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Review Article

Ayurvedic Method for Prevention and Management of Environmental Toxicant induces Respiratory Disease

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ABSTRACT

Environmental toxicant induces respiratory disease has been increased day by day in all over world including India. The toxicant emitted from air pollution has been affected to human being and causes health hazards. The air pollutant like DDT, TCDD, Atrazine, Benzoperylene and Carbofuran causes severe consequences of health hazards in human beings including chronic bronchitis, emphysema. Ayurveda is an ancient medical science and mentioned air pollutant like *raja- dhooma* as causative factors of respiratory disease including allergic bronchitis *(shawas*), allergic rhinitis (*Pratishyaya),* cough *(kasa*) and hiccough (*hikka*). The prevention and management of disease is the basic principle of Ayurveda for any disease. Ayurveda suggested the *nidan parivarjan* for the prevention of disease. The prevention of environmental toxicant can be achieved by social preventative methods like Containment, replacement, Dilution, Legislation, International action, balcony gardens and personal preventative methods like air filter mask. The induced emesis should be done by using Lagenaria siceraria to excrete out the vitiated *kapha* from the body. After completion of *sansarjan karma sitopalaadi, yastimadhu, tankan bhasma* should be given along with *laxmi vilas rasa* and *shwas kuthar rasa* in allergic bronchitis and allergic rhinitis respectively. *Chitrak haritaki* and *vasa aveleha* should be given along with *haridra khsirpaka* to calm down the *srotodusti* of *pranvaha srotas*. *Nasya therapy* should be given by *shadbindu* oil.
Thus social and personal preventive methods, induced emesis, either *laxmivilas rasa* or *shwaskuthar rasa, chitrak haritaki avaleha , vasa avaleha* and *nasya therapy* will be helpful to prevent and cure of environmental toxicant induces respiratory disease.

Key- words: Ayurveda, Environmental pollution, Toxicity, Respiratory Disease

INTRODUCTION

The Natural Environment- Man's environment in its widest sense is called the biosphere which consists of the earth's crust, the surrounding atmosphere and the various forms of life that exist. The biosphere is very complex and so is usually divided into smaller units or ecosystems.

One of the greatest problems that the world is facing today is that of environmental pollution, increasing with every passing year. Environmental pollution has existed for centuries but only started to be significant following the industrial revolution in the 19th century. Smoke from factories, vehicles or burning of wood basically occurs due to coal burning; this releases Sulfur dioxide (SO2), carbon monoxide (CO), Nitrogen oxides (NO_x) into the air making it toxic and spraying

insecticide, pesticides like DDT, Offensive odors like H_2S and others, bioaccumulation process these are causes of environmental toxicity. The harmful chemical & synthetic elements became an integral part of our life. These substances cause damages to our body as well as our environment and prove dangerous in one way or other.

Clinically, environmental toxicity may lead to chronic bronchitis and emphysema, degenerative diseases, lung cancer, cardiovascular and respiratory diseases. According to Ayurvedic aspect of air pollutant *(Rajo-Dhooma*) as a causative factor of *Shawas, Hikka, Kasa* and *Pratishyaya* disease.

Aims & Objectives

1) To collect, evaluate, elaborate and discussion of environmental toxicant induced respiratory disease as per Ayurveda and modern science.

2) To give the Ayurvedic protocol for prevention and management of environmental toxicant induced respiratory disease.

MATERIALS & METHODS

This article is based on literary survey and clinical experiences on concern disease. The matter related to environmental toxicant and its respiratory disease has been collected from various text books of modern sciences. The text book of *Ayurveda* and its commentary has been referred to understand the concern disease. The protocol for the preventive and management of environmental toxicant induced respiratory disease has been made by using Ayurvedic principles.

