



Review Article

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## SCOPE OF AYURVEDA IN PREVENTION AND MANAGEMENT OF ENVIRONMENTAL TOXICANT INDUCED RESPIRATORY DISEASES

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### Abstract:

In this era of modernisation and stressful life, people are getting more civilized which resulted in lifestyle changes. Along with these changes, environmental pollution is a major threat and is one of the greatest problems that the whole world is facing. Environmental toxicants- induced respiratory disease has increased gradually all over the world including in India. The toxicant emitted from air pollution is affecting human beings and causes many health hazards. The air pollutant like particulate matter, ground-level ozone, sulphur oxides, nitrogen oxides, lead, carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), chlorofluorocarbons (CFCs) and carbofuran, etc. causes severe health consequences including respiratory problems like chronic bronchitis and emphysema, etc. Ayurveda mentioned air pollutants like *Raja-dhooma* and *Dushit vayu* as causative factors of respiratory disease including allergic bronchitis (*Shawasa*), allergic rhinitis (*Pratishyaya*), cough (*Kasa*) and hiccup (*Hikka*). This study throws some light on the prevention and management of environmental toxicants that cause respiratory diseases.

**Keywords:** Environmental, Toxins, Respiratory, Diseases, *Janapadhotwamsa*, *Ayurveda*.

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## Introduction:

Air pollution can be defined as contamination of the indoor or outdoor environment by any chemical, physical, or biological agent that modifies the natural characteristics of the atmosphere<sup>1,2</sup>. Common sources of air pollution include motor vehicles, industrial facilities, household combustion devices, and forest fires. The air that nearly every human being on the planet (99%) breathes is more polluted than what the World Health Organization considers safe. People who live in over 6000 cities across 117 countries are currently being exposed to unhealthy levels of nitrogen dioxide and fine particulate matter in the air, with those in low- and middle-income countries being most exposed<sup>3</sup>. Environmental air pollution contributes to this huge burden through the initiation and promotion of respiratory diseases that are leading causes of death<sup>4</sup>.

Air pollution is a significant risk factor for a number of pollution-related diseases and health and these effects can result in increased medication use, increased doctor or emergency room visits, and more hospital admissions and premature death. According to a Lancet study, nearly 1.67 million deaths and an estimated loss of USD 28.8 billion worth of output were India's prices for worsening air pollution in 2019<sup>5,6</sup>.

Smoke from factories, vehicles, or burning of wood basically occurs due to coal burning; this releases Sulfur dioxide (SO<sub>2</sub>), carbon monoxide (CO), and Nitrogen oxides (NO<sub>x</sub>) into the air making them toxic and spraying insecticides, and pesticides like DDT, offensive odours like H<sub>2</sub>S and others, bioaccumulation process these are causes of environmental toxicity.

Household air pollution was responsible for an estimated 3.2 million deaths per year in 2020, including over 2,37,000 deaths of children under the age of 5. The decrease in the quality of air leads to several respiratory problems including chronic bronchitis, allergic rhinitis, emphysema, non-communicable cardiovascular diseases like stroke, ischemic heart disease and respiratory diseases like chronic obstructive pulmonary disease (COPD), lung cancer etc<sup>7</sup>.

In *Charak samhita* under the title "*Janpadodwamsa*," *acharya Charaka* mentioned, *Janpada* means by which mass people get afflicted with disease and destroy the whole

region, the disease that spreads the form of epidemics is called “*Janpadodhvansa rogas*”<sup>8</sup>. The cause of an unhealthy environment is the *adharma* of rulers and residents of that particular area which leads to the impairment of the ecosystem and its components<sup>9</sup>. Further in *Shushrut samhita*, *acharya* mentioned that in efforts to protect one's army and land the weaker king introduces various types of poisons in land water, and air in the way of a strong king and thus causes deliberate harm to the environment and other living beings including human. During those days it was the duty of royal physicians to identify such toxic environment and purify it and also treat the persons affected by such environment<sup>10</sup>.

### **Aim:**

1. To collect, evaluate, elaborate, and discuss environmental toxicants-induced respiratory diseases as per *Ayurveda* and modern science.

### **Objectives:**

1. To study environmental toxicants and their sign & symptoms on body.
2. To give the *Ayurvedic* protocol for prevention and management of environmental toxicant-induced respiratory disease.

### **Materials & Methods:**

This article is based on a literary survey. The classical texts in Ayurveda dealing with the concerned topic have been referred to articles published in the online database and have been reviewed for the purpose. The matter related to environmental toxicants and respiratory disease has been collected from various textbooks of modern sciences. The textbook of *Ayurveda* and its commentary has been referred to understand the concern diseases. The protocol for the prevention and management of environmental toxicant-induced respiratory disease has been made by using *Ayurvedic* principles.

