

Examining the AQI with effect of Agnihotra in NCR Region: Extracting Knowledge for Sustainable Society and Holistic Development with Healthcare 5.0

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Abstract. Yajna refers to any worship, prayer and praise, offerings done in front of holy fire with chanting of mantras. There are Yajna depending on time interval, some last only a few minute whereas some are carried out over an interval of hours, days or even months. All these have their own benefits and area of influence. Particulate Matter (PM-10) and (PM-2.5), Ozone (O₃), Sulphur dioxide (SO₂), Nitrogen dioxide (NO₂), Carbon Monoxide (CO), Lead (Pb) and Ammonia (NH₃) are the parameters on which Air Quality Index (AQI) depends. AQI can be determined by various devices, higher the AQI value, greater will be the air pollution and higher will be the health issues. Air pollution causes health problems including Lung damage, wheezing, chest pain, respiratory disease such as asthma. Over population can be seen as the major cause for environmental pollution. Since Vedic era, Yajna and Mantras are being used for numerous benefits including treatment of illness, purification of atmosphere, Yana ash as an effective fertilizer. According to research, the issue of Air pollution is more in developing countries rather than in developed countries. The authors' team performed the Yajna and Mantra and found that there is a major difference in AQI level before and after the experiment. The hazardous air pollutants such as PM_{2.5} and PM₁₀ reduces to a safe level.

Keywords-- AQI, PM 2.5, PM 10, Climate Change, Yajna, Mantra, Human Health, Economic Growth, Knowledge Management, Knowledge Pyramid, Sustainable Society, Knowledge Levels and Extractions

MOTIVATION

Day by day the quality of air is degrading in our surroundings, and the result is the death of various birds, breathing problems in humans. Accumulation of large number of SPM's, NO₂, SO₂, CO molecules, and other pollutants degraded the quality of air. Now it would be very difficult for any individual person or organization to work against air pollution and clean it. So the motivation came from the experiment performed which showed how AQI can be improved by following Vedic Indian Culture. Yajna and Hawan are two basic rituals that were very necessary in Vedic times. The basic idea is that these rituals can be performed by everyone at home, and they can improve the AQI of the place wherever they are done.

SCOPE OF THE STUDY

In this Study, we will know how the simple ancient Vedic technique can help to relieve us from very serious issue of air pollution. For this purpose proper experiment was performed for a period of four months and readings were taken on a regular basis and based on those readings the author team found how Yajna and Hawan can decrease the AQI levels of the surroundings in which they were performed. Our study also tells about some of the other researches done by other authors in this field. Apart from offering a solution to air pollution our study also leaves space for other readers to read and explore more about the ancient Vedic culture.

1. INTRODUCTION

Air pollution is one of the major environmental threat causing various diseases and even deaths, although human beings are responsible for it. According to a scientific study, some pollutants can harm public health even at very low level, and are not visible. So, Air Pollution and activities causing it should be controlled with an effective method, Yajna is one of that method. Yajna is easy to perform and cheaper than all other methods.

1. Air Quality and Global and Indian GDP

Increasing air quality index leads risk to human health. Deaths due to road accidents in 2020 were 1.3 million, deaths due to air pollution in 2020 were approximately 4.5 million, so we can say that the deaths due to air pollution are three and half times the deaths due to road accidents worldwide (Shaddick, G. et al., 2020) [7].

It was found that the loss due to air pollution is \$9.1 trillion which is equal to 6.1% of the GDP of the world. It was observed that the death due to air pollution in developing countries is more than that of developed countries. India also faces so many challenges due to increasing AQI it costs Indian business approximately \$95 billion (7 lakh cr.) which is equivalent to 3% of India's GDP. The loss due to AQI in India is equal to 50% of all kind of taxes which is collected in India annually (as per figure 2) (Gupta, G. et al., 2021) [4].

1.2.Yajna and Mantra: A Complete Science

According to first Law of Thermodynamics, energy can neither be created nor be destroyed and since Yajna and Mantra two energies (heat and sound) get produced along with light energy in the Hawan activity, so these energies get transformed from one form to another and results in the purification of surroundings. According to a study, the place where people perform Yajna and Mantra on regular basis is free from environmental pollution and health related issues are also negligible (as per Figure 5) (Acharya, N.R. et al., 2019) [8].

