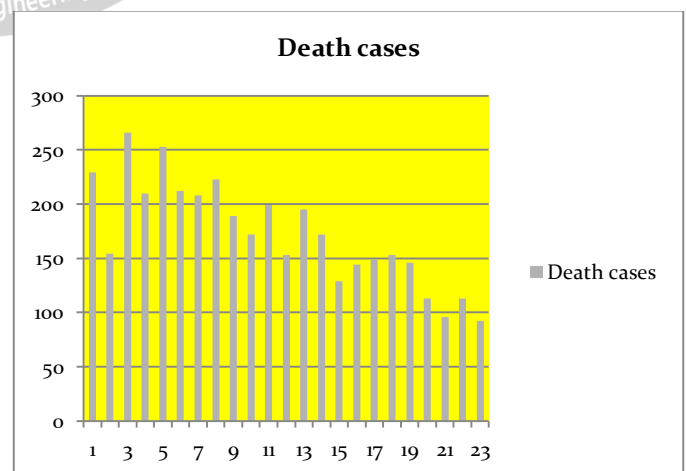


Chart 4: Comparison between COVID cases in top most polluted city (Raipur) and Least Polluted (Bastar) in Chhattisgarh from 1st May 2021 to 23rd May 2021.

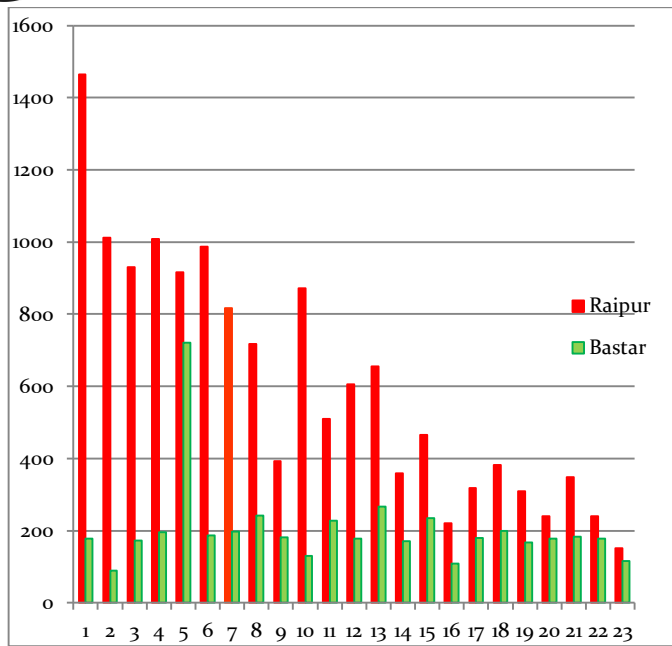
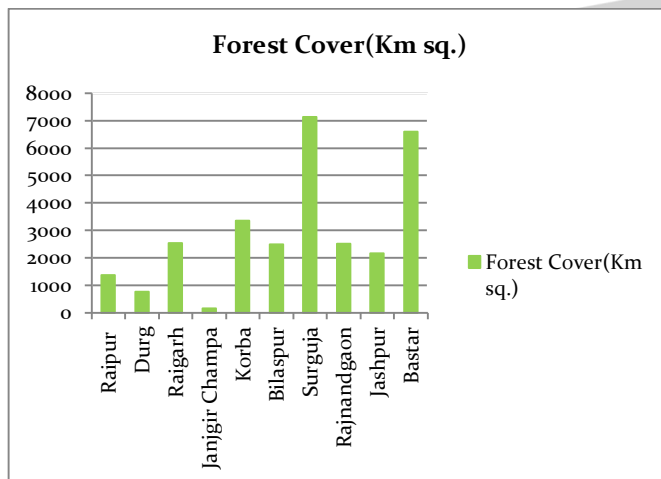
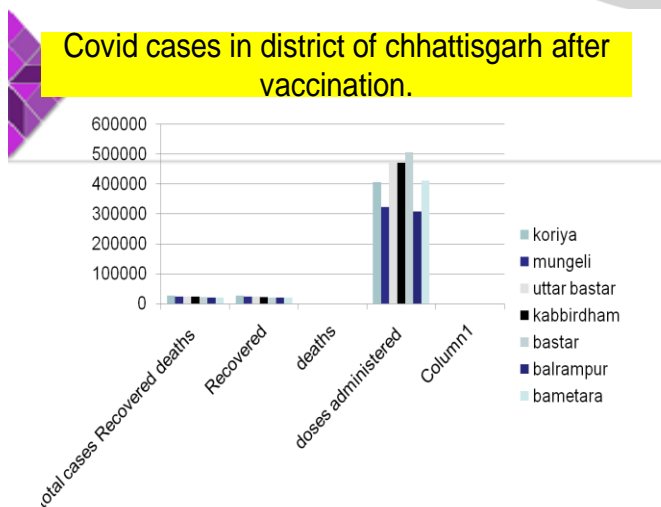


