

An Overview on Health Effects of Asbestos Exposure in Humans and Disposal Technique of Asbestos

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Abstract - The aim is to be aware of the harmful effects on the body due to asbestos which is used in different construction materials. Asbestos is widely used by humans in a variety of products, and exposures are likely from a number of sources. Extensive data are available on current production, import, and use of asbestos. Asbestos fibers are non-volatile and insoluble, so their natural tendency is to settle out of air and water, and deposit in soil or sediment. Many industries and researchers interested in studying the health effects of asbestos in exposed workers maintain registries of individuals who were exposed to asbestos on the job.

The results of an overview of studies on asbestos exposure cause respiratory and non-respiratory cancers.

Index Terms - Asbestos, Chrysotile, asbestosis, mesothelioma

I. INTRODUCTION

Asbestos is the name given to a group of six different fibrous minerals (amosite, chrysotile, crocidolite, and the fibrous varieties of tremolite, actinolite, and anthophyllite) that occur naturally in the environment. One of these, namely chrysotile, belongs to the serpentine family of minerals, while all of the others belong to the amphibole family. Although asbestos is neither volatile nor soluble, small fibers or clumps of fibers may occur in suspension in both air and water. These fibers are very stable and do not undergo significant degradation in the environment. Large fibers are removed from air and water by gravitational settling at a rate dependent upon their size, but small fibers may remain suspended for long periods of time. Amphibole asbestos fibers are generally brittle and often have a rod- or needle-like shape, whereas chrysotile asbestos fibers are flexible and curved. Asbestos fibers are minerals with exceptional physical and chemical properties. They do not burn; they are remarkably resistant to diverse chemical attacks, depending on the asbestos type, and they show a heightened mechanical tensile strength. They are good thermal and electrical insulators. These properties have led to the development of the use of asbestos fibers in multiple forms for manufacturing numerous widely-consumed industrial products and in the construction of buildings materials, friction products, and heat-resistant fabrics. Asbestos fibers do not have any detectable odor or taste. They do not dissolve in water or evaporate and are resistant to heat, fire, chemical and biological degradation. However, pieces of fibers can enter the air and water from the weathering of natural deposits and the wearing down of manufactured asbestos products. Small diameter fibers and fiber-containing particles may remain suspended in the air for a long time and be carried long distances by wind or water currents but they are not able to move through the soil. They are generally not broken down to other compounds in the environment and will remain virtually unchanged over long periods. However, the most common

form of asbestos, chrysotile, may have some minor mineral loss in acidic environments.

Asbestos has been widely used in construction materials and for a number of purposes including fireproofing, thermal insulation, electrical insulation, sound insulation, decorative plasters, roofing products, flooring products, heat resistant materials, gaskets, chemical resistance etc. Chrysotile and amphibole fibers also have been widely used in the fabrication of papers, flooring and roofing products, pipeline wrapping, electrical insulation and textiles, comprising yarn, thread, cloth, tape, or rope. They were also used in thermal and electrical insulation and friction products in brakes or clutch pads, filters in food or pharmaceutical preparation.

Asbestos-containing material had been disturbing the asbestos material, might release asbestos fibers into the air. Therefore, workers involved in demolition work or asbestos abatement, as well as in building maintenance and repair, are potentially exposed to higher levels of asbestos. Older buildings may contain asbestos-containing materials, which had been used for insulation, surface treatment, floor and ceiling tiles, insulating boards, and spackling, patching, and plastering compounds and asbestos levels are generally higher in indoor air than outdoors. However, exposure appears to be low regardless of whether the buildings do not contain asbestos-containing materials, contain asbestos-containing materials in good condition, or contain damaged asbestos-containing materials [1].

Asbestos is released to water from a number of sources, including erosion of natural deposits and waste piles, corrosion from asbestos-cement pipes, and disintegration of asbestos roofing materials with subsequent transport via rainwater into cisterns, sewers, etc.[2]. Sources of asbestos in drinking water may be a result of natural deposits from releases due to the use of asbestos-cement pipes in water distribution systems. The people most likely to have high exposure to asbestos are workers who come into contact with asbestos while on the job, measured or calculated with reference to an eight-hour period

as an average. The exposure limit value for all types of asbestos is 0.1 fibres per cubic centimetre of air (equivalent to 100 fibres per litre of air). This exposure limit value is not a 'safe threshold'. It is calculated that lung cancer mortality through forty-five years of exposure to 0.1 fibres per cm³ would amount to five additional deaths per thousand exposed people. This is roughly equivalent to an occupational risk level of 4 x10-3[5]. This includes people involved in the mining of asbestos and asbestos containing minerals and manufacture of asbestos-containing products, and also people who install, service, remove, or use these products. The presence of asbestos form minerals is widespread in mining areas, and people employed in the mining and processing of other ores may therefore be exposed to asbestos [3]. Workers engaged in the demolition of buildings with asbestos-containing materials are also potentially exposed.