### **Conceptual Study:**

Environmental Toxicants<sup>11</sup>:

1. Particulate matter
2. Ground-level ozone
3. Carbon monoxide

4. Sulfur oxides
5. Nitrogen oxides
6. Lead
7. Carbon monoxide (CO)
8. Carbon dioxide (CO<sub>2</sub>)
9. Chlorofluorocarbons (CFCs)
10. Dichloro-diphenyl-trichloroethane (DDT)
11. 2,3,7,8 Tetrachlorodibenzodioxin (TCDD)
12. Atrazine
13. Benzoperylene
14. Carbofuran etc.

#### **Diseases caused by Environmental Toxicant<sup>12</sup>:**

Air pollution can cause a wide range of illnesses, from minor irritations of the eyes, nose, mouth, and throat to more serious conditions such as headaches, dizziness, and low energy.

The most common conditions affected by air pollution are as follows:

- ✓ Asthma attacks
- ✓ Chronic Obstructive Pulmonary Disease– COPD
- ✓ Reduced lung function
- ✓ Chronic bronchitis
- ✓ Emphysema
- ✓ Pulmonary cancer – Caused by a series of carcinogen chemicals that enter the body through inhalation
- ✓ Mesothelioma: a specific kind of lung cancer that typically develops 20–30 years after first exposure to asbestos and is linked to asbestos exposure
- ✓ Pneumonia

The diseases that can arise from bird droppings include candidiasis, a disease called cryptococcosis that affects the lungs and later affects the central nervous system. Newcastle disease, a highly contagious bird disease brought on by a paramyxovirus, is also spread by bird droppings<sup>13</sup>.

Alveolar macrophages and T lymphocytes can be activated as well as a type-III immune complex-mediated hypersensitivity reaction when exposed to antigens in pigeon droppings and bloom. This triggers an inflammatory reaction and is most likely the underlying cause of hypersensitivity pneumonitis<sup>14</sup>.

### **Methods to control air pollution and prevention from its hazardous effects:**

1. Containment- Penalizing vehicles in which pollution is not under control
2. Replacement- Replacement of methods in which more smoke is created. eg. Electric stoves
3. Legislation- Legal action should be taken on factories causing air pollution
4. International action- International action should be taken on countries that are causing more air pollution.
5. Dilution: Dilution through the use of equipment that may decrease air pollution.
6. Balcony gardens
7. Personal preventative methods like air filter masks should be used.

### **Ayurvedic aspects in Environmental toxicity:**

In *Ayurveda*, the signs of vitiated *vayu* are mentioned as, those winds which are not following the season, excessively moist, speedy, harsh, cold, hot, rough, blocking, making terrible sounds, excessive clashing with each other, with unsuitable smell, vapours, gravels, dust, and smoke<sup>15</sup>.

When the *vayu* becomes extremely vitiated, birds those are in the air plummet and die. In humans, it causes symptoms like nasal discharge, cough, headache, and eye diseases<sup>16</sup>. The air that has been poisoned will be cold during summer and hot during winter, causing giddiness, fainting, and other symptoms<sup>17</sup>. According to the *Ayurvedic* aspect air pollutant (*Rajo- Dhooma*) is a causative factor of *shawasa*, *hikka*, *kasa*, and *pratishyaya* disease<sup>1</sup>.

### **Management of environmental toxicant induces respiratory diseases according to *Ayurveda*:**

According to *Ayurveda* management can be done in the following ways

1. *Nidan parivarjan*
2. *Sanshamanchikitsa*
3. *Srotagatchikitsa*
4. *Samsodhan chikitsa*
5. *Nasya chikitsa*
6. *Dhoopan Chikitsa*
7. *Rasayan chikitsa*

1. *Nidan parivarjan:-*

The half treatment is *nidan parivarjan* if we give treatment and do not break the *hetu sevan* there will be no *samprapti bhang*. The prognosis of disease will be continued because of *hetu sevan* air pollutant (*rajo-dhoom*) as a causative factor and further *dushti* of *pranvaha srotas* will occur and induce respiratory disease.

2. *Sanshmna chikitsa:-*

a) For purification of toxic air Lakshaharidradi Yog is mentioned. Drugs like *laksha*, *haridra*, *ativisha*, *abhaya*, *musta*, *harenuka*, *eladala* (leaf of ela), *tagara*, *kushtha*, and *priyangu* etc. should be burned and its smoke should be spread all over to purify the toxic air & smoke<sup>18</sup>.

b) *Sigrvadi agada*- Fine powder of *devadāru*, *nata*, *ananta (durvā)* *arjuna*, *gairika*, (red ochre) *vajrakanda (sudha)*, *lata (priyañgu)* and *lodhra* is to be sprinkled over the top of the trees, flag posts, tall pillars, gables of tall houses, etc. By coming in contact with this powder everywhere, the poisoned air becomes detoxicated<sup>19</sup>.

c) If someone gets affected by such type of polluted environment then *shobhanjanmooladi agad* should be used for treatment.

d) In case of Chronic Allergic Rhinitis, combinations of *Nardiya Laxmivilas ras*<sup>20</sup> 125 mg, *Sitopaladichurna*<sup>21</sup> 2 gm, *Yastimadhuchurna*<sup>22</sup> 2 gm and *tankan bhasma* 250 mg should be given with honey 3 to 4 times of a day in chronic rhinitis.

e) In case of chronic allergic bronchitis the *Laxmivilas ras* will be replaced with *shwaskutharras*<sup>23</sup> from the above combination.