2.LITERATURE REVIEW

In developing countries, the issue of Air pollution is far more than in other developed countries. The reasons being, they are developing these decades and issue of the huge population (e.g India). Developing nations require more resources and lack proper facilities for pollution management. Apart from that large population requires more resources, more vehicles, which ultimately leads to more consumption and hence resulting in more pollution.

Nasir, H. et al., (2016) stated in their experiment that the air pollution trends in India are alarming. Major Indian cities like Delhi, Lucknow, Bengaluru, Agra, Ahmadabad, Chennai, Hyderabad, Jharia, etc. are breathing polluted air regularly, as shown in the research study, the data set was taken from National Air Quality Index (NAQI) As per the study, the major source of air pollution in India are Vehicles, Industrial Wastes and Thermal power stations, Burning of the crop remains in fields and Volcanic eruptions, etc. The harmful effects of air pollutions are dangerous. It can damage the lungs of

living beings can shorten their life span. Air pollution may cause acid rain problems which deteriorate the quality of the soil (Nasir, H. et al., 2016) [5].

The study also presented various data based on air pollution in various cities of India which showed that the level of pollutants is higher in winter as compared to summer and monsoon seasons. It showed that Chennai has the highest level of SO₂ and the highest level of NO₂ concentration is in Delhi and Bangalore (Gowtham, S., et al., 2015) [3].

One of the very good solutions highlighted in the paper was to make air pollution a national issue and make people aware of it, to shift more towards clean and renewable energy resources. (Nasir, H. et al., 2016) [5].

Chaube R.K., et.al. (2020) displayed in their research that Yajna and Mantra help in reducing the air pollutants such as SO₂, NO₂, PM-2.5 and PM-10 etc. Hawan purifies the atmosphere to a greater level when performed in indoor environment. Yajna and Mantra eliminates various diseases and illness. In Vedic era, it was stated that Yajna, if performed with proper plan of action lead to a good environmental purification and also helps in boosting the immunity (Chaubey, R. K. et al., 2020).

The aim of Yajna/Hawan should be evaporation of ingredients to a range so that they can make positive changes in the atmosphere (Sannigrahi, S. et al., 2021) [6]. In Yajna or Hawan, all the elements such as Hawan Samagri, dry wood (mango/sandal/Agar/Tagar etc.) are put in Hawan-Kunda (vessels in which all the offerings are made) and invocation of Mantras were done. (Gautam, S. et al., 2021) [2].

Here three energies are produced that are heat energy from the fire in Hawan-Kunda and sound energy from the uttering of Mantras along with light energy of fire flame. These energies remove the air pollutants causing bacteria, germs and viruses. Hawan should be done with proper procedure, otherwise it can be harmful for nature (Chaubey, R. K. et al., 2020) [1].

3. METHODOLOGY AND SETUP OF EXPERIMENT

Dr. Mamta Saxena, an esteemed scientist ex-Director General of Ministry of Statistics and PI (MoS-PI), had done this experimentation during second phase of COVID –19 pandemic at her home in New Delhi, India. Very few people were engaged at the time of experimentation as public gatherings were not allowed during the pandemic.

3.1.Setup

Steps:

1. A 10 by 10 room with proper light and ventilation was chosen.
 2. Air-Veda device was set up permanently inside the room.
- Base of Hawan-Kund (in which the fire is put and all the oblations offerings are made) is made with bricks, sand and water in the middle of the room.
 - Syzygium cumini-wood and Mango-wood sticks were placed in the Hawan-Kund.
 - Sticks should be placed one upon another in such a way that forms a square and there must be proper space between the layers so that there is ambient supply of Oxygen.
 - Black sesame seeds, paddy seeds (half of sesame), rice seeds (half of paddy seeds), sugar, cow's ghee, camphor, clove, dhoop-powder, sandalwood powder and Hawan Samagri (is a mixture of dried herbal roots and leaves that are burned during Yajna and Hawan) was mixed together to form Samagri for Ya-jna.
 - Some of the specific Mantra's to be chanted during the Yajna: Gayatri-Mantra, Navarn-Mantra, Shiv Gayatri-Mantra, Vaishnav-Mantra, Shakt-Mantra, Shaiv-Mantra.
 - Yajna was conducted in the morning at 06:00-06:30 A.M. regularly for the four months that is from April-2021 to July-2021.
 - Air quality index of the room was monitored before and after the Hawan regu-

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larly for the four months with AIR VEDA device.

