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Asbestos and Para Occupational Exposure

Muhsin AKBABA
Çukurova Üniversitesi Tıp Fakültesi
Halk Sağlığı A.D.

Volkan Recai ÖTEGEN
Çukurova Üniversitesi Tıp Fakültesi
Halk Sağlığı A.D.

Abstract: Asbestos was largely used in history because of its unique features even its known health effects. Its production made a pick with industrial evolution. But in 1900s its found to cause serious diseases like lung cancer, mesothelioma and other diseases by making inflamation. First its health effects are defined at workers. But later its found to make similiar diseases at families who work with asbestos. For para occupational exposure there is some evidence that family members of workers heavily exposed to asbestos face an increased risk. This risk is thought to result from exposure to asbestos fibers brought into the home on the shoes, clothing, skin, and hair of workers. To decrease these exposures, we have to limit the possibility of asbestos being brought home in this way.

Keywords: Asbestos, Para occupational, toxicity

Asbestos

The word asbestos comes from the Greek language meaning indestructible. Since before the time of Christ, asbestos has been used in “a number of woven products, such as shrouds for deceased royalty placed in funeral pyres and wicks for oil lamps.” 1 However, asbestos has been known by many other names including: "mountain leather," "incombustible linen," and "rock floss." The name of chrysotile, one of the most common forms of asbestos, is derived from the Greek words "chrysos" (gold) and "tilos" (fiber) or "gold fiber." 2

Asbestos is the name of a group of minerals with long, thin fibers. It was once used widely as insulation. It also occurs in the environment. Asbestos fibers are so small you can't see them. If you disturb asbestos, the fibers can float in the air. This makes them easy to inhale, and some may become lodged in the lungs.

If you breathe in high levels of asbestos over a long period of time, the fibers can build up in the lungs. This causes scarring and inflammation, and can affect breathing. Eventually it can lead to diseases such as Asbestosis, or scarring of the lungs that makes it hard to breathe, Mesothelioma, a rare cancer that affects

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the lining of the lungs or abdomen, Lung cancer

Lung diseases associated with asbestos usually develop over many years. People who become ill from asbestos are usually exposed on the job over long periods of time. Smoking cigarettes increases the risk. 3

Chemical and Physical Properties

For all practical purposes most forms of asbestos are inert. That is one quality that makes them so desirable in industry. They are insoluble in water and organic solvents and are nonflammable. While the serpentine chrysotile is soluble in acid, the amphiboles amosite, crocidolite and anthophyllite are resistant to acids.

Asbestos has a host of physical properties that make it almost a superstar in the world of industrial chemistry. Its tensile strength surpasses that of steel. It has tremendous thermal stability, thermal and electrical resistance and is non-flammable. It can be subdivided into fine fibers that are strong enough and flexible enough to be spun into material that is a flame retardant, chemically inert thermal and electrical insulator. Note that asbestos binds with better insulating materials to create the ultimate construction materials.

Asbestos fibers have no detectible odor or taste. They are all solids that do not move through soil and are insoluble in water. Its color will vary according to type, and metallic composition. Crocidolite, which has iron and sodium as its only metallic elements, is the most colorful, adorned in a range of colors including shades of lavender, blue and green. In general, asbestos-containing iron may display a green color ranging from a hint of green to solid green depending upon the amount of iron present. 4

Asbestos Use

The story of asbestos is an all to familiar one, "A miraculous, do anything chemical substance is identified as a serious health hazard" - except for one thing. Unlike many of its doomed chemical contemporaries, asbestos is not a product of modern technology. Its use predates history, and the recognition of health hazards associated with asbestos is recorded in writings from the first century. Even in prehistoric times, it was considered to be the wonder mineral that had limitless uses. In modern times at least 5,000 different products have been manufactured from asbestos. 4

The Romans mined or quarried asbestos from all over Europe and the Mediterranean. It was used in literally hundreds of products because it is strong, insulates well, and resists fire and corrosion. The ancient Greeks used asbestos in their cloth and the Romans used it in their building materials. They wove asbestos fibres into fabrics to make towels, napkins, nets and head coverings for women. It was also used in cremation robes and candlewicks and may have been used in the everlasting flame that was kept alight by the Vestal Virgins.

