



(REVIEW ARTICLE)



## Scope of Agadtantra (Ayurvedic toxicology) in environmental air pollution W.S.R to Janpadodhvansa: A Review

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World Journal of Advanced Research and Reviews, 2023, 17(01), 862–867

Publication history: Received on 02 December 2022; revised on 16 January 2023; accepted on 21 January 2023

Article DOI: <https://doi.org/10.30574/wjarr.2023.17.1.0061>

### Abstract

*Ayurveda* is an ancient science, it helps to promote and preserve the fitness of a healthy individual and also provide the various treatment for the diseases. Environmental pollution is the major problem in the present situation. Pollution is a continuous process in which pollutants gets collected and stored, which later cause harm to the natural environmental constituents. This issue of pollution should be taken very seriously, as it harms the natural elements of earth such as air, water which are responsible for life on earth. The presence of these in undesirable quantity animals including human being and plants could not survive. Environmental pollution consist of mainly air water and soil pollution. *Agadtantra* (Ayurvedic toxicology) is the 6<sup>th</sup> branch of *Ashtang Ayurved* which deals with the poison i.e. its identification, types of poison from mineral, plant and animals as well as artificial poison and its treatment. The concept of environmental pollution had been described in the various text and classical books. In *Ayurveda Acharyas* had briefly describes the environmental health in *Dincharya*, *Rutucharya* and *Janpadodhvansa*. The review article is a primary approach to find out the solution for upcoming environmental pollution through ancient science.

**Keywords:** *Ayurveda*; Environmental pollution; *Agadtantra*; *Janpadodhvansa*

### 1. Introduction

The term environment broadly includes all the external factors such as living, non- living, material, and non-material which are surrounded to the man. Environment is made up of three components i.e. physical, biological, and social.

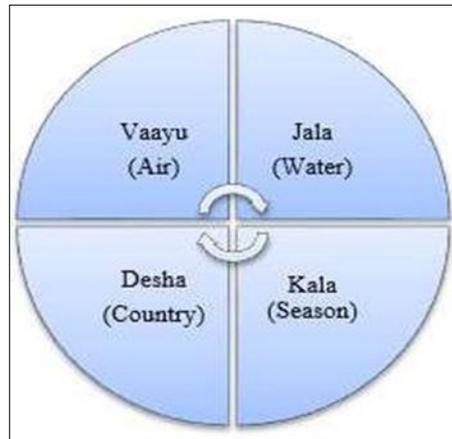
- Physical: Water, Air, Soil, Housing waste, radiation etc.
- Biologic: Plant and animal life including bacteria, viruses, insects, rodents, and animals.
- Social: Customs, culture, habits, income, occupation, religion, etc.

The key to healthy life of man lies in the environment. All the environmental components which leads to air pollution, water pollution, soil pollution, poor housing condition, presence of animal reservoirs and insects, vectors of diseases continuous threatened to man's health. The word pollution is derived from the Latin word *pollutioneum* which means to make dirty. The qualitative degradation of environment and its natural resources with different pollutants is called as environmental pollution[1]. Pollution is a global problem which cause hazardous effect on human being and natural resources. The main harmful effect of pollution is seen on environment which further leads to the breakdown of different eco system chain present in it. The global problem pollution in the environment leads to the physical and biological effect that vary according to their intensity.

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Mass quantity of people is called as Janpada and when this mass people get effected with diseased and destroy the whole region and it spread like an epidemics is called as “Janpadodhvansa Rogas”. Acharya Charaka has been describe it in chapter 3 of Vimana Sthan in which the description of Vayu (Air), Desha (Land), Kala (Season), and Jala ( water) all are effected. Acharya Charaka has also described symptoms of Samanya Vayu (Normal air), Vikrut Vayu (Polluted air) and Vlshdushit Vayu (Poisoned Air). Poorvarupa (early science of Janpadodhvansa) are normal condition of stars, planets, moon, sun, air, fire and the environment which derange the seasons [2].

According to modern science we get to know that above four factors gets vitiated due to pollution and leads to epidemics continuous exposure to this factor leads to various disorders and complication. Their constituents get stored in the body and when favorable condition occurs it stimulate the constituent and create various complication in the body[3].



**Figure 1** Factors affected under Janpadodhvansa

## 2. Air Pollution and its Ayurvedic Perspective

Air is the constituent on which all forms of life depends. Human beings, animals, and plants requires continuous supply of air to exist. Air pollutants like chemical, physical (e.g. Particulate Matter) or biological agent which modifies the natural characteristic of the atmospheric air is categorizes as air pollution. In today’s situation, air pollution creates on chief discussion in human life. It is not bounded or recognized by geographical or political boundaries[4]. Air pollution act like as an silent killer as it is present all around us, and it preys to both young and old, To counteract, hygiene is most important, not only in terms of health but also in production performance and in terms of food safety[5].

### 2.1. Current scenario [6]

- Due to household exposure to smoke from dirty cook stoves and fuels, 3.8 million die every year.
- 91% of the world’s population lives in places where Air quality exceeds WHO guideline limits.
- 4.2 million Deaths every year as a result of exposure to ambient (outdoor) air pollution.

