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POLLUTION & RESPIRATORY TRACT PROBLEMS

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ABSTRACT

Air pollution has many negative effects on health of people, especially on children. It is the major environment related health threat to children. Exposure to pollutants and specially air pollutants increases a risk to human health and may lead to death. In today's era use of tobacco, smoking is very trendy in youngsters which is a major cause of respiratory infections. In this fast life people are not understanding about importance of being healthy. Money minded people are shifting towards big cities for jobs which is a major cause of increase in population, that basically decreases open area to get fresh air. In poorly ventilated dwellings, indoor smoke increases 100 times higher than acceptable levels for small particles. In this article we will discuss about pollution and some respiratory tract issues and their prevention.

KEYWORDS: Air pollution, tobacco, respiratory tract.

INTRODUCTION

Pollution is the introduction of contaminants into the natural environment that cause adverse changes[1] and can take form of chemical substances or energy, such as noise heat or light. A pollutant is a substance introduced into environment that has undesired effects. Globally, seven million deaths were attributable to the joint effects of household and ambient air pollution. According to WHO report in 2008, 1.3 million deaths were estimated. Then 3.7 million in 2012 were recorded. In 2015, pollution killed 9 million people in the world.[2]

Pollution is often classified as

1. Point source, i.e; a single identifiable source of air, water, thermal, noise or light pollution. It negligible extent. It includes air pollution, water pollution, noise pollution, radio pollution.
2. Non point source, results from land run off, precipitation, atmospheric deposition, drainage, sewage, or hydrological modification where tracing the pollution back to a single source is difficult.[3]

Pollution causes epidemic diseases such as whooping cough occurs in spring, influenza common cold and other infections of upper respiratory tract such as sore throat, occurs predominantly in the winters.

Ayurvedic aspect of Pollution

As pollution causes epidemic diseases and this word epidemic is correlated with *janpadodhwansh* in *ayurveda*. *Acharya charak* has described clearly, that due to pollution of air, water, soil and time, population of that particular area gets infected with several diseases.

Acharya Charak described air pollution as excessive cold air, excessive hot air, too much dried or too much humid air, smelly air, vaporized air, sand mixed air, and fast moving air, all these causes air pollution related diseases and infections.

All these four *bhav*, i.e; *vaat, jal, desh,* and *kala*, when get polluted creates *Janpadodhwansh*.

According to *Ayurveda*, basic reason for increasing these pollution is *adharma*, *pragyaparadha*, i.e; population of any particular area loose their interest in cleaning their environment. Due to which in long run environment gets polluted and climate changes its normal activity due to that, monsoon, summers and winters do not come on their normal time and destruction of crops occurs and air, water, soil, pollution increases different diseases and infections.

TREATMENT OF EPIDEMIOLOGY IN AYURVEDA

Acharya charak has described, if a person is administered proper medicaments, then he will not suffer from the disease even while all these four vitiated factors ending with seasons are at work. *Acharya* has described about five elimination therapies, i.e; emesis, purgation, *asthapan, anuvasana* and *sirovirechana,* are best.

Some therapies are described by *acharya charak*, which if adopted during epidemics can easily save the lives of individuals, such as charity, sacrifices, adoption of preventive measures, tranquility, observance of *brahmacarya*.

AIR POLLUTION

It is mixture of particulate matter and gases into atmosphere by industries, motor vehicles and thermoelectric power plants as well as biomas and fossil fuel burning. Air pollution can induce the acute exacerbation of COPD (chronic obstructive pulmonary disease), and onset of asthma, increase the respiratory morbidity and mortality.

AIR POLLUTANTS

1. Chemical pollutants - such as dust, smoke, soot, sand, CO, CO2, Arsenic, Bereylium, Zinc, lead.
2. Biological pollutants – Pathogens.