Conceptual study

Environmental Toxicant

Table 1 - Various environmental toxicants and its half line [1]

Sr. No	Toxicant	Half life	Media
1	DDT (Dichloro diphenyl trichloroethane)	10 year	Soil
2	TCDD (Tetrachloro dibenzodioxin)	9 year	Soil
3	Atrazine	25months	Soil
4	Benzoperylene (PAH)	14 months	Soil
5	Phenanthrene (PAH)	138 days	Soil
6	Carbofuran	45 days	Water

7. Sulfur dioxide (SO_2), carbon monoxide (CO), Nitrogen oxides (NOx)

8. Offensive odors:- [2,3] Malodors are environment due to H2S released from pulp mills and

Oil refineries, some chemical plants, food processing plants, phosphate fertilizer and iron and metal smelters

9. Outdoor air pollution: - In urban areas, role is unclear, but is small compared to smoking. Air pollution from fossil fuel combustion is associated with decrement in lung function. [4]

BIOACCUMULATION: - Bioaccumulation is defined as the process by which organisms accumulate chemicals both directly from the abiotic environment (i.e. water, air, soil) and from dietary sources (tropic transfer). Bioaccumulation potential of chemicals is positively correlated with lipid solubility (lipophilicity). [5]

Hazards of Environmental Toxicant

CHRONIC Hazards:- [6]

Chronic intoxication is more common than acute episodes of poisoning.

1) A prolonged exposure to air pollutants such as NO2 and O3, for instance, may lead to chronic bronchitis and emphysema.

2) The combination of SO2 and smoke pollution is thought to have synergistic effects with cigarette smoking, causing degenerative diseases.

3) Inhalation of toxic materials, such as arsenic, asbestos, chromium, soot, mustard gas, and radon, under occupational conditions may cause lung cancer.

4) NO2 and O3 were strongly associated with hospital deaths from cardiovascular and respiratory diseases.

Ayurvedic Aspect of air pollutant *(Rajo-Dhuma*) as a causative factor of Respiratory Disease

Sr. No	Disease	*Charka*	*Shusruta*	*Vagbhata*
1.	*Shawas* [7-9]	+	+	+
2.	*Hikka* [7-9]	+	+	+
3.	*Kasa* [10]	-	+	-
4.	*Pratishyaya* [11]	-	+	-

Pathogenesis in respiratory tract due to Air Pollutant:-

Toxic air pollutant in the form of dust and smoke enter in the respiratory tract by means of nostrils during inspiration. These pollutants get deposited on the respiratory mucosa including nasal mucosa, bronchial mucosa. The people who have sensitive mucosa to the pollutant cause mucosal extra secretion within the tract. Thus this vitiated *kapha* (extra mucosal secretion along with dust) obstruct to the air entry and exit of air means *vata* which produces *shawas* (Allergic bronchitis and Emphysema).

Clinical Diagnosis of Lung Cancer: - All patients with a likely diagnosis of lung cancer should be referred to a member of a lung cancer MDT (usually a chest physician) within one week, preferably with a recent CXR (NICE 2005/CG27).

Urgent requests for a CXR should be made when a patient presents with: - haemoptysis (occurring on more than one occasion and of recent onset, or with clots), OR with persistent or worsening signs and symptoms including dyspnoea, cough, weight loss, chest/ shoulder/ arm pain (non-cardiac and unexplained), hoarseness, finger clubbing, lymphadenopathy.

Chronic Obstructive Pulmonary Disease (COPD): [12]

There are so many causes of COPD but mainly are Emphysema and chronic bronchitis.

Emphysema- Emphysema is characterized by enlargement of the airspaces distal to the terminal bronchioles, either from dilatation or destruction of their walls.

Chronic bronchitis- It is clinically defined as chronic cough with expectoration for three months for two consecutive years, with other known causes being ruled out.

Clinical Diagnosis of COPD -

- Breathlessness- For patients, breathlessness (dyspnoea) is often the most concerning symptom of COPD. It is progressive and persistent and is usually worse with physical exertion. As the disease progresses, breathlessness becomes more problematic.
- Chronic cough- Chronic cough is one of the earliest symptoms of COPD. Cough can be productive or unproductive and initially occurs intermittently, becoming more frequent as the disease progresses.
- Sputum- Regular production of sputum in three or more months over two consecutive years defines the presence of chronic bronchitis.
- Other Symptoms- Wheeze and chest tightness can occur any stage of COPD, but usually occurs in severe COPD. More frequent "winter colds" or "winter bronchitis" and fatigue are also common among those with COPD.