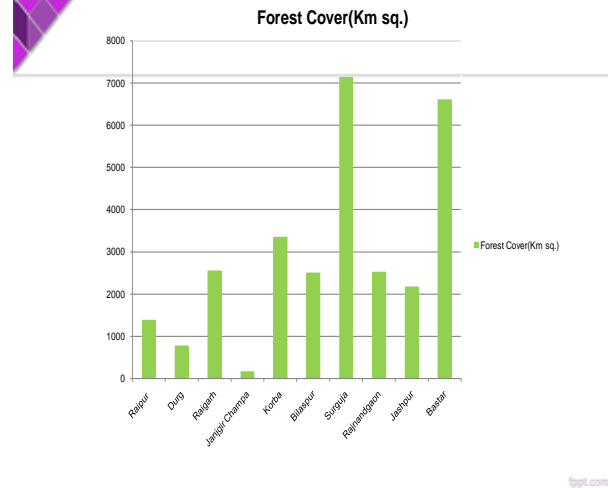
Chart 5: Comparison of Forest cover(km square) of different districts of Chhattisgarh.



Pic1: Heat Map Of Comparison of AQI of Durg Bhilai Raipur major cities in Chhattisgarh

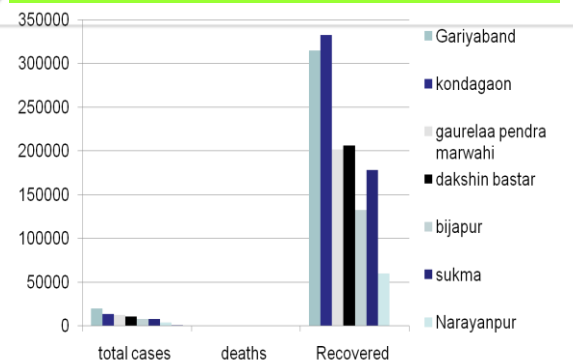


Bar Diagram 4: Comparison of Forest cover(km square) of different districts of Chhattisgarh.

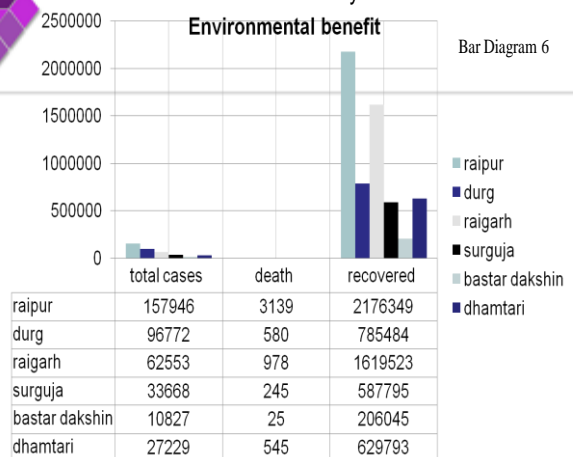


Bar Diagram 5

Covid -19 cases in dense forest areas



Comparison between areas where forest is dense is dense and where areas is very dense.



