

Effects of Yajna Activity on AQI with in India: *Solutions for Pandemic Challenges in Cities and Healthcare Remedies*

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Authors' Profile



Dr. Rohit Rastogi received his B.E. C. S. S. Univ. Meerut, 2003. Master's degree in CS of NITTTR-Chandigarh from Punjab University. He obtained his doctoral degree from the Dayalbagh Educational Institute in Agra, India. He is serving as Sr. Asst. Professor in the CSE department of ABES Engineering

College, Ghaziabad, India. He has won awards in several areas, including improved education, significant contributions, human value promotion, and long-term service. He keeps himself engaged in various competition events, activities, webinars, seminars, workshops, projects and various other educational learning forums. He has guided around 40 Btech Students projects and 5 M.tech. Thesis. He is editor and reviewer member of several international Journals and conferences. He has 100+ publications in journals and conferences of International repute. He strongly believes that Transformation starts within self.



Mr. Mukund Rastogi is engineering student in AKTU Univ. Presently he is B.Tech. Final Year student of CSE in ABESEC, Ghaziabad. India. He is working presently on Yagya and Mantra therapy and its analysis by Machine Learning. He has keen interest in Google surfing. His hobbies is playing badminton and reading books. He is young, talented and dynamic. He is placed in a good IT company and strong interest in Data sciences. He is versatile and smart personality and wish to Serve country through IT sector. He has developed some good analysis for different data science projects.



Mr. Saransh Chauhan is a student of B.Tech. (CSE) in ABESEC which is affiliated to AKTU. He is currently working on the Air Pollution Index. He has been keen interest in coding and gaming projects. His hobbies are singing, badminton and chess. He wishes to be a successful software engineer and want to serve his knowledge to the nation following the principles of Shraddha, Saburi and Samarpan. Saransh is sincere, punctual and hardworking.



Mr. Vaibhav Aggarwal is an undergrad student pursuing his bachelors in technology from ABES Engineering College affiliated to APJ Abdul Kalam technical university. He is an Ambivert, i.e., he has the traits of both extroverts and introverts. Vaibhav enjoys spending time alone in Nature and sometimes gazing at the night sky. Vaibhav has a keen interest in story writing and poetry. His hobbies include listening to music, watching Animated & Sci-Fi movies and playing badminton and chess. He wishes to serve humanity by using his skill sets and develop new skills so that he can be useful.



Mr. Utkarsh Agrawal is a student doing bachelors in technology in the field of electronics and communication from ABES Engineering College, Ghaziabad. He is a curious and hard working student. Utkarsh has keen interest in astrophysics and neurology. He likes to learn new things whenever possible. He wishes to be a researcher in the field of particle physics and pry onto the mysteries of the universe, to understand the very reason of our existence and develop humanity as a whole civilization. He has hobbies of listening to music, star gazing, and playing badminton. Ultimately Utkarsh wants to serve the whole of humanity, not bounded by boundaries of nations.



Ms. **Richa Singh** is a graduate student majoring in graduation in Life Science at Delhi University. She has a keen interest in language and literature. Her hobbies are reading novels. She has great endearment for nature and wishes to do something to bring the torture we are doing to our environment to halt.

ABSTRACT

The manuscript deals with the increasing pollution and vanishing of AQI in NCR region of India due to many factors like Parali (stubble) burning, traffic and pollution caused by factories to generate electricity by thermal power combustion. The Manuscript discusses the statistical effects of Indian Homa and Yajna process and its effect on curbing the pollution and improving AQI. It has been found that Yajna helps in purification of the environment and different AQI factors are improved by its continuous exercise for long time at a particular place. The python based data analysis has been presented to justify the problem statement and gadget and sensor based readings are produced in evidences. This paper is an attempt to convert the belief of one hundred thirty-eight crores Indians into practical and an evolutionary step towards Vedic sciences and natural prevention of Air-Pollutions. This is an effort to draw the attention of the masses and to bring into notice and consideration of this wonderful technique in front of the whole world.

Keyword-- AQI, PM 2.5, PM 10, Climate Change, Yajna, Mantra, Human Health, Economic Growth

Motivation

Today we can see that air pollution has become the very danger threatening the existence of life on Earth, which is the very factor that inspired us to look for a potential solution towards this problem.

Being from the ancient and rich Hindu culture, we've always heard and believed that yajna reduces pollution, bacteria count, PM, radiation and many other harmful elements from our surroundings, which motivated us to make 'effect of yajna on AQI' as the core of this study.

The zeal to prove that Indian Vedic culture is wholly scientific is also a factor which moves us all to get engrossed in this research.

Scope of the Study

The Science of Yajna can be analyzed further using necessary tools in advanced labs and/or supportive conditions. It can be optimized to such an extent that we can use Yagyopathy as an advanced tool in itself. When given proper time of research and funding, Yajnas may even be able to reduce the harmful effects of electromagnetic radiation from electronic devices such as laptop, mobile phones, etc to null point. The same science can also be used as a pollution controller and to clean the environment back from harmful gases. Advanced techniques can further be employed that can help us in studying its potential effect on radioactive radiation. Potentially, we may permanently be able to nullify the harmful effect of radioactive radiations in Hiroshima and Nagasaki and at the site of the Bhopal gas tragedy. And even as a controller of radioactive radiations. We might also be able to control any future possible radiation leak and minimize its after effects using the same.

Topic Organizations

This study, first of all, gives a general idea of global health in today's time and the failure of modern medicine to manage pandemic covid-19. The author team explained about Yajna and Havan activity followed by the Indian masses from ancient times. For the endorsement of the study, the author team did a literary survey and reviewed eight research papers of concerned topics etc. This literary survey provides deep knowledge about the Yajna, Indian aspects and different AQI related experiments.

The author team has described the methodology in which they have represented the methods used for the study. This study used the ML based critical analysis of the data where the data collected from the Air Veda device was analyzed. Further, the paper discusses the arrangement of collecting data which is presented in a logical sequence unbiasedly as a result. The Manuscript presents all data in graphical and tabular form as well.

In the recommendation section, which is one of the most important parts of the research studies, suggestions for specific applications to address the issues and constraints identified in the assessment have been presented. The novelty section refers to elements that are new in the research. In the last, the conclusion section represents the final assessment and describes the overall findings of the study.

Ethical Committee and Funding

The experiments don't include any human related experiments and so no ethical constraints have been violated. Though the subjects performing the study were humans and air quality directly affects them but the study doesn't violate any health related measures. The Project is not funded by any agency.