Radiological Diagnosis of Emphysema and Chronic Bronchitis:- [13]

- Spirometry- Spirometry shows presence of post bronchodilator FEV_1 / FVC < 0.7 confirms the presence of persistent airflow limitation and thus of COPD.
- Arterial Blood Gas- in Emphysema Abg shows retention of CO_2 due to metabolic acidosis.
- X- Ray chest- In case of Emphysema and chronic bronchitis X-ray PA view may shows hyper translucency of lung fields, widened intercostals spaces, low flat diaphragm, increased retrosternal translucency, large hilar shadow and HRCT Chest is currently the definitive test to diagnose emphysema.

Prevention of Environmental toxicity

Social Prevention- [14] The control of air pollution is ultimately an engineering problem. The WHO has recommended the following procedures for the prevention and control of air pollution:

(a) Containment: - That is, prevention of escape of toxic substances into the ambient air. Containment can be achieved by a variety of engineering methods such as enclosure, ventilation and air cleaning.

(b) Replacement: - That is, replacing a technological process causing air pollution, by a new process that does not. Increased use of electricity, natural gas and central heating in place of coal has greatly helped in smoke reduction.
(c) Dilution: - Dilution is valid so long as it is within the self cleaning capacity of the environment. For example, some air pollutants are readily removed by vegetation.
(d) Legislation: - Air pollution is controlled in many countries by suitable legislation, e.g., Clean Air Acts.
(e) International action:- To deal with air pollution on a worldwide scale, the who has established an international network of laboratories for the monitoring
(f) The relatives of the patient of allergic bronchitis should be grow the green leafy plants in their balcony's and so that the dust should be avoided come in the room and patients will get plenty of oxygen which is required.

Personal prevention-

Prevention of the disease and management the main principle of ayurveda. The environmental toxicant induce respiratory disease can be prevented *Aacharya Charka* has status *Nidan Parivarjan* for the prevention of any disease. Hence it will be better if patient of allergic Bronchitis has being transferred from the environmental pollutant area to the fresh area where the fresh oxygen will be available pollutant free but practically it is not possible follow this guideline for the each and every person.

- The patient should be avoiding to goes that places where the pollutions is maximum.
- Mask- Patient whenever goes out he must use the mask.
- If patient is economical strong than he should use air filter mask when goes out.

Management of Environmental Toxicant induces Respiratory Disease according Ayurveda

Ayurveda treatment is beneficial for cases of chronic exposure of environmental toxicity.

1 *Samsodhan chikitsa*:- To remove the accumulated environment toxicant and its metabolite from human body the induced emesis should be done as most of the environment air pollution causes injury to *kapha sthan* means *pran-vaha srotas*.

Induced emesis- The induced emesis should be underwent in three phases *purva karma, pradhan* and *paschat karma*.

a) *Purva karma*- In *purva karma snehan* with *vasadi ghrit* [15] will be given in increasing order as 15 ml, 100 ml, 150 ml, 200 ml, every morning till the clinical features will be well appeared. *Peti swedan* should be given in the morning at the day of induced emesis.

It should be done as per schedule describe in text.

b) *Pradhan karma*- After *samyak snehan* of a patient the *vamak yoga* (emitting drugs) prepared from 1 parts of fruit juice of *Lagenaria siceraria* and 3 parts of *kshira* should be given early in the morning as per protocol and observed the *vamana vega* an any adverse effect. [16]

c) *Paschat karma- Dhooppaan* and *sansarjan karma* as per schedule.

2. *Sansmna chikitsa:-*

a) Sanshaman Chikitsa-

In case of Chronic Allergic Rhinitis, combinations of *Nardiya Laxmi vilas ras* [17] 125mg, *Sitopaladi churna* [18] *2gm, Yastimadhu churna* [19] *2gm and tankan bhasma* [20] 250mg should be given with honey 3 to 4 times of a day in chronic rhinitis.

In case of Chronic Allergic Bronchitis the *Laxmivilas ras* will be replaced with *shwas kuthar ras* [21] from above combination.

b) *Srotagat chikitsa-*

Chitrak Haritaki Avaleha [22] 10gm should be given in twice a day along with medicated milk prepared from 2gm turmeric powder and 1 gm zinger powder. *Vasa avaleha* [23] also helpful to pacify to vitiated kapha of pranvaha and anavaha srotas both.

c) *Nasya* therapy-

Nasya of *Shadbindu tail* [24] should be given after gentle massage with warm mustard oil followed by local *swedan* by warm cotton cloth on and near nasal area daily.