- Recorded readings were studied and analyzed using various analyzing techniques and graphs.

3.2.Flow Chart

1. Following is the flow chart for the process adopted by researchers' team (as per Figure 1)

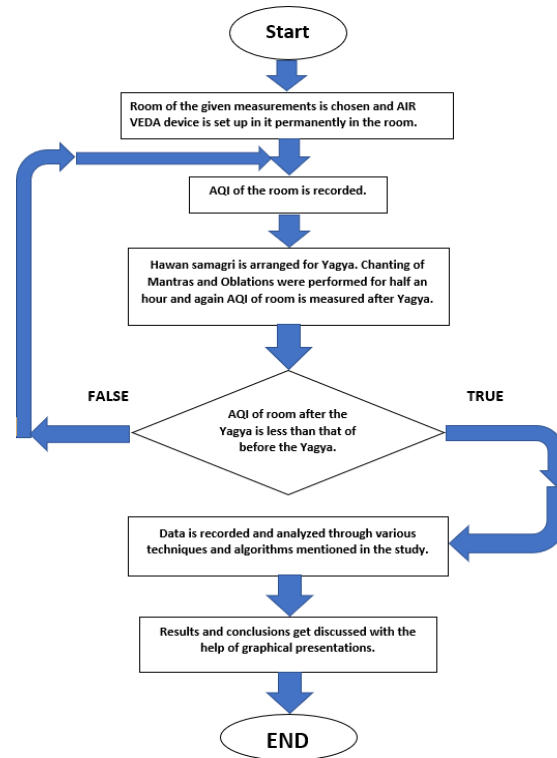


Fig. 1. The Flow-Chart of the Activities done in AQI measurement.

4. RESULTS AND DISCUSSIONS

Researcher has gathering the four month information on doing Yajna from April to July. And create the dataset in different characteristics like Air Quality Index (AQI), PM2.5, PM10, CO2, Humidity, and Temperature. Researcher play out the Yajna in various areas like done in partially closed balcony, Indoor bedroom, In balcony and in some dates Researcher don't perform Yajna and take the Value (as per Figure 7). In the below plot Researcher analyzed the data of PM2.5 according to dates through data visualization matplotlib library in python. Here Researcher check that from 10 April to 22 April Researcher performed Yajna in closed balcony and from 23 April to 24 April Researcher doesn't perform any Yajna. Researcher can check in the plot PM2.5 increases in these days and when Performing Yajna the value of PM2.5 is decreases (as per Figure 2).

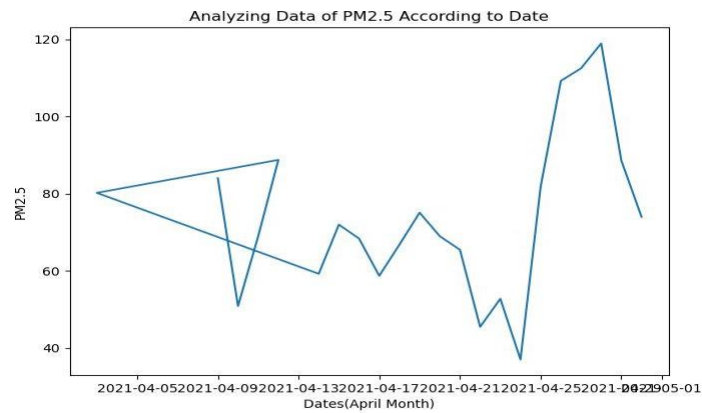


Fig. 2. Analyzing Data of PM2.5 According to Date

In the above plot Researcher analyze the data of PM2.5 according to dates through data visualization matplotlib library in python. Here Researcher check that from 10 April to 22 April Researcher performed Yajna in closed balcony and from 23 April to 24 April Researcher doesn't perform any Yajna. Researcher can check in the plot PM2.5 increases in these days and when Performing Yajna the value of PM2.5 is decreases (as per Figure 2).