1 INTRODUCTION

1.1 Air Quality Global Challenge in 21st Century

The greed for rapid and fast attainment of technology and development is continuously degrading the quality of air leading to poor ratio of high ppm. A very large number of developing and underdeveloped countries can be considered as the main root cause for poor AQI and its related concerns. This is leading to the increasingly high amount of particulate matter, carbon dioxide, nitrogen and sulfur dioxide. This is causing breathlessness, lung infections, ischemic heart diseases, acute lower respiratory infections in children, lung cancer and chronic obstructive pulmonary disease (COPD) The risks of such diseases are now prone to humans of all age groups including the young, children and old. The problem has reached a level so worse that the human race is continuously observing a repeated number of ozone holes. Data collected from 1979-2004 NASA's TOMS instruments, 2009-2011 RNMI institute's OMI, 2012-2019 by OMP's Soumi satellite have collaboratively demonstrated that the amount of earth's natural ozone layer is thinning dramatically every year(Jiang, M. et al., 2020)[7]; (Carlowicz, M. et al., 2009)[3].

1.2 World AQI in 2021

The overall condition of AQI has dropped to only worse with time, except the occasions of various lockdowns in different parts of the world. Around 4.2 million casualties are caused due to outdoor pollution every year according to the World Health Organization. While developed countries have been a little successful in improving their air quality. Various other developing and underdeveloped countries are still facing air quality as a challenge. Currently Hotan (China), Lahore (Pakistan), Ghaziabad (India), Kashgar (China) and Manikganj (Bangladesh) have become the world's most polluted cities. While Stockholm (Sweden), Calgary (Canada), & Helsinki (Finland) have become the world's cleanest cities in terms of air quality(Basahi, J.M. et al., 2014) [1]; (Gautam, S. et al., 2021) [4] ; (Camfil, 2018)[2]..

The change of 12.4 to 9.8 ($\mu\text{g}/\text{m}^3$) North America & Europe and 54.8 to 61.5 ($\mu\text{g}/\text{m}^3$) in central & southern Asia in terms of 'population weighted concentration' shows the trend in AQI in the 21st century.

55.3% people were found to be exposed to high PM (2.5) levels in between 2010 and 2016 which show how adverse the situation is getting over time. The spread of COVID-19 pandemic has had a great impact on the current quality of air. A mean reduction of 29% NO₂ & 9% PM (2.5) were observed just after one week of complete lockdown in several areas of the world and a whopping amount of PM-10 and PM-2.5 were reduced in Delhi, India with 60% and 39% reduction, respectively. Also, Mahato et.al. confirmed an overall improvement of 40% to 50% in the AQI of Delhi, India (Sannigrahi, S., et al., 2021)[13].

Thus, The resultant AQI of the world currently in the year 2021 is a combinedly complex output of increasing air pollution until 2019 and also improved air quality due to various lockdowns practiced in different parts of the world after the COVID'19 disease was declared a global 'Pandemic'(Shaddick, G. et al., 2020)[14]; (Kelly, F., et al., 2015) [10].

1.3 Vedic Sanskriti (Culture) and Eco Friendly System

Veda, the term which itself means knowledge, is the oldest text of humankind. Vedas not only covers every aspect of not only human life but also of the very universe itself (Kaur, R., et al., 2021) [9].

The four Vedas had beautifully and efficiently imparted the knowledge and wisdom in the form of hymns. Each word of these hymns symbolizes something which needs to be decoded in order to truly understand the meaning of these verses.

Vedic Sanskriti based on the teachings and concepts of the four sacred Vedas had always been ahead of its time with knowledge of all the sciences showing how much developed the civilization was. Ecology which although is believed to have originated in the 20th century also finds its roots springing through Vedas.

The Vedic civilization believed that the five basic elements known as panch (five) Mahabhoot are the basis of all life forms. Thus these five basic elements i.e., water, fire, land, sky, air were worshiped by them. They believed that natural energies are the souls of demiurge and nature is the mother of all. Padam Puran deplored water pollution. Rigveda enjoined that forests should not be destroyed. Yajurveda clearly says ' do not destroy anything of the sky and do not pollute the sky. Do not destroy anything of Antariksh.'

The Shanti mantra speaks for the welfare of all the biotic and abiotic components of nature. There is even the concept of Janpad dhvans in the ancient texts of Ayurveda which can be correlated to the modern day term pandemic. Janpad dhvans states the destruction of human kind due to contamination of land, soil, water or air.

The facts clearly manifest that Vedic civilization was very eco-friendly. The way in which the texts were taught and studied in Aryavart too symbolizes the sustainable approach as there was no use of papers thus minimizing cutting of trees (Rastogi, R. et al., 2022a)[17].

Today when we are sliding towards the sixth mass extinction very fast due to our ignorance towards mother nature the only rope that could hold us back is the Vedic knowledge which not only needs to be recognized but also needs to be adopted (Tiwari, S., 2010)[15].

1.4 21st Century with Scientific Indian Culture and Vedic Wisdom

Indian culture has always fascinated the whole world for its simple facts like Neti, Upvaas, etc. have a deep scientific approach. Ever since the world has learned about Vedas everyone has bowed in front of its unmatched scientific knowledge. Schopenhauer, a German philosopher, described the Upanishads, India's ancient texts, as consolation of his life and death.

The facts that have been adapted a long time ago in our culture are now being proved by the modern sciences as authentic. Vedas treasure the information about every aspect of life from health to social life. Werner Heisenberg once said that information about quantum physics, atoms and molecules is well found in the Vedas. The temples which are the schools of the Hindu culture are also epitome of science. The Vedas being the mother of Indian culture has made science run deep in it's very aspect (Rastogi, R. et al., 2022b)[18].

Yoga, Yajna, Pranayam, Ayurveda, Jyotish Shastra, and Vastu Shastra are some common examples of the heights that the Vedic wisdom has achieved. Unfortunately we have lost a large part of it in the dirt of time, those parts needed to be rediscovered by studying Vedas and adapting the virtues of Indian culture in our daily life(Kumar, D., 2019)[11].

Today in 21st century modern scientific research methods should be used to re-establish the Vedic knowledge again. The issues like growing pollution and declining health might be solved through ancient knowledge (Jayswal, P., 2021) [6].