EFFECT OF SUNLIGHT AND TEMPERATURE INVERSION

Degree of pollution is influenced by atmospheric temperature humidity, atmospheric pressure and air movements. Pollutants are affected by sunlight and temperature inversion. The UV rays of the sun act on the oxides of nitrogen and other hydrocarbons and form photo oxidants, which are irritant to conjunctiva, nose, throat, and respiratory mucosa membrane. Temperature rises with increase in altitude. The normal upward movement of air is impeded. Pollutants become locked up and their concentration rises deeply. Temperature inversion often persists for several days, resulting in acute episodes of respiratory illness, suffocation and death.[4] While inhaling dirty air, we bring pollutants deep into our lungs., which causes severe damage to the respiratory tract.[5] Both adults & children are effected with the harsh effects of pollution. But children are particularly susceptible. They breathe through nose including their mouths, by passing the filtering effects of nasal passage and allowing pollutants to travel deeper into the lungs. Children have large lung surface area than adults and inhale more polluted air.

HISTORY

Pollution has been started since the creation of first fires in prehistoric times by man. Air pollution is a constant problem throughout the world, due to man's own activities. Air pollution is not only a public health problem but also an economic problem. Findings of "soot", (mass of impure carbon particles resulting from the incomplete combustion of

hydrocarbons), on ceilings of pre historic caves, provides evidences of pollution due to inadequate ventilations.

RESPIRATORY DISEASES

Respiratory disease is a medical term that encompasses pathological conditions affecting the organs and tissues that make gas exchange possible in higher organisms, and includes conditions of upper respiratory tract, trachea, bronchi, bronchioles, alveoli, pleura and pleural cavity. Respiratory diseases ranges from mild and self limiting such as common cold, to life threatening entities like bacterial pneumonia, pulmonary embolism, acute asthma and lung cancer.[6]

Respiratory diseases may be classified as;

1. Chronic respiratory diseases
2. Restrictive lung diseases
3. Respiratory tract infections

CHRONIC RESPIRATORY DISEASES (CRD)

These are the diseases of the airways and other structures of lungs, characterized by high inflammatory cell recruitment. Such as Asthma. Exposure to air pollution is associated with an increase in respiratory morbidity from CRD. Smoking is recognized as the most important factor for the development of CRD. Indoor biomass burning is a significant cause of CRD in non smoking women, who are exposed to high concentrations of pollutants during cooking activities, especially in rural areas of developing countries. While women with CRD caused by smoking have emphysema and goblet cell metaplasia.

A study conducted in Denmark followed 57,053 individuals between 1993 & 2004 and showed that, 1,786 develop CRD. Between 2001 & 2003 a study in city of Sao Paulo, Brazil evaluated 1,769 patients over 40 yrs of age showed CRD associated with increase in air concentrations of PM10 and SO2.

Mordern aspect of ASTHMA

It is a chronic, intermittent, inflammatory disease of the airways characterized by episodes of wheezing, coughing, breathlessness and chest tightness. There is expiratory dyspnoea. It is thought to be caused by a combination of genetic and environmental factors. In 2015, 358

million people globally had asthma, up from 183 million in 1990. About 3,97,100 deaths were recorded in 2015.[7]

Ayurvedic aspect of ASTHMA

According to *Ayurveda*, asthma is correlated to *swas roga*. This is very important disease of the respiratory system. According to *Acharya Charak*, it is considered as a serious and fatal disease.[9]

Acharya charak has described that when *kapha* involves with *kupit vaat* and acts as a barrier for *pranvaha, annahavah* & *udakvah srotas*, then this *vayu* moves around different *srotas* of body and develops *swas roga*.

In *ayurveda* 5 types of *swaas roga* are described.

1. *Maha swaas*
2. *Urdhva swaas*
3. *Chhinna swaas*
4. *Tamak swaas*
5. *Chhudra swaas*

Symptoms may include, distention of abdomen, chest pain, cardinal pain, muscular pain.[9]

Treatment according to Ayurveda

1. First of all patient should avoid all reasons that aggravate *swaas roga*, i.e; Prevention.
2. Apply *saindhav lavan* with *til tail* on chest and *nadisweda, prastar sweda* or *sankar sweda* with *snigdha dravyas* should be done.

