



ASBESTOS EXPOSURE

Gana Shree G, Afreen Khanam A, Dr. Zafar Ali Khan

Presidency University

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ABSTRACT:

It is found that 545 million people in the world had chronic respiratory disease. It is the third leading cause of death, world wide causing 3.23 million deaths in 2019. According to IARC estimates in Columbia, 88 new cases of mesothelioma were diagnosed in 2018, representing 0.1 percent of the total number of new cancer cases with 72 cancer (GLOBOCAN, 2018). The future scenarios as to the mesothelioma incidence in countries, where asbestos has been banned, are discussed. Is asbestos removal the only option?

Introduction:

Asbestos-any of several minerals such as chrysotile that readily separate into long flexible fibres, which cause a disease known as asbestosis. Asbestos has remarkable durability and resistance to properties conserving value in a wide range of products including building and pipe insulation, heat, friction products including fire resistance bricks and break shoes. It has been woven into cloth which is fire proof and incorporated into pipes (cement) used into erosion-resistant cement proofing tiles and for water transport.

History

Some Evidence proves that asbestos was discovered and utilised in Cyprus, as long as 4000 years ago, for lampwicks, hats and shoes, manufacture of cremation cloths. In early 20th century, some of the adverse effects on health by asbestos were found. But it was in 1960's that asbestos-related diseases known as asbestosis, mesothelioma, lung cancer were fully understood. The term salamander to define 'asbestos' was used by *Travels of Marco Polo*. Define 'asbestos' was used by *Travels of Marco Polo*.

Many centuries later Benjamin Franklin also used the term "salamander cotton". In modern times "Linen and salamander" were the two terms used. Indeed, mass producers of the first thermo-resistant mattresses used the trade name "salamandra". Even as late as the 1950s, a well-affirmed occupational specialist Ernst Bader, defined, in his 5th Edition on occupational pathology, this new disease of pneumoconiosis as "Bergflachs-lunge", in which translated form of it means "mountain linen lung. He also described about how asbestos was extracted.

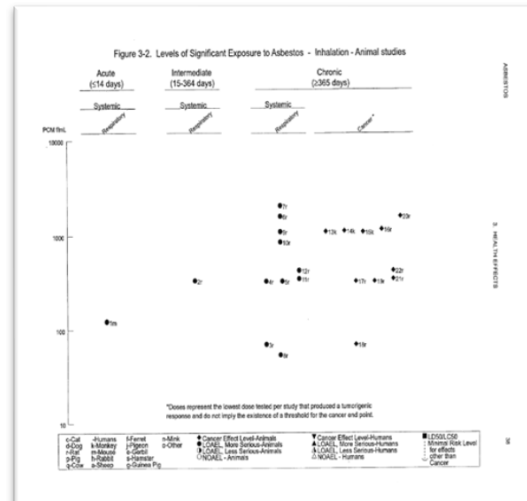
How can asbestos affect my health?

Information on the health effects of asbestos comes mostly from studies of people who were exposed in the past, to levels of asbestos fibers (greater than or equal to 5 µm in length) in workplace air that were as high as 5 million fibres/m³ (5 fibers/mL). Workers might develop a slow build-up to scar-like tissue in lungs and in membrane that surrounds the lungs, if they repeatedly breathe in asbestos fibres with length equal to or greater than 5.1 micrometer. This scar-like tissue does not contract and expand like normal lung tissue, so breathing becomes difficult. Blood flow to the lung may also be decreased, and this causes the enlarging of heart. This disease is known as asbestosis. People with asbestosis often cough accompanied by shortness of breath. This is a serious disease and can eventually lead to death or disability in people exposed to high amounts of asbestos over a long period. However, asbestosis is not much of concern to people who are exposed to low levels of asbestos. Changes in the membrane surrounding the lung, called pleural plaques, are quite common in people who are occupationally exposed to asbestos and are sometimes found in people who are living in areas with high environmental levels of asbestos.

The levels of asbestos in the air that lead to lung disease depends on several factors: 1) for what period you were exposed to asbestos, (2) whether you smoked cigarettes 3) how long it has been since your exposure started. Asbestos exposure and cigarette smoking increase your chances of getting lung cancer. Also, there is a scientific debate which concerns regarding the differences in the extent of disease caused by different fiber sizes and its types. Some of these differences might also arise may be due to the physical and chemical properties of the different asbestos fiber types. It has been determined by Department of Health and Human Services (DHHS) that asbestos is carcinogenic. It has also been determined by EPA that asbestos is a human carcinogen. The International Agency for Research on Cancer (IARC) has reported that asbestos is carcinogenic to humans.

Can asbestos affect children?