1.5 How Yajna and Vedic Rituals may curb Pollution

Sustainable development is the only approach that could save the life of this planet from the monstrous pollution, global warming, el-nino and other environmental hazards taking toll on nature. This sustainable development can be done by using the Vedic wisdom which has gifted us the cure of everything in form of Yajna. The Yajna and the Vedic rituals are the only promising solution to the pollution. Yajna has been proved effective in reducing air pollution by diffusing the aroma of its Samagri in form of fumes which in turn purifies the air. Reduction of 40% to 90% of SO₂ is observed after Yajna. Also studies shows trend of decrease of PM 2.5, PM 10 and CO₂ as post Yajna effects. The ability of Yajna to reduce the electromagnetic radiation of electronic gadgets to significant levels is an easy solution to reduce electromagnetic pollution. The ghee and samagri are beneficial as environmental friendly insecticide and germicide due to their germicidal and insecticidal effects when burn in Yajna. Today when the nature is crying for help in its preservation Vedic rituals and Yajna seems to be the most effective way out of the problem (Kumar,D.,2019)[11] (as per Figure 1).



Figure 1. The Havan kits available in the market are the new Environment friendly Air Purifiers.

<https://images.app.goo.gl/kwJ6vKJGC38jn7vS8>

1.6 Need of Smart Cities

Need of smart cities in the present era can alone be estimated by the fact that the cities which only cover less than two percent of the earth utilizes more than 75% of Earth's resources. According to the data of 2018

sixty six percent of total world population resides in the city thus making the need for the development of smart cities an indisputable fact (Rastogi, R. et al., 2022c)[19].

The smart cities primarily focus on three aspects i.e., traditional, physical, and social. All the aspects required to be built on a sustainable approach keeping in mind the need to harbor a holistic approach in regards with the environment. The smart cities with efficient artificial intelligence and ultra modern technology are the modus operandi for tracking and monitoring electricity, water and waste tracking, detecting leaks and encouraging predictive maintenance. Prognosticating the rush hour, traffic jams etc. It can very well help in reduction of the emission of harmful gases. The smart cities must harbor the idea of smart buildings thus reducing light consumption, keeping ambient temperature etc and further reducing environmental harms.

The ability of intelligent asset management and process control extraction of data will also be helpful in reduction of environmental contamination.

In today's world smart cities are not a luxury anymore. It's our only voyage to reach the far end where we can truly apply the concept of sustainable development and not just recite it in our speeches (Johnson, K., 2018) [8].

1.7 A New Design of Eco Friendly System for Smart Cities with Vedic Culture

As technology is growing towards smart cities, nature is being exploited. Human health efficiency is decreasing due to pollution and dependency of humans on machines. Vedic culture plays an important role in connecting humans with nature and improving health efficiency through yoga and exercises. Vedic mantras are an excellent source of mental peace and motivation. Vedic Yajna and Hawan work as air purifiers. The process of creating smart cities with Vedic science model will create a balance of technology with nature. Vedic model should not be considered just a part of smart cities but an essential component of smart cities without which the idea of creating smart cities will again be an injustice with nature and its resources (Gautam, S. et al., 2021) [4]; (Rastogi, R. et al., 2022d)[20].

1.8 Yajna is a Sustainable Development Approach for Healthcare 5.0

When the development of a country (or this economic world) is achieved such that there is no loss or harm caused to nature & mother earth and the earth's natural resources are preserved as well, then such a development is the best development and is called as sustainable development. While healthcare 5.0 is the most advanced healthcare system till date. Yajna is a completely sustainable procedure in itself. Yajna helps rejuvenate nature and human beings in every way possible. It makes mother nature shine and trees enjoy by bringing rain. It purifies air by producing formaldehyde and killing of harmful microorganisms, like bacteria and viruses through the heat produced from it. The vapor of Yajna contains limitless medicinal benefits for patients. It contains a large number of medicinal and many beneficial herbs & elements, which when inhaled, clears our throat of infection and even makes our lungs more functional. Also, various hymns chanted during yajna produce different types of vibrations which stimulate various glands, activate our chakra points and help increase human focus and concentration. Thus, Yagyopathy can be included in Modern healthcare 5.0 as an alternate therapy (Rastogi, R. et al., 2022e)[21].

1.9 A Holistic Perspective of Indian Vedic Science for Smart City and Human Health

Sarve Bhavantu Sukhinah, Sarve Santu Niramayah, Sarve Bhadrani Pasyantu, Ma Kashit Dukhah Bhag Bhavet- may all living beings, regions, trees, waters and all nature live in peace and harmony, balance and peace should reside everywhere.

With recent development of some major cities to smart cities, and more and more urbanization of land, have quaked the very foundation on balance and harmony between natural constituents (living beings, waters, trees, natural laws), and now it demands a more sustainable model of development to reduce the shortcomings of present day's infrastructure. Indian Vedic culture has all along been a culture of mutual and sustainable development. Now-a-days we are exploiting the natural resources as they are our own, but Vedic culture teaches us to wisely utilize the elements and resources we get from mother Earth, maintaining a constant state of balance between these constituents is the key towards a healthy and developing civilization.

Vasudhaiva Kutumbakam - all of the world is our home, so we should take care of it as we do of our homes and grow with everyone (Acharya. N. R., 2019)[16]; (Gautam, S. et al., 2021) [4].

2 LITERATURE REVIEW

2.1 World AQI In 2021

Today more than half the world's population is breathing polluted air. According to recent WHO report, 4.2 million people die annually due to air pollution. Air pollution from power plants, vehicles, households, industries and agriculture sector is due to inefficient use of energy. Air pollution is also generated due to dust, sand and unburnt matter. The paper uses Ground Monitoring (GM) techniques with DIMAQ (Data Integration Model for Air Quality) to provide analysis over AQI in various regions. Moreover it also makes use of the Global Human Settlement Layer to categories area as urban, rural and sub-urban. It is observed that the AQI level of middle and low-income countries is worse than high income countries. The countries of eastern-Asia, central-Asia, and southern-Asia and Sahara region of Africa have poor air quality index and the level of air pollution in these region is on increasing which is actually a threat to whole world. It is found that the Sahara desert is the major cause of PM_{2.5} in the Sahara region of Africa and about 55.3 percent of the world's population is being affected by concentration of PM_{2.5}. An annual decrement has been observed in the pollution level from 12.4 to 9.8 $\mu\text{g}/\text{m}^3$ in regions of North America and Europe but an opposite swing has been seen in the Southern and Central Asia where the pollution level has incremented from 54.8 to 61.5 $\mu\text{g}/\text{m}^3$. The reason for decrease in the pollution level in Europe and North America is strict implementation of rule and regulation in controlling pollution level through 'Clean Air Act' and 'Smoke Control Act'. Similarly in Eastern Asia and South Eastern Asia air pollution rose from 2010-2013 but by the implementation of 'Air Pollution Prevention' and 'Control Action Plan' it declines from 2013-2016.

The data presented is actually ground monitoring(GM) of 9690 locations of the world consisting of the trends from 2010 to 2016. There are still many locations that are not included in the database and locations that are monitored also lag spatial coverage (Jiang, M. et al., 2020)[7].