In the below line graph Researcher visualized the data of May Month. In the May month Researcher do the Yajna in balcony and see the major change in the value of AQI and PM2.5. Here, Researcher had seen that when the value of AQI decreases as well as the value of PM2.5 also decreases and when value of AQI increases then the value of PM2.5 also increases(as per Figure 3).

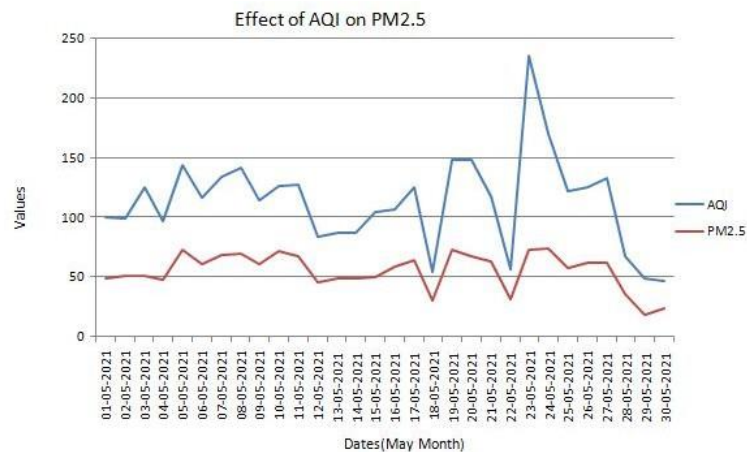


Fig. 3. Effect of AQI on PM 2.5

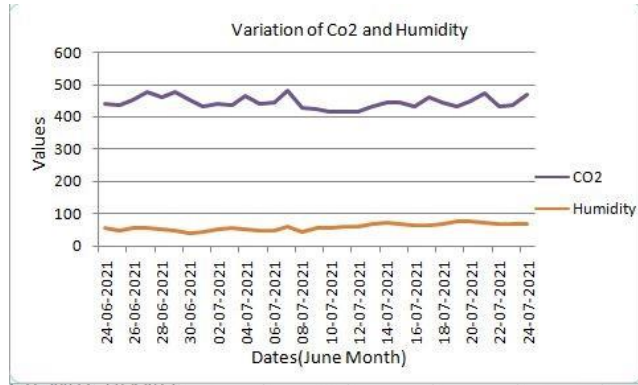


Fig. 4. Variation of CO2 and Humidity

In the above given line graph Researcher analyze the given dataset and check the variation between the CO2 and Humidity. In the June month Researcher performed Yajna in balcony and record the data and seen the major differences in CO2 and Humidity. Here, the purple line shows the variation of CO2 and orange line shows the variation in Humidity (as per Figure 4).

In the below given line graph Researcher analyze the Data of April Month Data and find that the humidity effect the PM10. When Researcher done Yajna the value of Humidity decreases and as well as the PM10 also decreases and when Humidity increases not performing any Yajna the PM10 also increases. That defines that Yajna impacted on each and every factor of pollution (as per Figure 5).