3. *Srotagat chikitsa-*

1) *Chitrak haritaki avaleha*<sup>24</sup> 10 gm should be given twice a day along with medicated milk prepared from 2 gm turmeric powder and 1 gm ginger powder.

2) *Vasa avaleha*<sup>25</sup> is also helpful to pacify to vitiated *kapha* of *pranvaha* and *anavaha srotas* both.

4. *Samsodhan chikitsa:* - To remove the accumulated environment toxicant and its metabolite from human body the induced emesis should be done as most environmental air pollution causes injury to *kaphasthan* means *pranvaha srotas*. There should be three stages to the induced emesis: *purva karma*, *pradhan*, and *paschat karma*.

- a) *Purva karma*- In *purva karma*, *snehan* with *vasadighrit*<sup>26</sup> will be given in increasing order as per patients *Agni* every morning till the clinical features will be well appeared. *Peti swedan* should be given in the morning on the day of induced emesis. It should be done as per the schedule described in the text.
- b) *Pradhan karma*- After *samyak snehan lakshana* is seen by a patient the *vamak yoga* (emitting drugs) prepared from 1 part of fruit juice of *Lagenaria Siceraria* (Bottle gourd) and 3 parts of *kshira* should be given early in the morning as per protocol and observed the *vamana vega* an any adverse effect<sup>27</sup>.
- c) *Paschat karma*- *Dhoopan* and *sansarjan karma* as per schedule.
- To perform *vamana* (induced emesis), one should employ the *vamak dravyas* as described in *Ayurveda* to eliminate the vitiated *kapha* from the *pranvaha strotas*. Additionally, one should use the *shaman dravyas* as mentioned in *Ayurvedic* texts.
5. *Nasya chikitsa*- *Nasya* of *Shadbindu tail*<sup>28</sup> should be given after gentle massage with warm mustard oil followed by local *swedan* by warm cotton cloth on and near nasal area daily.
6. *Dhoopan chikitsa*- With drugs like *laksha*, *haridra*, *ativisha*, *abhaya*, *abda*, *harenuka*, *ela*, *dal*, *vakra*, *kushtha*, *priyangu*, etc. are to be done for the purification of air<sup>29</sup>.
7. *Rasayan chikitsa*- *Rasayan chikitsa* plays an important role in respiratory diseases because it mainly does *samprapti bhanga* and *apunarbhavta* of disease, it should be taken after *shodhan chikitsa*. The main *hetu* is allergens in the above *samprapti* which aggravates the disease so, hence *rasayan* therapy is useful to build up immunity and give strength to *pranvaha strotas* so it can fight against environmental induced allergens.
- Many *rasayan dravyas* are specifically mentioned to have their action on *pranvaha strotas* like *vardhaman pippali rasayan*, *bhallatak*, *amalaki*, *maricha*, and most commonly used *chavanprashavleha* which acts as excellent rejuvenators<sup>30</sup>.

### Discussion:

In the modern world, air pollution is a big threat. Environmental toxicants-induced respiratory disease has increased gradually all over the world including in India. India has a lot of polluted cities, Delhi being the most polluted among them all<sup>31</sup>. Containment, replacement, dilution, legislation, international action, and balcony gardens are some

methods to achieve the inhibition of air pollution on the community level which may help in the prevention of respiratory disease.

The *Ayurveda* text mentioned air pollutants like *raja-dhooma*, *dushit vayu* as causative factors of respiratory disease. *Ayurveda* is based on the principle of prevention and treatment of disease as prevention is better than cure, social prevention based on community, and personal prevention based on a diseased person is needed to free from such type of big problem. *Acharya Charaka* has recommended the *nidan parivarjan* to break up the entry of causative factors and prevent diseases. So patients with respiratory conditions should stay away from areas with high levels of pollution and they should use air filter masks while leaving the home. *vamana* (induced emesis) should be done by using *vamak dravyas* described in *Ayurveda* to excrete out the vitiated *kapha* from the body, *Shaman dravyas* mentioned in *Ayurveda* texts should be used. Also *ritu shodan* should be done to eliminate the *dushit doshas* regularly and *rasayan chikitsa* should be done to increase the immune system of *pranvaha strotas* to fight against the allergens.

### Conclusion:

This article concluded that environmental toxicant-induced respiratory diseases can be prevented and treated by *Ayurveda*. By practicing the regimen described in *Ayurveda* we can prevent respiratory diseases. Air pollution can be controlled to some extent with the use of methods like replacement, dilution, legislation, international action, use of filtered masks, and balcony gardens, etc.

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