DISCUSSION & CONCLUSION

The increased level of air pollution and its causative toxicant in environment is burning problem all over world including India as five big cities including Delhi, has been placed in first ten most polluted cities of the world. [25] It is a danger signal for India and need to find out the solutions.

Ayurveda is an ancient science and causative factor (*hetu)* and pathogenesis (*samprapti),* principle of prevention and management has been well described in Ayurveda . In *Ayurveda raja- dhooma* has been described as a causative factor of respiratory disease including *shawas, hikka, kasa* and *pratishaya*. Modern science has added the current chemical in the form of gases like DDT, TCDD, Atrazine, Benzoperylene and Carbofuran which also play a major role in environmental toxicant induces respiratory disease. According to Ayurveda all these causative toxicant causes irritations and inflammations to respiratory tract (*pran-vaha srotas*) due to it respiratory mucosa produces extra mucosal secretion. These extra mucosal secretions along with dust obstruct the air entry and causes COPD (Chronic obstructive pulmonary disease). Diagnosis of environmental toxicant induces respiratory disease is based on history of frequent exposure of air toxicant, clinical manifestation like breathlessness, chronic cough with sputum and radiological hyper translucency of long field in X-ray chest.

Ayurveda is based on principle of prevention and treatment of disease as prevention is better than cure, the social prevention based on community and personal prevention based on diseased person is needed to free from such type of big problem.

The Containment, replacement, Dilution, Legislation, International action and balcony gardens these are some methods to achieve the inhibition of air pollution on community level which may help for prevention of respiratory disease.

Acharya Charaka has recommended the *nidan parivarjan* to break up the entry of causative factors and prevent the diseases. The patients of respiratory diseases avoid leaving or going such places where the pollution is maximum. He should use air filter mask while leaving the home.

The principle of management of *Ayurveda* is based on *Samsodhan Sansmna* and *Sansmna chikitsa.* It is need to *samsodhan chikitsa* best before medication. In environment toxicant induced respiratory disease the *vaman karma* using *vamak yoga* prepared by fruit juice Lagenaria siceraria with milk should be beneficial as this is indicated for *kritrim visha*. *Nardiya laxmi vilas rasa, sitoplaadi, yastimadhu and tankan bhasma g*iven along with honey should be useful to calm down the extra mucosal secretion of upper respiratory tract (vitiated *Kapha)* in case of chronic bronchitis where the vitiated *kapha* has been collected in lower respiratory tract, the *shawas kuthar* should be used with *sitoplaadi, yastimadhu, tankan bhasma* instead of *laxmi vilas rasa*. In case of chronic allergic rhinitis and chronic allergic bronchitis both *laxmivilas rasa* as well as *shawas kuthar* should be given along with *sitoplaadi, yastimadhu* and *tankan bhasma*.

As the *mahasrotas* is one of the root place (*mool sthan*) of *pranvaha* srotas, [26] the *pran-vaha srotas* in either chronic allergic rhinitis or chronic allergic bronchitis or both should be need to normalize it without pacify the vitiated *kapha* within the *mahasrotas*. It is difficult to give complete cures in said disease.

Chitrak haritaki avaleha given with medicated milk, prepared from turmeric and zinger should be beneficial and help to normalized the vitiated *annavaha srotas* which the root places of *pran-vaha srotas. Vasa avaleha* also helpful to pacify to vitiated *kapha* of *pranvaha* and *annavaha srotas* both. Hence, it should be given in bronchitis.

As environmental toxicant causes irritations and inflammations to the only such patients who have a sensitive respiratory mucosa, it is need to develop the more immunity and non sensitive mucosa of such person to fight the irritation and inflammation of environmental toxicant to avoid recurrence of allergic respiratory disease. The *Nasya* therapy by *shandbindu* oil after given with gentle massage of warm mustard oil and local *swedan* by warm cotton clothes should be help to develop the special strength and immunity of respiratory mucosa.

Thus preventative method, *Samsodhan, Sansmna chikitsa, srotogat chikitsa and nasya therapy* may give relief from environmental toxicant induces respiratory diseases.

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