The WHO has issued guidelines to control air pollution but still air pollution in the developing countries is on peak. There is need to follow the concept of sustainable development so that a balance can be created between technology advancement and pollution level (Shaddick, G. et al., 2020)[14].

2.2 Air Pollution and Public Health

Kelly, F. et al. in their paper 'Air pollution and public health: emerging hazards and improved understanding of risk' have elaborated about the grave effects Air pollution have, had and will have on human health, but they also talked about how people are starting to understand the gravity of the matter.

The team have talked about the historical and modern perspective of the problem, they have elaborated how air pollution has different health effects on humans like increase in mortality/death rate due to increased morbidity. Data now shows that long term exposure to PM has effects on diabetes, neurological development and major cardiovascular diseases.

PM_{2.5} and PM₁₀ are a complex heterogeneous mixture of different constituents- Black Carbon, Organic Carbon, Aerosols, Coarse PM(Dust) and ultra-fine particles. A qualitative graph on mortality rate (Deaths due to pollution vs years), flow charts over how PM exposure leads to different diseases, are used to compare the parameters more visually(Gowtham, S. et al, 2015) [5].

The result indicates that the majority of the population lives in a bad environment and is always in danger of different kinds of new and old chronic, life-threatening diseases. The problem strongly requires powerful and capable authorities to take appropriate actions towards it, traffic should be reduced, reforestation should be done on a large scale and environment friendly energy sources should be increased all over the world. But the most important factor in order to improve air quality is blatant engagement and awareness of the general public in this regard (Kelly, F., et al. 2015) [10].

2.3 Effectiveness of Yajna in Air Pollution

Devender Kumar has tried to bring to light the great effectiveness of Yajna as the panacea for the life threatening problem of environmental pollution that the whole world is facing. The importance of yajna has been described in Vedas, very well. Chandogya Upanishad describes Yajna as the best solution for pollution. The smoke, the Havan Samagri, saffron with ghee and rice all act as a germicidal agent when burnt in the flames of Havan. Even the woods of mango trees along with the samagri and sugar when burned in Yajna creates aroma in the atmosphere that removes all pollution and purifies the air. The EMR, which has been declared as carcinogenic by IARC, can be reduced significantly through the non-conventional method of Yajna. Yajna also maintains balance between the carbon dioxide and oxygen present in the air(Kaur, R. et al., 2021) [9].

During the process of yajna the formaldehyde is produced which acts as a powerful genocidal agent when in presence of sound of water. The PM of air can also be reduced through Havan. Its miraculous effect was seen when, during the Bhopal gas tragedy three families survived the ill effects of the toxic gases which leaked, because they were performing yajna at that moment(Panwar., D., et al., 2021)[12].

There is mention of cloud formation through the yajna in Bhagavad Gita. Atharveda and Rig Veda also describe Yagya as a cure for water pollution. Both modern studies and ancient texts state the need of Yajna in the present time to fight against the demons of pollution (Kumar, D., 2019)[11].

3 METHODOLOGY AND SETUP OF EXPERIMENT

This experiment was conducted during the second wave of covid 19 pandemic & lockdown 2.0 in India. It was performed using Havan Samagri and burnt into Hawan Kunda. Dr. Mamata Saxena, a renowned scientist and ex-director general of Ministry of Statistics & PI (MoS-PI), performed this experiment at her residence, Lodhi road, New Delhi, India. Due to the ongoing lockdown 2.0, public ceremony was not possible.

3.1 Setup

Steps

- The apparatus was set up inside 8 by 10 room with one window for ventilation.
- The Air Veda machine was then permanently fixed inside this room.
- A Hawan Kunda with sand at its base was placed in the middle of this room.
- Mango wood sticks were then placed inside this Hawan Kund.
- The woods were placed such that it made the shape of a square & the fire would spread evenly inside the Kund.
- Various ingredients in the process such as Cow's Clove, camphor, Herbal Havan Samagri were included and mixed together thoroughly to form Yagya Samagri.
- The Specific protocol to conduct this Yagya was as follows:
 - 1) Guru Mantra & Gayatri Aavahan Mantra.
 - 2) 24 oblations with Gayatri Mantra
 - 3) 24 oblations with Mahamrityunjaya Mantra.
 - 4) 5 oblations of Surya Gayatri Mantra.
 - 5) 3 oblations of Surya Gayatri Mantra.
 - 6) PurnaAhooti Mantra.
 - 7) Shanti Path.
- The Yagya was performed from 6:30am to 7:00am in the months of April & May while from 6:00am to 6:30am in the months of June & July.
- The Yagya was conducted for a duration of four months on a daily basis(from April 2021 to July 2021).
- The readings collected from the Air Veda machine were recorded for those four months continuously in a time gap of every 30 minutes throughout the day.
- The data collected was then arranged, studied & analyzed through graphical representations.

3.2 Flow Chart

- Following is the flow chart for the process adopted by researchers' team (as per Figure 2).