Asbestos exposure in both adults and children may occur due to nearer buildings (private or public) containing asbestos building materials or near asbestos-related industrial operations. Or due to breathing in asbestos-containing materials. Usually children breathe differently and they have different lung structures than adults. Children drink more fluids per kilogram of body weight than adults and can also be vulnerable through asbestos-contaminated drinking water. Eating asbestos-contaminated dust and soil is another source of exposure for children. Some children intentionally eat soil, and all young children eat more soil than adults through hand-to-mouth activities. In ancient days, family members have also been exhibited to asbestos that was carried home on the clothing of other family members who worked in asbestos mines or mills. Breathing of asbestos fibers may result in difficulty in breathing, lung cancer, or ASBESTOS 8 1. PUBLIC HEALTH STATEMENT mesothelioma. These diseases generally appear many years following the initial exposure to asbestos and are hence not likely to be seen in children. But since it may take up to 40 or more years for the effects of disclosure to be seen, people who have been exposed to asbestos at a young age may be more likely to become infected to these diseases than those who are originally exposed later in life.



Background and environmental exposures to asbestos in the United states.

Over 99.1% of asbestos which is used in the United State (U.S.) is chrysotile. Because of its low cost and desirable properties like heat and fire resistance, wear and friction characteristics, tensile strength, heat, electrical and sound insulation, adsorption capacity, and resistance to physical and chemical attack, asbestos has been used in large number of applications and types of products. In 1996, asbestos consumed was 7% of what it was in 1981. The 1996 domestic consumption pattern was 48% for roofing products, 28% for friction products (automobile clutch, brake, and transmission components), and 17% for gaskets and packaging. These studies have reported results in a various units, including PCM f/mL (fiber's permL air=fibers per cm³, which is measured by microscopy phase contrast) Definition of a fiber, is critical in these methods. The most widely used definition of a fiber between health professionals is a particle that has a length $\geq 5 \mu\text{m}$ and a length or width ratio of $\geq 3:1$. Although health effects studies and numerous exposure have employed the PCM method for analysis of airborne asbestos concentrations, this method is not capable of detecting fibers smaller in diameter than approximately $0.3\text{-}0.4 \mu\text{m}$ and these thinner fibers may cause a significant health threat. Therefore, comparisons between environmental exposure data and occupational exposures associated with adverse health effects can be most readily made using measurements expressed in terms of PCM. According to study Indoor air concentrations of asbestos is ranged approximately from 10^{-3} to 10^{-4} f/mL in a study of air concentrations measured in a total of 316 U.S. commercial facilities and public.

Is there any medical test to determine whether I have been exposed to asbestos?

The most common test used to determine if we have received continuous exposure to asbestos is a chest X-RAY. A chest X-RAY is used for detecting sustained exposure to asbestos, only in persons who have been sustained to relatively high exposure. A CHEST X-RAY is of no much used for detecting evidence of asbestos in a person whose exposure to asbestos has been transient only brief. The x-ray cannot detect the asbestos fibers itself, but it can detect early signs of lung disease which is caused by asbestos. While other substances other than asbestos can few times produce similar changes in the lungs, this test is usually used for detecting asbestos-related effects produced by long-term exposures at relatively high concentrations of asbestos fibers. tests, such as gallium-67 lung scanning and high-resolution computed tomography, are useful in detecting changes in the lungs. However, currently there no means of detecting asbestos exposure-related effects from commonly encountered environmental exposures.

The reliable test to determine if we have been exposed to asbestos is detection of microscopic asbestos fibers which is present in lung tissue, removed by surgery but this is a very trespassing test. A test can be run to determine the presence of asbestos fibers in material rinsed out of the lung. However, this test can cause some discomfort. Asbestos fibers can also be found in mucus (sputum), faeces, or urine, but these tests are cannot be trusted for determining how much asbestos would be in our lungs. Low levels of asbestos fibers are found in these materials for all people. Higher-than-average

levels can show that we have been exposed to asbestos, but it is not possible to use the results of this test to range how much asbestos you have been exposed to, or to predict whether you will suffer from any health effects.

Minimal risk levels

Inhalation MRLs

No MRLs were obtained for inhalation exposure to asbestos. Results obtained from epidemiological studies of cohorts of workers, who were chronically exposed to airborne asbestos fiber concentrations ranging from 6 to 19 f/mL provided convincing evidence of the development of asbestos eventually induced lung fibrosis, but due to the large degree of uncertainty in extrapolating, a chronic MRL was not derived. From the data available to levels of exposure that might be several orders of magnitude lower than that of current U.S. occupational exposure limits (0.1 f/mL). Data regarding the adverse health effects associated with intermediate or acute duration exposure to asbestos are lacking or are too limited to support the derivation of an MRL.

Oral MRLs

No MRLs were found for oral exposure to asbestos for any duration. No studies were humans who are orally exposed to asbestos

fibers, although asbestos cement pipes have been used in some water community systems for many years. It is because ingested asbestos fibers are poorly absorbed, the tissue most

highly exposed to ingested asbestos is the gastrointestinal tract epithelium. A few studies reported some biochemical or histological changes in gastrointestinal tract cells of rats which were chronically exposed to oral doses of asbestos, but, in an extensive series of dietary lifetime exposure studies in rats and Syrian hamsters, microscopic evaluation of tissues and organs found no excess non-neoplastic lesions in the epithelium of gastrointestinal or in other tissues or organs in animals exposed to daily doses as high as 600–800 mg/kg/day. The weight of evidence shows that asbestos ingestion does not cause any dangerous noncarcinogenic effects in the gastrointestinal tract or other tissues, it supports the generally held ideology that oral exposure to asbestos does not cause a high priority public health concern for non-cancer effects.