Bar Diagram 6

raipur	157946	3139	2176349
durg	96772	580	785484
raigarh	62553	978	1619523
surguja	33668	245	587795
bastar dakshin	10827	25	206045
dhamtari	27229	545	629793

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Covid cases in district of chhattisgarh after vaccination

District	Total Cases	New Cases	Active Cases	Recovered	Deaths (In %)	Doses Administered
Koriya	26,973	NA	5	26,792	176 (0.7%)	405,773
Mungeli	23,916	NA	9	23,740	167 (0.7%)	322,244
Uttar Bastar Kanker	23,624	1	4	23,397	223 (0.9%)	474,742
Kabeerdham	22,770	NA		22,503	267 (1.2%)	470,870
Bastar	21,029	NA	6	20,835	188 (0.9%)	505,210
Balrampur	20,299	NA		20,181	118 (0.6%)	307,513
Bemetara	19,958		3	19,719	236 (1.2%)	410,834

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District	Total Cases	New Cases	Active Cases	Recovered	Deaths (In %)	Doses Administered
Gariaband	19,698	NA	2	19,502	194 (1.0%)	314,810
Kondagaon	13,133	NA	8	13,026	99 (0.8%)	332,382
Gaurela Pendra Marwahi	12,010	NA		11,864	146 (1.2%)	201,448
Dakshin Bastar Dantewada	10,827	1	11	10,791	25 (0.2%)	206,045
Bijapur	8,311	NA		8,256	55 (0.7%)	132,218
Sukma	8,052	1	12	8,020	20 (0.2%)	178,148
Narayanpur	4,018	NA		4,004	14 (0.3%)	60,045

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District	Total Cases	New Cases	Active Cases	Recovered	Deaths (In %)	Doses Administered
Other State	790	NA	6	653	131 (16.6%)	NA

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IV.RESULT AND DISCUSSION

THE Research Findings proved that there is relation between environment and human health .and the GreenChemistry approach helps and prevent the pollution and Pandemic.

Link between,Forest cover, pollution and virus:

Geologically, the pollution can be defined as the addition of any substance (solid, liquid, gas) or any form of energy (heat, sound, or radioactivity) to the Earth's atmosphere above permissible limit which directly affect environment, every life and human health. The major kinds of pollutions are air pollution (greenhouse gas emission), noise pollution, water pollution and solid waste pollution (NEERI, 2013). Troposphere, the lowest layer of Earth's atmosphere (0km to 12km), is the most affected layer by pollution as maximum number of living and most of the polluting agents have direct exposure to this layer. Ozone layer, part

of upper troposphere and lower stratosphere (10km to 50km), filters out sunlight wavelengths by ultraviolet wave absorption through ordinary oxygen and nitrogen in air which is one of the most important factor to effective life sustainability (Wikipedia, 2020). Low level ozone (O3), in troposphere, is the resultant of higher rate of air pollution which is increasing in general and

Causing relatively higher temperatures and raising heat-related mortality during heat waves

(Diem et al, 2010, 2017). On the other hand, virus, a submicroscopic infectious agent that replicates only inside

the living cells of an organism, can infect all types of life forms viz. animals, plants and microorganisms (Koonin et, al. 20016). Researcher has already established a direct link between pollution and virus by lab experiment (Salk and Gori, 1960, Mumford et, al 1987, Gerba et, al. 2017 and many more). Virus aggregation-disaggregation is a complex process and varies with environmental circumstances (Gerba and Betancourt, 2017). It has also been proved that

Pollution in any form is directly concerned to human health. More precisely, air pollution (higher AQI) has both acute and chronic effects on human health. It affects number of different systems and organs resulted in minor upper respiratory irritation to chronic respiratory and heart disease, lung cancer and acute respiratory infections (Kampa and Castanas, 2008). In nut cell, human corona viruses, including present COVID-19, which causes lethal data.