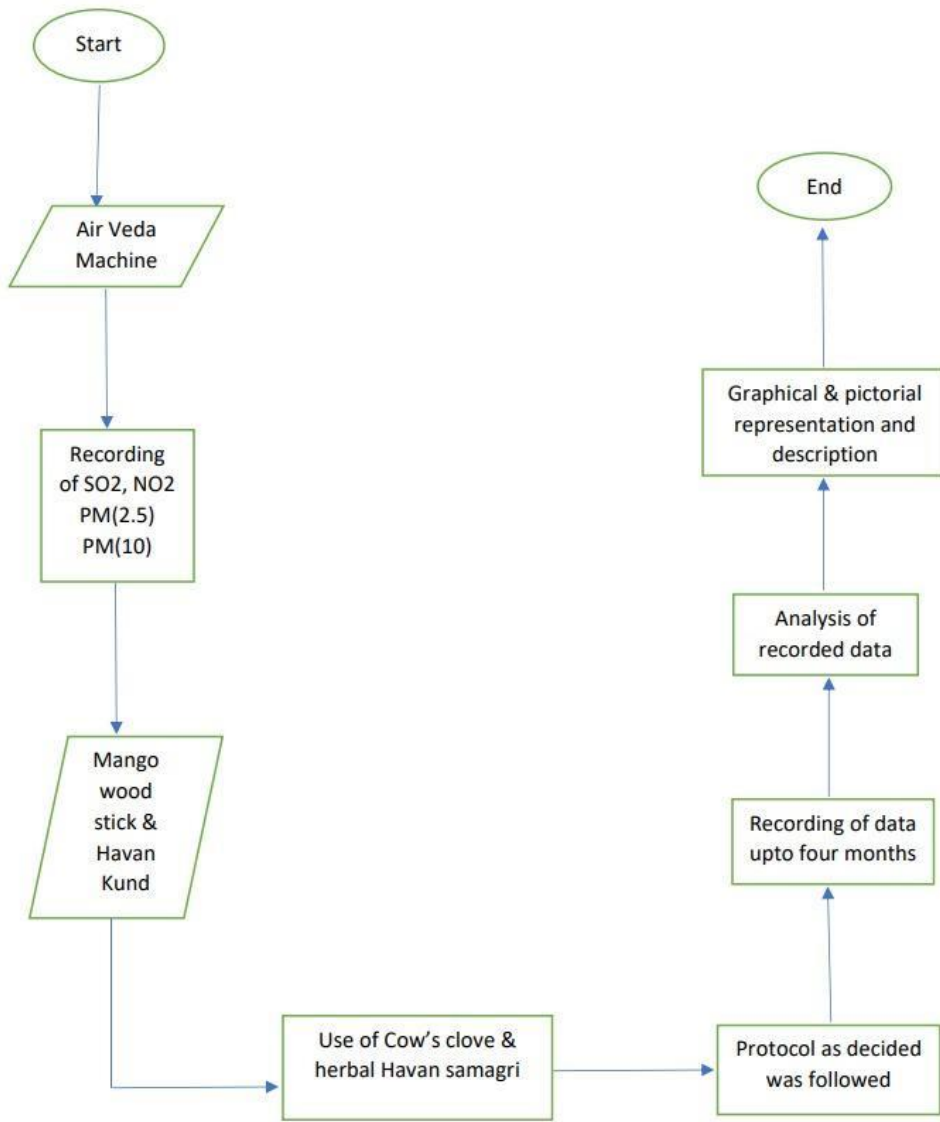


Figure 2. The Flowchart of the Activities done in AQI measurement.

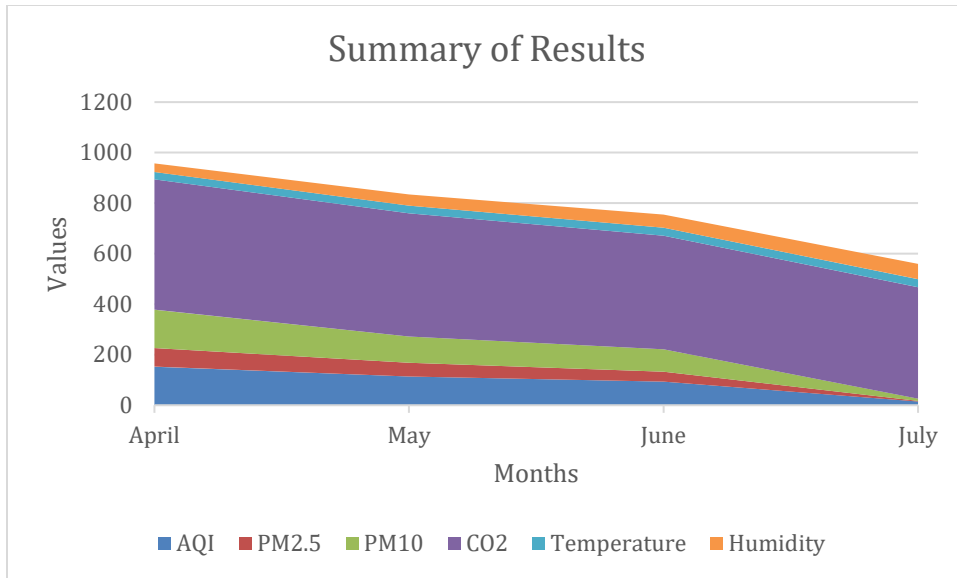


Figure 3. The Summary of AQI factors in Results

As, above it has been discussed earlier that Yajna performed from April to July and research team recorded readings with the help of Airveda device. We can analyze that AQI, PM2.5, PM10 and CO2 are decreased rapidly. In July month, AQI and PM is very less as compared to April month due to continuous Yajna. Blue color shows AQI, orange color shows PM2.5 and yellow represents CO2 (Pl. refer Figure 3).

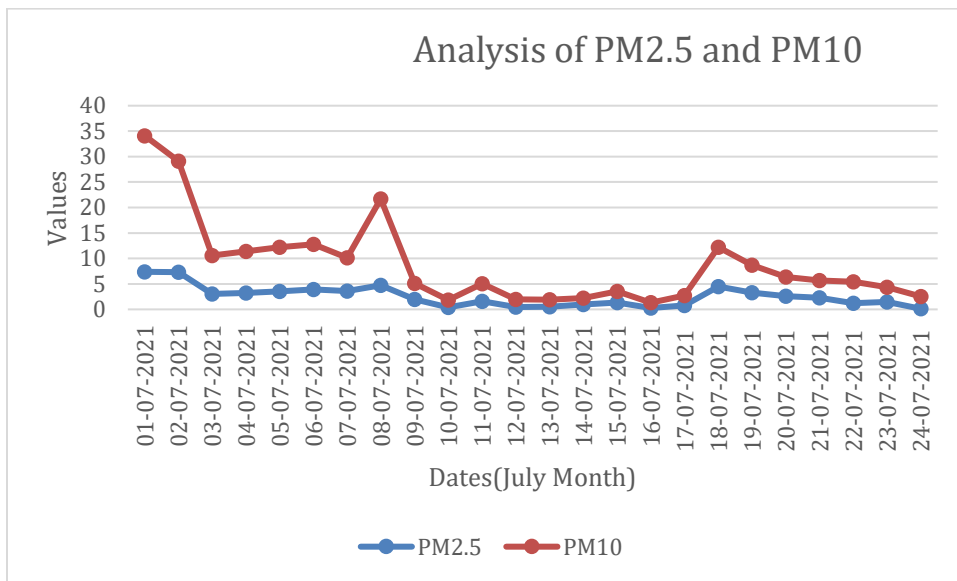


Figure 4. The Analysis of PM factors in July, 2021 Month

In the above graph, multiple line chart is shown. Orange line shows the PM10 and blue line represents the PM2.5. X axis denotes Dates in July month and Y axis indicates values of PM. Yajna performed on open

balcony in July month. In the starting of July PM2.5 and PM10 is hazardous as compared to the last of July. So it will be very helpful in reducing PM and CO2 (Pl. refer Figure 4).