#### 2.1.1. Sources [7]

- Indoor air Pollution: Stove, aerosol sprays, solvents tobacco smoke, resin products building material and insecticide sprays etc
- Industries: Through the chimney large amounts of pollutants is emitted into the atmosphere. Combustion of fuel to generate heat and power produces smoke, sulphur dioxide, nitrogen oxides, and fly ash.
- Domestic Sources: In domestic usage of coal, wood, or oil smoke, dust, sulphur dioxide, and nitrogen oxide are gotten.
- Automobiles: One of the major sources of air pollution is motor vehicles. These vehicles emit hydrocarbons, carbon monoxide, lead, nitrogen oxides, and particulate matter.
- Miscellaneous: These comprise burning refuse, incinerators, pesticide, spraying, natural sources (e.g. wind-borne dust, fungi, bacteria), and nuclear energy programs.

### 2.1.2. Health impacts

Air pollution has both immediate and delayed effect on health. Major air pollution and their health effect are mentioned in table[8].

**Table 1** Major air pollutants and adverse effect

Pollutant	Adverse effect
Oxide of nitrogen	Respiratory tract irritation, bronchial hyperactivity, impaired lung defenses
Lead	Impaired neuropsychological development in children
Hydrocarbons	Lung cancer
Sulphur dioxide	Exacerbation of asthma and COPD, respiratory tract irritation, death may occur in severe exposure
CO	CO poisoning cause cherry lips, unconsciousness, death by asphyxiation
Ozone discomfort	Cough, sub sternal Broncho-constriction, decreased exercise performance, respiratory tract irritation.

### 2.1.3. Prevention and control of air pollution [9]

WHO had recommended the following procedure for the prevention and control of air pollution they are as follows –

- Containment – Prevention of escape of toxic substances into the open air.
- Replacement – Replace a technological process which causing air pollution, by a new process that does not affect the natural constituent of air.
- Dilution – Establishments of ‘green belts’ between the industrial and residential areas for diluting the condense air.
- Legislation – Air pollution is controlled in many countries by suitable legislation, e.g. Clean Air Acts.
- International action – To deals with air pollution on a worldwide scale, the WHO has established an international network of laboratories for the monitoring and study of air pollution.

## 2.2. Ayurvedic view

As mention in ayurvedic text during ancient time, to harm or kill someone atmosphere poisoning was been done as military operation to harm the enemy during war by fumigation of toxic substances.

- Vikrita Vayu Lakshana [10] – This type of air is responsible for causing illness such as not following the season excessive moist speedy, harsh, cold, hot, blocking, rough, terrible sound, excessively clashing with each other and affected with an unsuitable smell, vapor, gravels, dust and smoke.
- Characteristics & Effects of polluted air [11] – Flying birds in the sky and fall down from the sky to ground in tired condition, it indicates that wind is polluted by the poisonous smoke. In human beings and attack of cough, nasal discharge, headache and Sevier eye disease among person inhaling the same wind and smoke.
- Purification of polluted air [12] – In ayurvedic text many drugs are mention which are helpful for the purification of atmospheric air by burning herbal drugs fumes coming out from this drugs helps in purification of poisonous air.

**Table 2** Drug mentioned for Air purification

1	Laksha	Shellac
2	Haridra	<i>Curcuma longa L.</i>
3	Ativisha	<i>Aconitum heterophyllum L.</i>
4	Abhaya	<i>Terminalia chebula Retz.</i>
5	Musta	<i>Cyperus rotundus L</i>
6	Harenuka	<i>Vitex negundo L.</i>
7	Ella	<i>Elettaria cardamomum (L.)Maton</i>
8	Tamalapatra	<i>Cinnamomum Tamala (Buch.-Ham.)T.Nees</i>
9	Vakra	<i>Valeriana officinalis L.</i>
10	Kustha	<i>Saussurea lappa C.B. Clarke.</i>
11	Priyangu	<i>Callicarpus macrophylla Vahl.</i>

In Chikitsa Sthana 23rd chapter Acharya Charaka has mentioned some fuming process that help in detoxifies the environment [13].

- Powder of Yellow Mustard (*Brassica campestris L.*) and Chandana (*Santalum album L.*) + Ghrita (Clarified butter)
- Combination of Tagar (*Valeriana wallichii DC.*), Kusthha (*Saussurea lappa C.B. Clarke*), flower of Shirisha (*Albizia lebbek Benth.*)
- Combination of equal quantity of Laksha (Shellac), Usheer (*Vetiveria zizanioidis L.*), Tejpatra (*Cinnamomum tamala Buch.-Ham. T.Nees*), Guggula (*Commiphora mukul Hook ex Stocks*), Bhallatak (*Semicarpus anacardium L.*), flower of Arjuna (*Terminalia arjuna Roxb.*), Raal (Extract of *Shorea robusta Gaertn.*), White Aparajita (*Clitoria ternatea L.*)

### 2.3. Recent Study

#### 2.3.1. Medicinal smoke reduces airborne bacteria [14].

This study shows the impact and ethnopharmacological aspects of medicinal smoke on aerial bacteria in an indoor environment. Smoke was originated by burning wood and a complex mixture of odoriferous and medicinal herbs (havan material) like *Aegle marmelos (L.)*, *Cedrus deodara (Roxb. Ex D. Don)*, etc. The obtained results show a 94% reduction on bacterial counts by 60 min and the effective time was up to 24 h in the closed room.