" The Romans called asbestos, amiantus (unpolluted), as a reflection of this easy to clean property and it remains the root of

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the French word (amiante) today. The 1st century historian Pliny the Elder also wrote of the qualities of asbestos. He noted "it is quite indestructible by fire," and "affords protection against all spells, especially those of the Magi."

Asbestos was widely known in other cultures as well. The Ancient Egyptians embalmed pharaohs with it and made clothing containing asbestos fibres to improve durability. Ancient Scandinavian peoples mixed it in pottery and sealed cracks in their log huts with it. The Persians imported 'stone wool' from India and they thought that this material was made from the hair of small rat-like animal, which lived in fire and died by water. When the Persians burned the bodies of their dead, they first wrapped them in linen called linum vivum, woven from the stone asbestos. Put into the fire, this cloth wouldn't burn, and so the ashes were preserved and kept safe to be put into the sepulcher.

In medieval times it was used as insulation in suits of armour. The Emperor Charlemagne reportedly used an asbestos tablecloth to convince some barbarian guests that he had supernatural powers, by throwing it into a fire and pulling it out unsinged. There is also obscure evidence of medieval merchants selling asbestos crosses, citing their resistance to fire as evidence that they were made from wood from 'the true cross'.

The negative health effects of asbestos were also known to the Romans. Both Strabo and Pliny also mentioned the sickness that seemed to follow those who worked with asbestos. It was recommended never to buy asbestos quarry slaves as they often "died young". Lung ailments were a common problem to anyone who worked with asbestos fibres. Pliny even made reference to the use of a transparent bladder skin as a respirator to avoid inhalation of the dust by slaves. 5

In 1897 a Viennese physician attributed emaciation and pulmonary problems to (asbestos) dust inhalation. The first documented case of an asbestos-related death was reported in 1906 when the autopsy of an asbestos worker revealed lung fibrosis. As early as 1908 insurance companies began decreasing policies and benefits for asbestos workers. Metropolitan Life increased the premiums for such workers. In 1928 Cook identified the effects of asbestos in the lungs as asbestosis. He pointed out that this fibrotic scarring of lungs resulting from prolonged exposure to asbestos dust could have a latency period of 15 years. Others have suggested that the latency period can be much longer. In 1929 a coroner called for public enquiry after the death of an employee. By 1935 physicians were beginning to notice that some patients who had asbestosis also were victims of lung cancer. 2

Despite the knowledge and warnings of the Ancients, the many uses of asbestos lead to ignoring the ramifications of exposure until the late 20th century. 5 It is interesting that despite the evidence of severe health risks related to exposure to asbestos dating as far back as the first century, the production of

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products containing asbestos continued to grow until the mid 1970s. Documents reveal that asbestos manufacturers were aware of the health risks related to exposure to asbestos from the 1940s and 1950s, but chose to conceal this information from their employees. In the 1970s, the Environmental Protection Agency (EPA) and Occupational Safety and Health Administration (OSHA) began to regulate asbestos. Today workers are protected from exposure to asbestos as a result of very strict regulations and enforcement. 2 Today asbestos use is largely being reduced all over the industrialized world. While still used in such capacities as rocket fuel shielding in space programs, the risk to human workers is slowly being eliminated. 5

Asbestos Health Effects

The modern history of asbestos disease dates from the beginning of the twentieth century, when two cases of asbestotic lung scarring were briefly described in asbestos textile workers. The pulmonary disease resulting from such scarring was well described in subsequent publications and the term asbestosis applied to it in 1924. An association of bronchogenic carcinoma with asbestos was first suggested in the 1930s. Mesothelioma, a malignancy of the lining of the chest or abdomen, was clearly associated with asbestos in 1960. 6