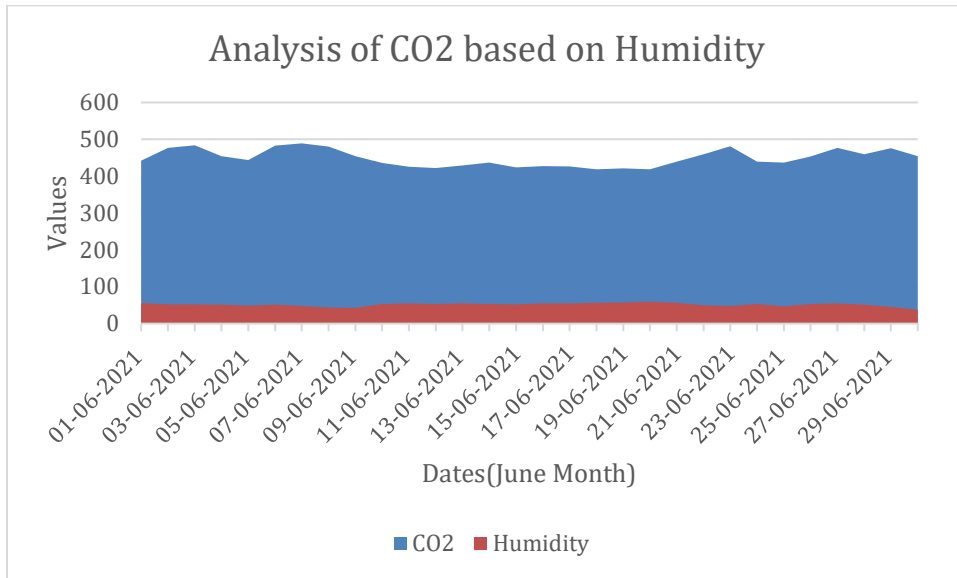


Figure 5. The Analysis of CO2 Based on Humidity in June 2021.

In the above graph, the research angle is that team had made stacked area chart which shows analysis of CO2 based on humidity. Blue color indicates CO2 and orange color denotes humidity. With the help of Yajna, CO2 is reduced from the environment. Yajna is performed in open balcony in June month. X axis denotes dates of June month and Y axis indicates values of CO2 and humidity (Pl. refer Figure 5).

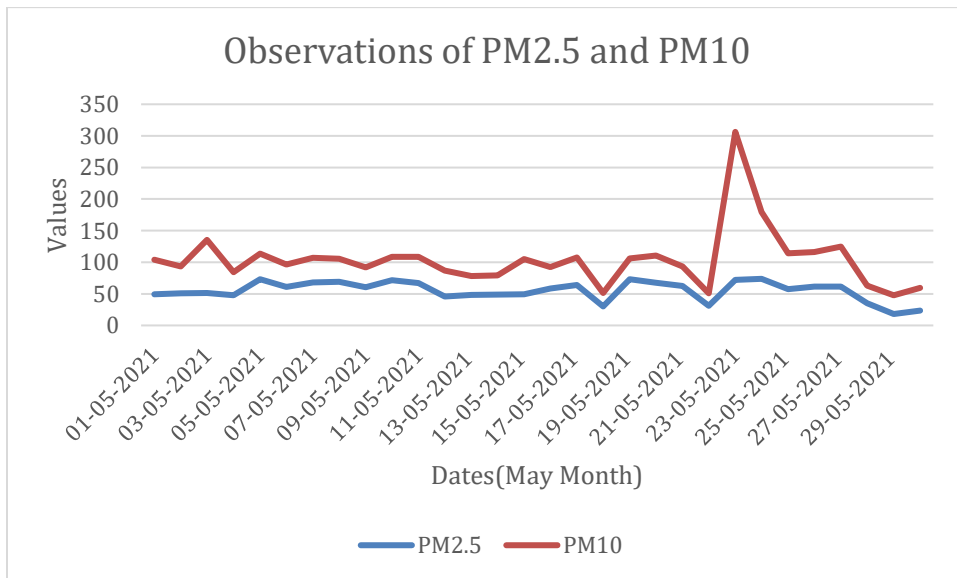


Figure 6. The Summary of PM-AQI factors in May, 2021 Month

In the above graph, it has been created line chart for observation of PM2.5 and PM10 in May month. X axis denotes Dates in May, 2021 month and Y axis indicates values of PM2.5 and PM10. Blue color indicates PM2.5 and orange color shows PM10. PM2.5 and PM10 values are reduced with the time, as you can see in the graph, PM values are high in the starting but at the end of month, it would be less. This happens with the help of daily Yajna (Pl. refer Figure 6).

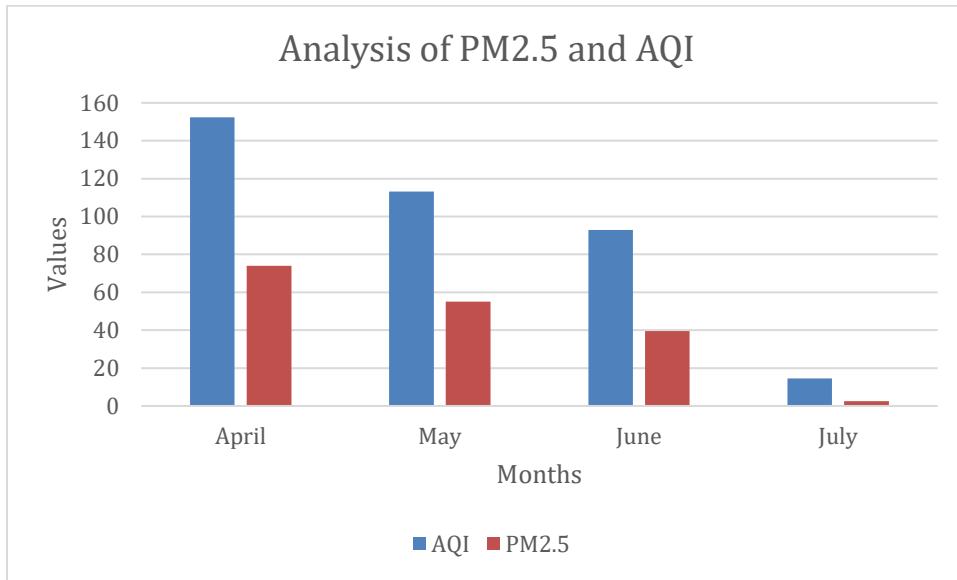


Figure 7. The Summary of AQI factors in May, 2021 Month

The above graph is bar plot which shows the analysis of AQI and PM2.5 of 4 months data. Blue bar shows AQI of each month and Orange bar represents PM2.5 data. When experiment started in month of April, AQI is too high, but gradually due to daily Yajna, this level of AQI is decreased. X-axis shows Months and Y axis denotes values of PM and AQI (as per figure 7).