2/-Intensive groundbreaking Research work must be implemented on the Raipur city, which can focus on the presence and impact of chemicals in soil, surface water, and groundwater. Environmental chemists study how chemicals - usually contaminants - move through the environment. Awareness. The groundbreaking research study of the chemical reactions and biochemical phenomena that occur in nature. It involves the understanding of how the uncontaminated environment works, and which naturally occurring chemicals are present, in what concentrations and with what effects. Then the designing, manufacture, and use of minimally-toxic, environmentally-friendly chemicals will work in environment. It will play a role in developing technological solutions for mankind. **My research work says that pollution is due to anthropogenic reasons but this research finding also says if citizens of Raipur city will aware about pros and cons then such aware people themselves can reduce pollution in a better ways. Green Plants, forest cover, Environment and Green chemistry plays an important role in healthy living and the existence of life on planet earth. And of course to help to protect from outbreak of such pandemic like Covid-19. To produce best result it is important to save the money , time by developing new technique with the**

help of green chemistry nano chemistry for example AuNPs which could be incorporated into facemasks or PPE in the form of nanotechnology -enabled functional clothing

This research provided a critical evaluation of the existing research on COVID-19's environmental origins and implications. We investigated the problem from two perspectives: the influence of COVID-19 on the environment and the impact of environmental indicators on COVID-19 transmissions and death. We find that the COVID-19 epidemic has resulted in enhanced environmental quality based on a careful analysis of 57 studies on the subject. Actions done by governments around the world in response to COVID-19 have resulted in considerable reductions in pollution and increases in environmental quality, particularly in areas where COVID-19 transmission is severe, such as temperature, air quality, wind speed and humidity, on COVID-19 transmission and mortality. Reduction in carbon emissions, air pollution, sound pollution and However, these reductions were due to lockdown and were persistent within the lockdown period. Whether the environmental quality will persist in the long-run is unknown. Besides, we have observed that environmental factors also contributed to both the spread and reduction of COVID-19 transmission and mortality rates. A significant number of reviewed articles provide positive, negative, mixed and inconclusive results of the influence of metrological factors, such as temperature, wind speed and humidity, on COVID-19 transmission and mortality. Future research should attempt a meta-analysis to provide more conclusive evidence.

Moreover, we contribute to the existing literature on COVID-19 and the environment by critically analyzing existing research and identify the gaps for future research. We tabulated different methodologies and data sources applied by significant methodological outcomes were discussed by the researchers. Future research could leverage the data sources and procedures used as a starting point for cross-country comparisons to better understand the similarities and variations in findings across different methodological and country settings. In order to better understand the dynamics between COVID-19 and the environment, we propose cluster-based future research issues. Finally, there are certain limitations to this research. It was limited to a specific time frame – November 2019 to October 2021 and the cases after the vaccination. Also this study covers the global post Covid situation. According to our findings the available data clearly relates the role of green chemistry in reducing environmental deterioration and sustaining the environment in Pandemic.

SUGGESTION:

Therefore, it is important for every individual to save and protect our environment and only groundbreaking research

based awareness able to transfer such noble asset to the new coming generation.

Green chemistry is the approach in chemical sciences that efficiently uses renewable raw materials, eliminating waste and avoiding the use of toxic and hazardous reagents and solvents in the manufacture and application of chemical products. it has helped a lot in pandemic protection. for example ,by converting released CO₂ to trans-critical CO₂ green chemistry prevent 15% of CO₂ release in atmosphere.

1. The diagnostic method currently being applied for SARS-Cov-2 identification including optical biosensor and point –of-care diagnostics that are on the horizon., Molecular diagnostics- the molecular techniques like reverse transcription polymerase chain reaction RT-PCR, is an effective method to detect Covid virus in patients, as it detects the presence of genetic material of virus in the Covid affected patient.

3. Use of green synthesized nano-material in the optical Biosensors devices could leads to sustainable and environmentally friendly approaches.

4. **Applying new technique with the help of green chemistry and nano chemistry for example incorporating AuNPs (gold nano particles) into facemasks or PPE in the form of nanotechnology -enabled functional clothing** these innovative technologies may provide accurate, sensitive and rapid diagnosis of SARS-CoV-2 to manage the outbreak of corona virus and could be beneficial in preventing epidemic in future.

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