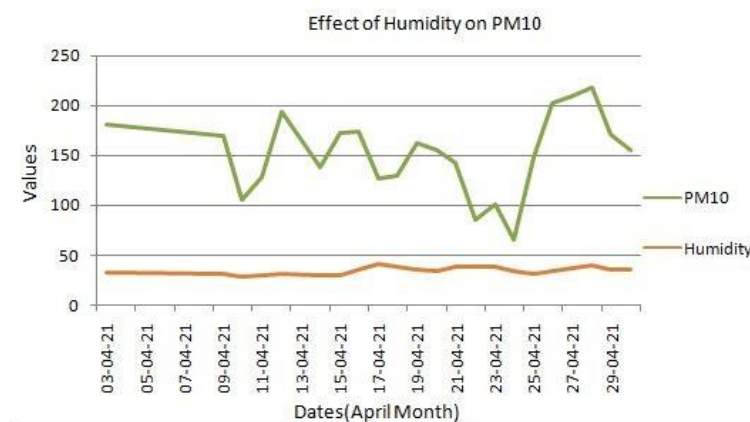


Fig.5. Effect of Humidity on PM10

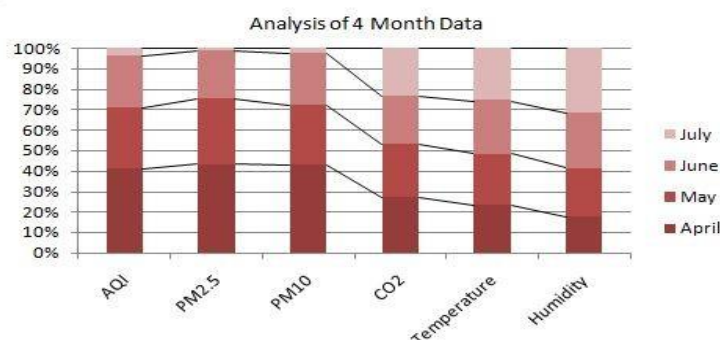


Fig. 6. Analyzing 4 month Data

In the above bar graph Researcher analyze the whole four month data and Researcher check the each value and seen there every value is decreasing in the end of the month on performing Yajna on each and every month in various places. Researcher performs Yajna and collects the data. In this analysis Researcher find the graph line goes through the below point which shows the value changes in the dataset doing Yajna.

5 NOVELTIES

- This research content describes the significance of Vedic Science at different levels.
- It has been scientifically proved through the experiment that the AQI quality improves by Yajna, Hawan and Mantra activities.
- With the use of Yajna and Hawan, the effect of harmful particles present in the atmosphere gets neutralized.
- So It provides a method to secure humans from different diseases as lung cancer, ischemic heart disease, and acute lower respiratory infections in children. So we can say that it is also the beauty of Indian culture that it scientifically heals the nature.

6 RECOMMENDATIONS

From the experiment done, the result obtained that there has been a decrease in AQI levels of the place where Hawan and Yajna was performed. The recommendation would be to minimize the use of each and every thing which may contribute to pollute the air (like travelling individually in vehicles, using petrol/ diesel operated vehicles for travelling short distances, stubble burning etc.).

The other solution to reduce the air pollution is to perform Yajna and Hawan by each and every

individual of society on regular intervals of time. These few small tasks can save one from very severe consequences of tomorrow.

7 FUTURE RESEARCH DIRECTIONS AND LIMITATIONS

Authors' team may have less knowledge about procedure of Yajna Experiment. The monitoring device Airveda may not be placed at right location to take appropriate readings. The Readings taken before and after Yajna experiment are of Small time periods (only four months). The Device used for measuring AQI level may has bad Sensor Quality.

In India, Yajna is performed for numerous reasons such as environmental purification, religiously, betterment of health and many more. In Vedas, it was found that Yajna-therapies (Yagyopathy) are very much helpful in curing diseases. Yajna can also be helpful for rain. It has been found that Yajna increases the probability of rain. Yajna ashes can be used for organic-farming.

8 CONCLUSIONS

In the above Analysis, Researchers performed Data analysis using Python and Excel Graph. After finding all data in different areas, Researchers examined it and saw that the Yajna makes the air clean and new, it decreases the contamination. More or less, Researchers can say that Yajna makes Environment new, clean and contamination free.

From the experiments, it can be derived that how a normal Vedic practices could save one from life threatening issue of air pollution. Air pollution is increasing day by day, and by data shown in research manuscript, the unusual growth of pollutant particles in air will lead to many serious problems in future and will make difficult the survival of each and every species and living being.

Regular Practice of Yajna and Hawan at home or workplace not only improves air quality but also improves one's heart and soul. The best part is that, it does not cost much and can be done by each and every one irrespective of financial conditions, and the other best benefit of this process is that in this process, not any single person or organization, but whole human population can work for benefit of themselves and the mother earth.

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