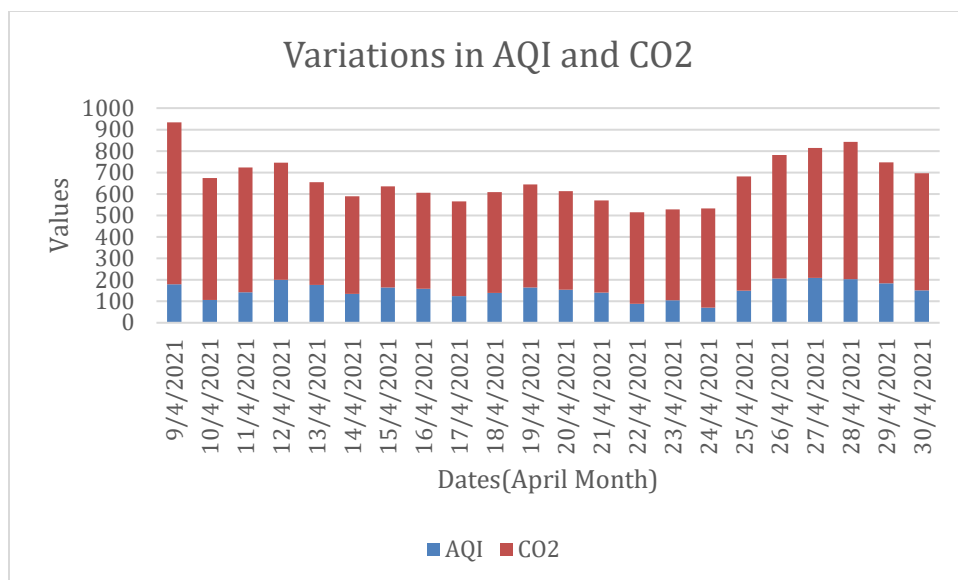


Figure 8. The Analysis of AQI and CO2 in April, 2021 Month

The above graph is stacked bar chart which represents variation in AQI and CO2 in the month of April, 2021. X axis denotes Dates in April Month and Y axis represents Values of AQI and CO2 in April. April, 2021 is the starting month of experiment, so readings are bit high. But at the end of April, 2021, readings are low which is good for our experiment. Hence Yajna is helpful in reducing the AQI and PM level (as per Figure 8).

5 NOVELTIES

The manuscript brings the importance of Vedic science and Indian Culture through this study. The analysis shows that the Vedic Science methods have the positive effects through Yajna and Havan on both isolated and non-isolated environments. It has been observed that the pollution level after the Yajna process has significantly decreased at that place. The report confirms that continuous use of Yajna and Havan are significant in improving human health and living. It can serve as Vedic and Natural remedy to cure and prevent lung diseases. Moreover, it can be an important step in controlling AQI level.

6 RECOMMENDATIONS

1. The reader is recommended to practice yajna at their homes to justify the results we've presented in paper.
2. One should try to be as eco-friendly as possible to give a contribution to a healthy future.
3. One should encourage and make the public aware about the seriousness of Bad Air Quality.
4. Vedic science offers a great range of scientifically true phenomena to be done in daily life, which have many benefits and everyone is recommended to practice these activities for their own good.
5. One can do research on other topics offered by Vedic culture to justify them scientifically.

7 FUTURE RESEARCH DIRECTIONS AND LIMITATIONS

7.1 Limitations

- The data set used here includes an inspection of three to four month, this analysis could be enhanced by collecting more dataset.
- It was quite difficult to predict exact results of analysis in a non-isolated environment.
- Sensors and computing devices used in the analysis were not of high precision and accuracy though this analysis is up to the mark for higher studies.

7.2 Future Directions

- The datasets can be collected that are more precise and accurate and a detailed analysis can be performed in both isolated and non-isolated environments.
- There is a need for new innovation and deep research in the field of Vedic Science. This paper is just a gist but not the end.
- This analysis opens the door for discovering scientific facts and features of Indian Vedic Sciences.
- Hawan has a significant role in reducing the harmful radiation emitted from electronic gadgets eg. the electromagnetic radiation emitted from smartphones covers a range of about 10 feet but it has been observed in the areas where Hawan is performed on a regular basis the radiations get shortened to a range of 2 feet or less than it.
- The byproducts of Hawan are very useful in the field of agriculture. Ashes generated from Hawan can be used in organic farming. Smoke emitted from Hawan helps in the process of ionization in the atmosphere which out-turns in cloud formation.
- Vedic Sciences, quite ancient but of great importance, can be considered as one more angle to analyse and solve those theories of nature that are still unsolved.

8 CONCLUSIONS

There is a clear cut indication in the graphical analysis presented here in result section that AQI factors, CO₂, PM level were drastically reduced due to Yajna Activity in Lockdown period in India. This paper aims to bring the importance of Vedic science methods in the society for the improvement of society and human being. The results of the analysis have been shown through different graphs. The first graphs depicts the dataset of every 30 minutes and the second graph shows the relationship of AQI level with time after the Hawan considering 24 hour supervision in that environment. The presented manuscript also brings into consideration the Havan effects in isolated and non-isolated environment. The different patterns in the graph show an increasing air quality index with time through regular practice of Yajna and Hawan. The other graphs shows level of PM_{2.5}, PM₁₀, SO₂, NO₂ and CO₂ before and after the Hawan and the variations are observable in each of the above parameters that proves the significance of Indian Vedic science. The article uses several mathematical derivations and formulas to produce an appropriate and accurate dataset to understand AQI level in the particular environment and positive effects of Yajna and Hawan.

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ADDITIONAL READINGS

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ANNEXURE

Key Terms and Definitions

AQI-An Air Quality Index is used by government agencies to communicate to the public how polluted the air currently is or how polluted it is forecast to become. Public health risks increase as the AQI rises.

PM 2.5- PM_{2.5} are tiny particles in the air that reduce visibility and cause the air to appear hazy when levels are elevated. It is an air pollutant that is a concern for people's health when levels in air are high.

PM 10-PM10 is any particulate matter in the air with a diameter of 10 micrometers or less, including smoke, dust, soot, salts, acids, and metals. Particulate matter can also be formed indirectly when gases emitted from motor vehicles and industries undergo chemical reactions in the atmosphere.

Climate Change-Climate change includes both human-induced global warming and its large-scale impacts on weather patterns. There have been previous periods of climate change, but the current changes are more rapid than any known events in Earth's history.

Yajna- Yajna refers in Hinduism to any ritual done in front of a sacred fire, often with mantras. Yajna has been a Vedic tradition, described in a layer of Vedic literature called Brahmanas, as well as Yajurveda.

