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Research Article

MALFUNCTIONING OF PULMONARY SYSTEM

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ABSTRACT
Hazardous chemicals escape to the environment by a number of natural and/or anthropogenic activities and may cause adverse effects on human health and the environment. Deteriorating air quality in many large urban centers and its adverse health effects has emerged as a major global issue. Increased combustion of fossil fuels in the last century is responsible for the progressive change in the atmospheric composition. In developing countries like India, the air pollution has grown with the alarming speed. In developed countries the most important indoor air pollutants are radon, asbestos, VOCs, pesticides, heavy metals, mites, moulds and environmental tobacco smoke. In the energy ladder, biomasses fuels namely animal dung, crop residues and wood are the dirtiest fuels. Electricity, which is the most expensive, lies at the top of ladder and also the cleanest fuel. For reducing this, we introduced the mask only for those who are doing house hold jobs and suffering from respiratory problems like asthama or those who are smokers, passive smokers etc. The study is conducted on the basis of candidate's short- and long-term exposures have also been linked with premature mortality and reduced life expectancy. These effects of air pollutants on human health and their mechanism of action are based on exposure duration to indoor air pollutants with the help of PEFR and result shows that indoor air pollutants are responsible for breathing problem.

Keywords: *Human Health, PEFR, VOCs, PAH, Detoxification*

INTRODUCTION
Air pollution has both acute and chronic effects on human health, affecting a number of different systems and organs. It ranges from minor upper respiratory irritation to chronic respiratory and heart disease, lung cancer, acute respiratory infections in children and chronic bronchitis in adults, aggravating pre-existing heart and lung disease, or asthmatic attacks. A variety of air pollutants have known or suspected harmful effects on human health and the environment. In most areas of India and other parts of country, these pollutants are principally the products of combustion from chullah, cigratte smoke, space heating, power generation or from motor vehicle traffic. Pollutants from these sources may not only prove a problem in the immediate vicinity of these sources but can travel long distances. It has been estimated that more than half world's households cook their food on the unprocessed solid fuels that typically release at least 50 times more noxious pollutants than gas. The stoves or *chullahor cow dungs* used for cooking are not energy efficient (WHO and UNEP, 2011). The fuels are not burned completely. The incomplete combustion of biomass releases complex mixture of organic compounds, which include suspended particulate matter, carbon monoxide, poly organic material (POM), poly aromatic hydrocarbons (PAH), formaldehyde, *etc*. The biomass may also contain intrinsic contaminants such as sulphur, trace metals, *etc*. A pollutant released indoors is one thousand times more likely to reach people's lung than a pollutant released outdoors. It has been estimated that about half a million women and children die each year from indoor air pollution in India. In comparison to other countries India has among the largest burden of disease due to the use of dirty household fuels and 28% of all deaths due to indoor air pollution4. Approximately half the world's population and up to90% of rural households in developing countries still rely on unprocessed biomass fuels such as wood, dung and crop residues (Lippman, 2000). A large number of studies of health impact of suspended particulate air pollution have been undertaken in developing countries (EPA, 1986). These studies show remarkable consistency in the relationship observed between changes in daily ambient suspended particulate levels and changes in mortality. Smith8 estimated the health risk from exposure to particulate air pollution by applying the mean risk per unit

ambient concentrations based on the results of some urban epidemiological studies (WHO, 1998; Lippman, 1989). Therefore we can see in humans pollutants can affect the skin, eyes and other body systems; they affect primarily the respiratory system. Air is breathed in through the nose, which acts as the primary filtering system of the body. The small hairs and the warm, humid conditions in the nose effectively remove the larger pollutant particles. The air then passes through the pharynx, esophagus, and larynx before reaching the top of the trachea. The trachea divides into two parts, the left and the right bronchi. Each bronchi subdivides into increasingly smaller compartments. The smallest compartments of the bronchi are called bronchioles, which contain millions of air sacs called alveoli. Together, the bronchioles and alveoli make up the lungs.

Both gaseous and particulate air pollutants can have negative effects on the lungs. Solid particles can settle on the walls of the trachea, bronchi, and bronchioles. Most of these particles are removed from the lungs through the cleansing (sweeping) action of "cilia", small hair like outgrowths of cells, located on the walls of the lungs. This is what occurs when you cough or sneeze.

A cough or sneeze transports the particles to the mouth. The particles are removed subsequently from the body when they are swallowed or expelled. However, extremely small particles may reach the alveoli, where it takes weeks, months, or even years for the body to remove the particles. Gaseous air pollutants may also affect the function of the lungs by slowing the action of the cilia. Continuous breathing of polluted air can slow the normal cleansing action of the lungs and result in more particles reaching the lower portions of the lung.