Asbestos Exposures

Inhalation of asbestos fibres from outdoor air, and to a lesser degree in indoor air, is the primary route of exposure for the non-smoking general population. Exposure may also occur via ingestion of drinking-water, which has been contaminated with asbestos through erosion of natural deposits, erosion of asbestos-containing waste sites, corrosion of asbestos-containing cement pipes, or filtering through asbestoscontaining filters. Families of asbestos-workers may be exposed via contact with fibres carried home on hair or on clothing 7

Asbestos firstly knew for diseases at asbestos workers but later, para-occupational and non-occupational ways found. The potential exposure scenarios for individuals who are non-occupationally exposed to asbestos vary, but may include: (1) neighborhood exposure due to asbestos emissions from nearby asbestos-product manufacturing facilities, asbestos mines, construction work involving asbestos, or naturally occurring asbestos; (2) household exposure from the use of asbestos-containing materials (e.g., use of tremolite/erionite whitewash on the exterior of homes); and (3) household contamination resulting from asbestos fibers brought into the home on workers' clothing or bodies, and domestic activities such as handling or laundering workers' contaminated clothing. 8

Para Occupational Asbestos Exposure

In the past, asbestos workers went home covered in asbestos dust because of a lack of proper industrial hygiene. The workers' families and other household contacts were then exposed via inhalation of asbestos dust:

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•From workers' skin, hair, and clothing, and
•During laundering of contaminated work clothes.

A mortality study of 878 household contacts of asbestos workers revealed that 4 out of 115 total deaths were from pleural mesothelioma and that the rate of deaths from all types of cancer was doubled [Joubert et al. 1991]. Also, 11 cases of mesothelioma (6M:5F ratio) were diagnosed from 1995-2006 among individuals who had not worked at the vermiculite operations in Libby, Montana, but who had some other indirect association with those operations. Most had environmental exposure from living, working, or regularly shopping in Libby community; two were family members of vermiculite workers [Whitehouse et al. 2008].

Solid evidence demonstrates an increased risk of mesothelioma among people whose exposure comes from a para-occupational or domestic source. Although information is sparse about the types of fibers involved in these circumstances, the diversity of countries and periods in which excess levels of mesothelioma have been found is so large that it is probable that all types of fibers may cause it. 9

In other environmental exposures [Constantopoulos 2008] asbestos was released into the air and soil around facilities such as
•Building demolitions,
•Factories handling asbestos,
•Power plants,
•Refineries,
•Shipyards,
•Steel mills, and
•Libby vermiculite mine.

People living around these facilities have been also exposed to asbestos through their residence close to asbestos-using industries.

For para occupational exposure there is some evidence that family members of workers heavily exposed to asbestos face an increased risk of developing mesothelioma. 10 This risk is thought to result from exposure to asbestos fibers brought into the home on the shoes, clothing, skin, and hair of workers. To decrease these exposures, Federal law regulates workplace practices to limit the possibility of asbestos being brought home in this way. Some employees may be required to shower and change their clothes before they leave work, store their street clothes in a separate area of the workplace, or wash their work clothes at home separately from other clothes. 11 Cases of mesothelioma have also been seen in individuals without occupational asbestos exposure who live close to asbestos mines. 10

What factors affect the risk of developing an asbestos-related disease?

Several factors can help to determine how asbestos exposure affects an individual, including 10,11 :

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•Dose (how much asbestos an individual was exposed to).

•Duration (how long an individual was exposed).

•Size, shape, and chemical makeup of the asbestos fibers.

•Source of the exposure.

•Individual risk factors, such as smoking and pre-existing lung disease.

How are asbestos-related diseases detected?

Individuals who have been exposed (or suspect they have been exposed) to asbestos fibers on the job, through the environment, or at home via a family contact should inform their doctor about their exposure history and whether or not they experience any symptoms. The symptoms of asbestos-related diseases may not become apparent for many decades after the exposure. It is particularly important to check with a doctor if any of the following symptoms develop :

•Shortness of breath, wheezing, or hoarseness.
•A persistent cough that gets worse over time.
•Blood in the sputum (fluid) coughed up from the lungs.
•Pain or tightening in the chest.
•Difficulty swallowing.
•Swelling of the neck or face.
•Loss of appetite.
•Weight loss.
•Fatigue or anemia. 10

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