Mantra-A mantra is a sacred utterance, a numinous sound, a syllable, word or phonemes, or group of words in Sanskrit, Pali and other languages believed by practitioners to have religious, magical or spiritual powers.

Human Health- Health, according to the World Health Organization, is "a state of complete physical, mental and social well-being and not merely the absence of disease and infirmity."

Economic Growth-Economic growth can be defined as the increase or improvement in the inflation-adjusted market value of the goods and services produced by an economy over time. statisticians conventionally measure such growth as the percent rate of increase in the real gross domestic product, or real GDP.

Data Sets

Table 1. Sample Dataset: April,2021

Device used is : Airveda Monitor

Created_Date(Asia/Kolkata)	AQI	PM2.5	PM10	CO2	Temperat	Humidity	
04-09-2021 18:30	42	12	42	739	28	28	
04-09-2021 19:00	191	85	237	806	29	28	
04-09-2021 19:30	312	136	314	761	29	28	
04-09-2021 20:00	320	147	312	748	29	29	
04-09-2021 20:30	304	126	254	740	29	30	
04-09-2021 21:00	207	93	154	801	29	32	
04-09-2021 21:30	165	80	122	790	29	33	
04-09-2021 22:00	121	67	108	767	29	33	
04-09-2021 22:30	102	60	104	744	29	33	
04-09-2021 23:00	104	59	107	710	29	34	
04-09-2021 23:30	106	59	109	688	29	33	
04-10-2021 00:00	97	51	97	651	29	32	
04-10-2021 00:30	75	39	75	607	29	31	
04-10-2021 01:00	61	33	61	593	29	30	
04-10-2021 01:30	51	29	51	588	29	30	
04-10-2021 02:00	44	24	44	562	29	29	

Airveda April, 2021

Table 2. Sample Dataset: May,2021

Created_Date(Asia/Kolkata)	AQI	PM2.5	PM10	CO2	Temperat	Humidity	
30-04-2021 07:30	282	115	237	585	31	41	
30-04-2021 08:00	306	128	290	542	31	38	
30-04-2021 08:30	339	148	382	512	31	36	
30-04-2021 09:00	387	164	420	491	32	34	
30-04-2021 09:30	302	123	306	467	32	33	
30-04-2021 10:00	224	98	229	453	31	33	
30-04-2021 10:30	193	88	189	479	31	34	
30-04-2021 11:00	148	75	161	479	31	34	
30-04-2021 11:30	126	57	140	468	31	33	
30-04-2021 12:00	118	50	128	470	31	33	
30-04-2021 12:30	114	47	122	471	31	32	
30-04-2021 13:00	110	46	115	463	31	33	
30-04-2021 13:30	114	52	122	472	31	33	
30-04-2021 14:00	107	49	111	495	31	34	
30-04-2021 14:30	104	45	106	483	31	33	
30-04-2021 15:00	101	44	102	471	31	33	
30-04-2021 15:30	101	46	101	467	31	33	
30-04-2021 16:00	101	43	101	438	32	31	
30-04-2021 16:30	100	43	100	450	32	31	

Table 3. Sample Dataset: June,2021

Created_Date(Asia/Kolkata)	AQI	PM2.5	PM10	CO2	Temperat	Humidity
29-05-2021 01:00	29	8	29	414	32	47
29-05-2021 01:30	20	6	20	418	32	46
29-05-2021 02:00	24	7	24	423	32	47
29-05-2021 02:30	30	9	30	423	31	48
29-05-2021 03:00	28	10	28	426	31	48
29-05-2021 03:30	23	10	23	424	31	48
29-05-2021 04:00	23	10	23	424	31	48
29-05-2021 04:30	26	14	26	431	31	48
29-05-2021 05:00	27	15	27	424	31	48
29-05-2021 05:30	38	13	38	423	30	49
29-05-2021 06:00	23	11	23	426	30	49
29-05-2021 06:30	43	20	43	421	30	49
29-05-2021 07:00	70	35	70	439	31	48
29-05-2021 07:30	34	17	34	417	30	50
29-05-2021 08:00	35	19	35	417	30	51
29-05-2021 08:30	41	22	41	415	30	50
29-05-2021 09:00	41	21	41	414	31	49
29-05-2021 09:30	43	20	43	415	31	49
29-05-2021 10:00	40	20	40	413	32	48

Table 4. Sample Dataset: July, 2021

Created_Date(Asia/Kolkata)	AQI	PM2.5	PM10	CO2	Temperat	Humidity
24-06-2021 04:00	68	28	68	423	32	55
24-06-2021 04:30	86	36	86	424	32	57
24-06-2021 05:00	94	41	94	437	32	58
24-06-2021 05:30	103	53	105	437	32	59
24-06-2021 06:00	99	47	99	438	32	59
24-06-2021 06:30	302	123	182	452	32	58
24-06-2021 07:00	349	184	251	464	33	58
24-06-2021 07:30	99	50	99	437	32	59
24-06-2021 08:00	101	51	102	441	32	60
24-06-2021 08:30	101	51	102	436	32	60
24-06-2021 09:00	101	51	102	441	32	60
24-06-2021 09:30	108	58	112	431	32	61
24-06-2021 10:00	112	62	118	437	33	60
24-06-2021 10:30	121	67	123	425	33	59
24-06-2021 11:00	113	64	120	433	33	58
24-06-2021 11:30	109	59	114	440	33	57
24-06-2021 12:00	102	53	104	433	34	56
24-06-2021 12:30	99	49	99	461	34	55
24-06-2021 13:00	102	51	103	456	34	54

Snapshots

Air Veda Machine



Figure A. Airveda

The Airveda provides accurate and real-time air quality index (AQI) from locations across the globe.

Supported Pics



Figure B: Equipments for detection AQI level



Figure C: Havankund



Figure D: Samagri



Figure E: Process of Yajna

Havan Kund is the center place in a Havan in which the fire is put and all the oblations offerings are made. It could be considered like a sanctum sanctorum for a Yajna.

Havan Samagri is a mixture of dried herbal roots and leaves that are burned during Yajna and Homa. Contents of the Samagri: Made from Ayurvedic Havan exotic herbs, Black til, Jau, 32 types of dhoop, Bhimseni Kapoor (camphor), rose petals, sandalwood powder, lobaan, Ghee, Agarbatti, Chandan and Tumeric.

Yajna In physical terms, Yajna is a process aimed at refinement of the subtle energy existing in matter with the help of thermal energy of the Mantras. The experiments of Yajna, when performed at a small scale in a day to day life are called – Havan or Agnihotra.