Releases to the environment may occur either to air or to soil and water, with releases to air being of greatest health concern. Waste friable asbestos is regulated as a hazardous substance, so disposal is permitted only in authorized waste sites. Methods of handling friable asbestos are prescribed to minimize dust release. However, data are lacking on the amount of asbestos disposed in waste sites, and on the location and status of these sites. Since asbestos fibers may cause harmful health effects in people who are exposed that has to dispose and all new uses of asbestos have to ban in India as per environment protection law.

II. HEALTH RISKS OF ASBESTOS EXPOSURE

All forms of asbestos are hazardous, and all can cause cancer, but amphibole forms of asbestos are considered to be somewhat more hazardous to health than chrysotile. It is now universally agreed that the exposure of human to asbestos fibres can, in certain circumstances, lead to three diseases: asbestosis, lung cancer, and mesothelioma of the pleura or peritoneum. It can certainly also cause a group of benign conditions of the pleura of variable importance, and it may cause a group of other cancers, including cancers of the larynx, gastrointestinal tract, and kidney, and conceivably a wide range of others[4]. When asbestos fibers are breathed in, they may get trapped in the lungs. Figure 1 shows that Asbestos Fibres Lodged in the Lungs.

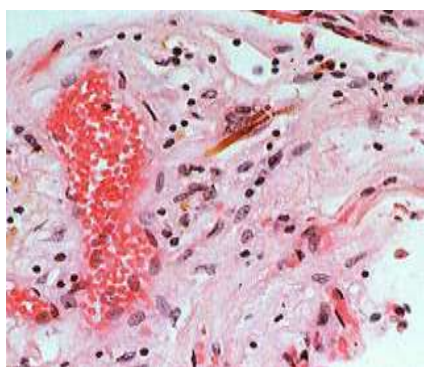


Fig. 1 Asbestos fibers lodged in the lungs. Asbestos-related conditions affect the lungs and surrounding tissues.[5]

Levels of fibers in lung tissue build up over time, but some fibers, particularly chrysotile fibers, can be removed from or

degraded in the lung with time. Chronic exposure to asbestos may increase the risk of lung cancer, mesothelioma, and nonmalignant lung and pleural disorders. Evidence in humans comes from epidemiologic studies as well as numerous studies of workers exposed to asbestos in a variety of occupational settings.

Asbestosis is a serious, progressive, long-term disease of the lungs. Asbestosis is not a cancer. The fibres penetrating deep into the lung can cause scarring of the tissue, which restricts breathing, leading to decreased lung volume and increased resistance in the airways [6]. Inhaling asbestos fibers that irritate and inflame lung tissues as shown in Figure 2, causing the lung tissues to scar. The scarring makes it hard to breathe and difficult for oxygen and carbon dioxide pass through the lungs [7]. Asbestosis generally progresses slowly. The latency period for the onset of asbestosis is typically 10-20 years after the initial exposure. The disease can vary from asymptomatic (no symptoms) to disabling and potentially fatal. Lung cancer is a malignant tumor that invades and obstructs the lung's air passages.

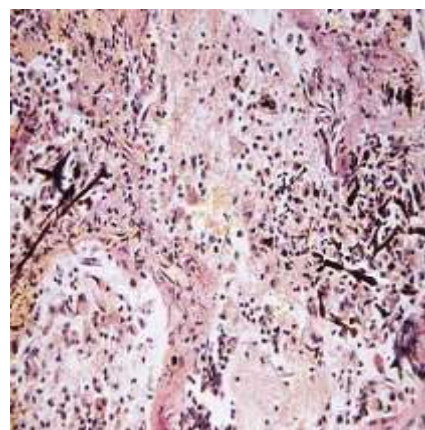


Fig. 2 Microscopic View of Lung Tissue with Asbestosis [5]

Cigarette smoking enormously improves the probability of a man creating lung growth as the consequence of asbestos presentation. The filtering electron micrograph of lung tumor appeared in Figure 3. The most well-known side effects of lung disease are hack, wheezing, unexplained weight reduction, hacking up blood, and worked relaxing. Different side effects of lung growth incorporate shortness of breath, diligent mid-section torment, raspiness, and iron deficiency. Individuals who build up these side effects don't as a matter of course have lung growth; however they ought to counsel a doctor for exhortation. Mesotheliomas are tumors emerging from the dainty layers that line the mid-section (thoracic) and stomach depressions and encompass interior organs are brought on by presentation to asbestos [8]. Some exploration recommends that introduction to asbestos likewise expands the danger of nonrespiratory malignancies. Be that as it may, regardless of a couple contemplates reporting these affiliations; most studies don't demonstrate a steady relationship between asbestos introduction and nonrespiratory growths.