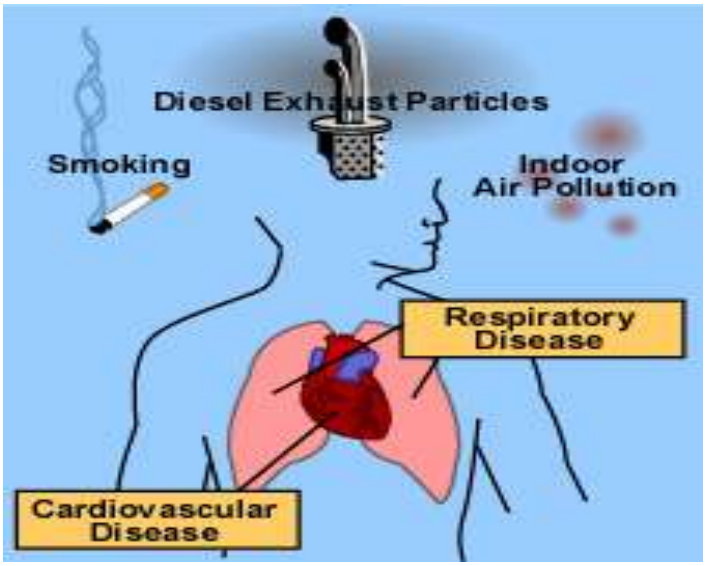

Figure1: Human respiratory system

The lungs are the organs responsible for absorbing oxygen from the air and removing carbon dioxide from the blood-stream. Damage to the lungs from air pollution can inhibit this process and contribute to the occurrence of respiratory diseases such as asthama, bronchitis, emphysema, and cancer. This can also put an additional burden on the heart and circulatory system. Human health effects associated with indoor air pollution are: headaches, tiredness, dizziness, nausea, and throat irritation. More serious effects include cancer and exacerbation of chronic respiratory diseases, such as asthma. Radon is estimated to be the second leading cause of lung cancer in the U.S. Environmental tobacco smoke causes eye, nose and throat irritation, and is a carcinogen. Asthma, particularly in children, is associated with poor indoor air quality. The most common sources of air pollution include particulate matter, ozone, nitrogen dioxide, and sulfur dioxide. Both indoor and outdoor air pollution have caused approximately 3.3 million deaths worldwide. Children aged less than five years that live in developing countries are the most vulnerable population in terms of total deaths attributable to indoor and outdoor air pollution.

MATERIALS AND METHODS

Randomly we have selected 200 test subjects. Some of them are suffering from asthama and few of them are passive smokers from all over the out skirt area. We persued to use the mask while cooking for 15, 30, 45 and 60 days on an average. We have divided the group according to their exposure time period that may be 4-5 hours. A survey pro -forma containing personal details eg. Physical, clinical, pre and post lung function status, etc. For knowing the lung status we were using PEFR (peak expiratory flow rate) instrument. By that we can easily calculate the capacity of lung (Lippman, 2000).

Figure 2: Peak expiratory flow gauge

Figure 3: Testing of lung status

RESULTS AND DISCUSSION

PEFR Table For those candidates suffering from smoking and few of them are non smoking:

Table1: PEFR VALUES

Days	Exposed for 4-5hrs(145)				Exposed for 6-8hrs(55)			
	Non smokers(83)		smokers(62)		Nonsmokers(25)		smokers(30)	
0	325	40.4	307	46.4	264	48.2	245.8	26.90
15	340	56.5	307.24	46.3	268.6	51.9	250.3	27.00
30	327	64.1	323.90	41.9	273.6	50.7	254.1	25.00
45	330	42.4	324.70	44.5	277.4	49.2	259.3	24.20
60	327.6	39.2	309.80	46.1	285.5	48.5	260.7	24.52

Discussion

It is pertinent to mention here that the study was conducted for a test period of 15 days but was further extended for 30, 45 and 60 days as most of the exposed subjects felt comfortable after using mask for 15 days. The recording of the PEFR values of each test subjects at day 0,15,30,45 and 60 using Peak Flow Gauge M400 4K.The symptomatic exposed for 4-5hrs group of subjects exhibited in the lung function status as compared to expose for 6-8 hrs as well as asymptomatic group of subjects.

We are seeing that those who were using this pollution mask while doing work their lung status is improving. It's a slight difference in the reading of PEFR values especially those who were smokers. Air pollutants that are inhaled have serious impact on human health affecting the lungs and the respiratory system; they are also taken up by the blood and pumped all round the body. These pollutants are also deposited on soil, plants, and in the water, further contributing to human exposure. There is utmost requirement to collect better and systematic information about actual exposure levels experienced by households in different districts and climatic zones and develop a model for predicting the exposure levels based on fuel use and other household data therein (exposure at last) to protect the health of children, women and elderly persons.

Still our work is continuing for the betterment of common public and we are trying to improve the quality of pollution mask by applying chemical.

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