Route of exposure- Discussion of health effects.

To help public health professionals and others address the needs of working or persons living hazardous waste sites, the info in this section is organized first by exposure of route (inhalation, oral, and dermal) and then by health effect (systemic, death, neurological, immunological, reproductive, developmental, genotoxic, and carcinogenic effects). These data are discussed in terms of three exposure periods: intermediate (15–364 days), acute (14 days or less) and chronic (365 days or more). The points in the figures showing no-observed-adverse-effect levels (NOAELs) or lowest-observed-adverse-effect levels (LOAELs) reflect the actual doses (levels of exposure) used in the studies. LOAELs have been divided into "serious" or "less serious" effects. "Serious" effects are those ASBESTOS Health effects that evoke failure in a biological system and it leads to mortality or morbidity (e.g., acute respiratory distress or death). "Less serious" effects are those that are not expected to cause death, significant dysfunction or those whose significance to the organism is not clear entirely.

Inhalation Exposure.

Units of Exposure-Consideration of quantitative data on asbestos inhalation studies are strategic by the fact that a number of various methods have been used to measure asbestos levels in air. Presently, the standard method for estimating asbestos concentrations in workplace air employs ASBESTOS 25 3. HEALTH EFFECTS

phase contrast microscopy (PCM). A particle manifest under PCM is counted as a fiber if it is ≥ 5 micrometers (μm) long and has a length/thickness ratio of $\geq 3:1$. Although, the method cannot detect fibers thinner than about 0.3 μm and cannot distinguish between asbestos fibers and other fibers (NIOSH 1987). Nonetheless, because currently available risk factors for asbestos are demonstrated in terms of PCM fibers, all air concentration data in this section are expressed in terms of PCM fibers/milliliter (f/mL) unless noted otherwise. It should be noted, that PCM analytical methods have improved substantially since early asbestos studies were performed, with an increase in numbers of fibers detected.

Overview of Health Effects. Studies in humans and animals indicate that breathing-in of asbestos fibers may lead to fibrotic lung disease (asbestosis), pleural plaques and thickening, and cancer of the lung, the pleura, and the peritoneum. It may also boost the risk of cancer at other sites, but the evidence is not strong. Eminent effects on other tissues have not been detected. A large number of researchers have found that the occurrence of asbestosis and lung cancer correlates with cumulative exposure (that is, the product of concentration [PCM fibers/mL] multiplied by years of exposure). Human risks are expressed below as PCM f-yr/mL. Animal data are rendered in terms of exposure level (PCM f/mL) and duration, and the cumulative exposure can be found simply by computing the product. However, due to dissimilarity in clearance rates and lifespan as well as other differences, cumulative doses in animals are not expected to be directly equivalent to cumulative doses in humans.

CONCLUSION

Recommendation that the federal government should make to protect human health. Regulations can be enforced by law. Federal agencies that develop regulations for toxic substances can include the Environmental Protection Agency (EPA), the Occupational Safety and Health Administration (OSHA), and the Food and Drug Administration (FDA). Recommendations deliver valuable guidelines to protect public health but cannot be enforced by law. Federal organizations that establish recommendations for toxic substances include the Agency for Toxic Substances and Disease Registry (ATSDR) and the National Institute for Occupational Safety and Health (NIOSH). Federal government has already taken few steps First, on July 12, 1989, EPA initiated refusal on new uses of asbestos. Second, EPA has established regulations that require school systems to inspect for asbestos and,

if contaminated asbestos is found, to eliminate or reduce the exposure, either covering it up or either by removing it up . In addition, EPA provides support and guidance for diminishing asbestos exposure in public buildings. Third, EPA controls the release of asbestos from factories and buildings during renovation or demolition to prevent asbestos from getting into the environment. EPA also manages the disposal of waste asbestos products or materials, requiring these to be placed only ASBESTOS 12 1. PUBLIC HEALTH STATEMENT in approved locations. Fourth, EPA has put forward a limit of 7 million fibers per liter on the concentration of long fibers (length greater than or equal to 4 μm) that may be present in drinking water. Fifth, FDA regulates the use of asbestos in the preparation of drugs and keeps under control the use of asbestos in food-packaging stuff. NIOSH has recommended that inhalation exposures not exceed 100,000 fibers with lengths greater than or equal to 4 μm per m³ of air (0.1 fibers/mL). OSHA has demonstrated an enforceable limit on the average 8-hour daily concentration of asbestos allowed in air in the workplace to be 100,000 fibers with lengths greater than or equal to 4 μm per m³ of air (0.1 fibers/mL).

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