Different medicines such as, *swaskuthar ras, talishadi churna, kanakasav, marichyadi vati, haridrakhand, panchsakar churna, vasadi kwath, kooshmand churna* etc. has a brilliant effect over *swas roga*.

RESTRICTIVE LUNG DISEASES

This is a category of respiratory disease characterized by a loss of lung compliances, causing incomplete lung expansion and increased lung stiffness, such as in infants with respiratory distress syndrome. 1% of new born infants die due to this syndrome.

RESPIRATORY TRACT INFECTIONS

These are divided into two parts:

1. Upper respiratory tract (URT) infections
2. Lower respiratory tract (LRT) infections

Upper respiratory Tract Infections

Most common infection is cough, common cold, and sinusitis.

Modern aspect of Cough and common cold

It is a viral infectious disease of URT, primarily affects nose[10] and throat. Signs and symptoms may include coughing, sore throat, runny nose, sneezing, headache and fever.

Cough is a sudden, explosive, often repetitive expiration, which helps to clear the tracheo bronchial tree of secretions and foreign material. It may be initiated either voluntarily or reflexively. The cough starts with a deep inspiration followed by glottis closure, relaxation of the diaphragm and muscle contraction against a closed glottis. Cough can be initiated by a variety of irritant triggers from an exogenous source smoke, dust, fumes, foreign bodies.

Ayurvedic aspect of Cough

Cough can be correlated with *kasa roga*. This is of two types- Dry cough and productive cough. In *ayurveda* it is defined as disease in which vitiated *vata* comes out from mouth traveling through *shirasth srotas*.

Causes are described as, dust, smoke, smog, *raja*, *dhooma*, exercise, and when food goes in opposite direction.

Different types of *Kasa roga* are described as:

1. *Vatik kasa*
2. *Paittik kasa*
3. *Kaphaj kasa*
4. *Kshtaj kasa*
5. *Kshayaj kasa*

Signs and symptoms may include itching in throat, discomfort in swallowing food bolus, agnisada.

पूर्वरूपं भवेतेषां शूकपूर्णगलास्यता। कण्ठे कण्डूश्च भोज्यनामवरोधश्च जायते।।(च.चि.- 18.5)

भविष्यतस्तस्यतु कण्ठकण्डूर्भोज्योपरोधो गलतालुलेपः। स्वशब्दवैषम्यमरोचकोऽग्रिसादश्च लिङ्गानि भवन्त्यमूनि।।

(सु.उ.त.- 52.7)

Treatment according to Ayurveda

Acharya charak has given a very specific treatment for *kasa rog*,

रुक्षस्यानिलजंकासमादौस्नेहैरुपाचरेत्। सर्पिभिर्तस्तिभिःपेयायूषक्षईररसादिभिः।।

वातघ्नसिद्धैः स्नेहाधैधूमैर्लहैश्चयुक्तितः। अक्यगै परिषैकश्च स्निग्धैःस्वैदैश्च बुद्धइमान्।।

वस्तिकिर्बद्धविड्वातंशुष्कोर्ध्व चोर्ध्वभक्तिकैः घृतेः सपितं सकफं जयेत् स्नेहविरेचनैः।। (च.चि.- 18.32-34)

Some medicines like, *chandramrit ras, lakshmi vilas ras, lavangadi vati, marichyadi vati, vyoshadi vati, vasadi vati, sitopladi churna, kanakasav, kantkari ghrit, pippalyadi ghrit, chitrakadi leh*, play a very magical role in treating *kasa roga*.

Lower respiratory tract infections

Acute lower respiratory tract infection is leading cause of death in children upto 5 years of age. In a study conducted between 2003 and 2005 in Canada, they investigated long term exposure to NO2, PM2.5, and SO2, and the risk of hospitalization for pneumonia. Another study in USA showed that 10ug/m3 increase in PM2.5 concentrations was associated with a 20% increase in the risk of death from pneumonia and influenza in non smokers. Most common LRT infections are pneumonia and tuberculosis. Poor oral care may be a contributing factor to LRT diseases.