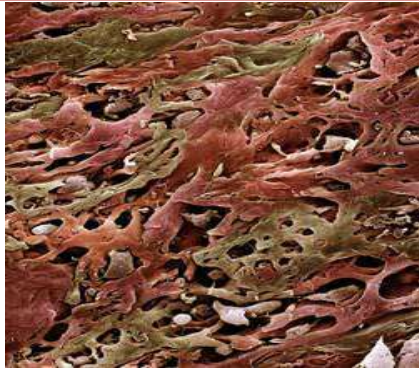


Fig. 3 Scanning Electron Micrograph of Lung Cancer Cells [5]

Although some confirmation recommends that presentation to asbestos additionally builds the danger of nonrespiratory diseases, the proof stays frail, contrasted with that of lung growth and mesothelioma. Persons with huge presentation to asbestos are at danger for creating different sorts of pleural (coating of the lungs) variations from the norm. These variations from the norm incorporate pleural plaques, pleural thickening, pleural calcification, and pleural mesothelioma.

In the development business, it is in these modern parts that are found the best number and most serious wellbeing issues. Consistently presented to a huge number of various fiber sorts, these laborers are currently living with the legacy from the terrible administration of asbestos amphibole fiber. Pro asbestos contractual workers, devastation temporary workers, risky waste administration temporary workers, asbestos investigators and asbestos surveyors are additionally at danger of introduction yet this gathering of laborers ought to have the experience, preparing and abilities to alleviate and control any huge potential for presentation to asbestos fibres[9]. Low levels of asbestos filaments can be measured in pee, defecation, bodily fluid, or lung washings of the overall population. Higher than normal levels of asbestos strands in tissue can affirm presentation however not figure out if you will encounter any wellbeing impacts. An intensive history, physical exam, and indicative tests are expected to assess asbestos-related malady. Mid-section x-beams are the best screening instrument to distinguish lung changes coming about because of asbestos presentation. Lung capacity tests and CAT checks additionally help with the analysis of asbestos-related illness.

III. DISPOSAL OF ASBESTOS

Where compartments of friable asbestos waste are being emptied, the emptying might be done so that no free friable asbestos squander or punctured, broken or spilling holders of friable asbestos waste are landfilled. Any friable asbestos squander that is in a compartment that is punctured, broken or spilling might be twofold packed away, promptly on disclosure, in two six-mil polyethylene sacks. Asbestos waste might be kept just at areas in a landfilling site that have been adjusted with the end goal of getting asbestos squander or are generally reasonable for that reason.

Asbestos waste might be saved at a landfill site just while the keeping is being regulated by the administrator of the site or a man assigned by him for the reason, and the individual overseeing is not likewise working apparatus or the truck included. Where asbestos waste is stored, no less than 25 centimeters of spread material other than refuse must be set quickly over the waste in such a way, to the point that immediate contact with compaction hardware or other gear working on the site is kept away from. The last cover ought to be no less than 125 centimeters thick and may incorporate refuse. The surfaces of vehicles and reusable compartments which have been in direct contact with friable asbestos waste must be completely cleaned preceding leaving the transfer site. Just the base measure of water important to wet the asbestos strands ought to be utilized amid cleaning. Any waste created amid vehicle or compartment cleaning ought to likewise be secured quickly. Each individual straightforwardly or by implication included in the transportation, taking care of or administration of asbestos waste ought to take all safety measures important to keep asbestos strands from getting to be airborne [10].

Prior to a site is utilized for the transfer of asbestos waste, care might be taken to set up that the site is appropriate, and adequate for, the reason. The transfer site picked might have vehicular access to the working face or to a gap or trench burrowed to get the asbestos waste. The waste should, wherever practicable, be kept at the foot of the working face of the landfill site or at the base of a removal burrowed for it. Where the waste must be saved from over the working face, or into a removal, care should be taken to avoid spillage, when stored, all waste other than high thickness waste might be secured to a satisfactory profundity, say 200 to 250 mm, at the earliest opportunity. No asbestos waste other than high thickness waste should be left revealed toward the end of a working day. Last covering of asbestos waste, other than high thickness waste, should be to a base profundity of 2 m. On the off chance that wet waste is kept, it should be secured similarly as dry waste to keep the break of asbestos aust on drying out. Wet pits ought not regularly be utilized for the transfer of any asbestos waste other than high thickness material. Where high thickness waste is deposited on a dry site, care might be taken to guarantee that it is not ground to tidy by the section of vehicles over it. The transfer locales for asbestos waste should be plainly differentiate and open passage might be restricted [11]. More secure options for asbestos containing results of all assortments is progressively accessible in the business sector substitutes for asbestos items are not constrained to items that just supplant asbestos with other material i.e polyvinyl acetic acid derivation and cellulose in fiber bond ridged sheet.

IV. CONCLUSION

Presentation to asbestos filaments must be forestalled, in so far as is sensibly practicable. It is critical to recollect that the length of asbestos contained materials are not harmed or bothered and stay in great condition, the danger of presentation from arrival of strands is negligible and ought not to introduce any risk to the wellbeing of those possessing a building containing such materials. In great condition asbestos

contained materials don't as a matter of course require expulsion yet ought to be surveyed frequently and figured out how to guarantee that their condition does not deteriorate. The accumulation, transport and transfer of asbestos are secured by the procurement of the waste administration go about as corrected.

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