#### 2.3.2. Agnihotra – A non-conventional solution to Air pollution [15].

Under the natural lab conditions and local artificial indoor pollution obtained results show a noticeable reduction in SO<sub>2</sub> & NO<sub>2</sub> concentration by almost 51%, 60% respectively more by Yagya when was compared without Yagya. In this study materials used for Yagya (fire rituals) such as cow's ghee (clarified butter), Pipal wood (*Ficus religiosa L.*), *Guggula (Commiphora mukul Hook. ex stocks)*, etc.

#### 2.3.3. In vivo studies on the effect of *Ocimum sanctum L.*, leaf extract in modifying the genotoxicity induced by chromium and mercury in *Allium root meristems* [16].

Heavy metals are non-degradable, they accumulate in the body and also disturb the food chains and biochemical cycles. The problem of heavy metals in modern conditions is global and is associated with contamination of soil and water with rare and scattered elements that have a biocide effect. Hg and Cr are the important heavy metals that are widely used in various industries which produce a mutagenic and carcinogenic effect. In this study, it was found that the leaf extract treatment shows highly significant ( $p < 0.001$ ) recovery in mitotic index (MI) and chromosomal aberrations (CA) as compared to pre-treated samples. The lower doses (5, 10, 20%) were found more effective than higher doses.

#### 2.3.4. Preparation and evaluation of Herbal Dhoop for cleansing the air [17].

This study promotes the use of the natural herbal product for room purifiers and air freshener instead of using chemical sources and the harmful UV rays. The obtained results show that the growth of the most aerial organism was inhibited. Microbiological evaluation of the cleansing activity of dhoop was conducted with Nutrient and Sabouraud Agar plates (in duplicates) mins. Herbal dhoop was prepared by using cow dung, cow ghee, cow milk, Camphor (*Cinnamomum camphora* (L.) J.Persl.), Guggul (*Commiphora mukul* Hook. ex stocks), Dhoop (*Boswellia serrata* Triana & Planch.), Kapurkachri (*Hedychium spicatum* Sm. In A.Rees) and Anantmula (*Hemidesmus indicus* (L.) R.Br.).

#### 2.3.5. Study the Impact of Houseplant in the purification of Environment using Wireless Sensor Network [18].

In this study, it was discovered how household plants help purify the environment. The air pollution monitoring system was developed by using a wireless sensor network (WSN) and tested in different tree cover area and non-tree cover area. The impact of tree cover area/non-tree cover area was co-related with due consideration of CO<sub>2</sub> depletion and O<sub>2</sub> emission concentration. The obtained results show that the concentration of CO<sub>2</sub> was decreased due to absorption by plants and O<sub>2</sub> concentration was increased. Plants were used in this study like Tulsi (*Ocimum sanctum* L.), Aloe Vera (*Aloe vera* (L.) Burm.f.), Peace Lily, Devis Ivy, Snake Plant, Orchids, etc.

### 2.4. Management of Janpadodhwansha according Acharya Charaka [19]

According Acharya Charaka, Panchkarma therapy (Vamana-Emesis, Virechana- Purgation, Niruha, Anuvasanam, Nasya-Errhines) is the best treatment. It helps in complete detoxification of body. After the panchakarma treatment and proper use of Rasayan (Rejuvenative therapy/Immuno-modulator) measures and management with the drugs collected in a normal environment is recommended. And also following the Sadvritta & Aachar Rasayan (Good behavioral activity and personal hygiene) is also helpful for reducing the effect of Adharma (i.e. not following the rules & regulations said by ancestors) which is the main reason of Janpadodhwansha (Imbalance of ecosystem)

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## 3. Conclusion

A healthy environment is most important factor to live a healthy life. It's not only important for proper healthy growth of human beings but also socioeconomic group of society and the nation. Our in discriminatory progress in today's era leads to gradual destroy of our eco system in the form of pollution which is the most iconic problem for all the countries in the world. If this burning problem of pollution is not taken seriously than it will create a frightening future. In ancient contemporary science our Acharyas has described the treatment associated with Janpadodhwansha which proves very effective in pollution associated problems. Agadhtantra is the 6th branch of Ayurveda which deals with the different type of poison and its toxicity and their management and treatment, so environmental toxicology comes under in it. Various studies shows that some of these method of Ayurveda have the potential to detoxify the environment from various pollutant. To prove the potential of the ayurvedic drugs for detoxifying the body as well as environment, more research has to be carried out. Many experimental researches can be done to signify the efficacy of these ayurvedic drug and methods mentioned in the Ayurveda through which they will help in detoxify the body and environment without causing any harm to other essential factors.

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## Compliance with ethical standards

### *Disclosure of conflict of interest*

There is no conflict of interest.

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