Modern aspect of tuberculosis

It is an infectious disease usually caused by the bacteria, *mycobacterium tuberculosis*, Tuberculosis is spread through the air when people who have active TB in their lungs cough, spit, speak, or sneeze.[11]

RISK FACTORS

Tuberculosis is linked to both over crowding and malnutrition, making it one of the principal disease of poverty. Chronic lung disease is another significant risk factor. Silicosis increases the risk about 30 times. Those who smoke cigrattes have nearly twice the risk of TB compared to non smokers.

Ayurvedic Aspect of Tuberculosis

In *ayurveda* it is called as *rajyakshma,* means disease of King.

यस्मात् सराज्ञः प्रागासीद्राजयक्ष्मा ततो मतः। (च.चि.- 8.11)

Each and every symptom of this disease acts itself as a complete disease, therefore, it is called as "*Roga samuh".*

राजयक्ष्मा रोगसमूहानां। (च.सू.- 25.40)

Different *Acharayas* in *ayurveda* has told four basic causes of tuberculosis on basis of which it is divided into four different types. It is described as communicable disease. Different *acharyas* accept smoking as a cause of developing tuberculosis. Polluted air makes lungs unable to work properly and they easily gets infected with *mycobacterium tuberculosis,*which deveploes the disease in body.

वेगरोधात् क्षयाच्चैव साहसाद्विषमाशनात्। त्रिदोषो जयते यक्ष्मागदोहेतुचतुष्टयात्।। (मा.नि.- 10.1)

कुष्ठं ज्वरश्च शोषश्च नेत्राभिष्यन्द एव च। औपसर्गिकरोगाश्च संक्रामन्ति नरान्नरम्।। (सु.नि.- 5.34)

Different *ayurvedic* treatments for tuberculosis has been described in *samhitas.*

Nasya karma in tuberculosis- *Siddha ghrita* with *balamool* and *mulheti*, mixed with *saindhava lavan* should be used for *nasya.*

बलाविदारिगन्धाधैर्विदार्या मधुकेन वा। सिद्धं सलवणं सर्पिर्नशय् स्यात्स्वर्यमुत्तमम्।। (च.चि.- 8.90)

Medicines such as, *sootshekhar ras, rajmrigank ras, swas kuthar ras, mrigshringi bhasm, muktapishti, talisadi churna, sitopladi churna, drakshasav, vasavleh, chyawanprash,* pla a very effective role on tuberculosis.

POLLUTION AND LUNG CANCER

Studies have shown the effect of exposure to pollutants and the development of lung cancer, which is attributed to the direct action of carcinogens present in pollution.

WHO estimated that, in 2008, there were 12.7 million cases of cancer that caused 7.6 million deaths world wide.[2]

EPIDEMIOLOGY

Respiratory disease is common and significant cause of illness and death around world. In The US, approx.1billion "common colds" occur every year.

In 2010, there were approx. 6.8 million emergency department visits for respiratory disorders in the US, for the patients under age of 18.

CONCLUSION

Exposure to pollutants and specially air pollutants increases a risk to human health and may lead to death. People should get awareness counseling to control pollution and how to adopt preventive measures to reduce the effects of indoor and outdoor pollutants. In addition, those who are at risk factors of pollution related diseases should start their treatment as soon as possible. Treatment should be *ayurvedic*, as it is non addictive, and even a healthy way to get rid of diseases without any side effects. Children are more susceptible to respiratory diseases, as they spend their most of time out doors, so they should be at priority level of prevention. The *daiva* (actions during previous life), and *purusakara* (actions of present life), both plays their roles in determination of span of life. One should avoid the over utilization, non utilization and wrong utilization of all regimens. Diseases caused by depletion and dhatus cannot get cured without nourishing therapy and diseases caused by over nourishment cannot be cured without depletion therapy as, *langhana, langhanapacana, dosavasecana*.

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