

Commentary

Battling with Asbestosis: Is this Global Challenge Still in Existence?

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Introduction

The use of asbestos has been dated for thousands of years, but the exploitation at the wide industrial scale began on the 19th century. It was used for many physical use: thermal and electrical isolation as wells for sound absorption. Every fiber and dust of asbestos is known to be indestructible, making its exposure even longer since it tends to have a cycle: from its mining process to the manufacture of it [1]. Asbestosis was the first identified disease related to dust and fibers. It is a type of restrictive lung disease and it is known to be incurable. Nevertheless, was in 2006 when the World Health Organization arranged for the eradication of the asbestos-related diseases, declaring that the effective method to abolish this problem is by prohibiting the utilization of all types of asbestos [2]. The asbestos exposure not only causes a type of pulmonary fibrosis, but is also associated to pleural disease, malignant mesothelioma, lung cancer and other types of cancer including larynx and ovary cancer. The clinical effects will depend on its exposure time and can appear even 30 to 40 years later from initial contact [3]. The occupational risk to asbestos causes approximately 107,00 of deaths yearly around the world. These fatalities are caused from asbestos-related lung cancer, malignant mesothelioma and asbestosis per se [4]. Regardless of its well-identified hazardous effects, there are nearly 125 million persons in the planet who are vulnerable to asbestos in their work at this present time. Despite that more than 50 countries have finally make illegal the use of asbestos, for example in the European Union, Australia, South Africa and Japan, these minerals continue to be extracted in industrial-developing countries like Russia, China, Brazil and Kazakhstan. While in the USA there is a lack of legal ban for the use of asbestos, it seems that its utilization has reduced in comparison with past years [5].

Why is this still a Problem?

The enigma with the carcinogenicity of the asbestos is that has been rising since the beginning of the 20th Century. The first reported cases were established in the USA and the UK during the 1930s. These

cases were preceded by several statements of pleural tumors about a decade later. Important to mention is that the latest evaluation about the carcinogen effect of the asbestos was made about ten years ago and published in the volume number 100 of the International Agency of Research on Cancer (IARC) monographs program. It was declared that “all forms of asbestos” (actinolite, amosite, anthophyllite, chrysolite, crocidolite and tremolite) are carcinogenic agents [6]. Furthermore, the Collegium Ramazzini reported an estimation data in the global burden of disease that is caused by asbestos. When the asbestos-related diseases (ARD) was studied on their own, the annual mortality was 41,000 for asbestos-related lung cancer (ARLC), 43,000 to 59,000 for malignant mesothelioma and 7000-24,000 for asbestosis. The Collegium Ramazzini declared that in major industrialized countries, massive amounts of asbestos persist to be a residue from former constructions in several quantities of schools and universities, houses, apartments as wells as business-related buildings [7]. On the other hand, another problem encounter is defining the disease and do a very challenging process of a correct diagnosis of asbestosis. In view of the fact that asbestosis is an interstitial fibrosis caused by the persistent contact to the inhalation of asbestos, we may differentiate it from idiopathic pulmonary fibrosis by having a history of exposure to the minerals. This remains complicated because currently is yet unknown the exact dose of asbestos that causes this problem [8]. The workers who are at risk to develop this type of fibrosis due to heavy exposures are the miners, millers and textile workers [9]. According to the WHO, this type of occupational airborne particle exposure causes up to 12% of deaths due to pulmonary disease [10].

Even though it has a high impact in costs of the disease, no economic burden studies on occupational lung disease and or mesothelioma due to asbestos exposure has been made. In 2011, a study made in Canada by Tompa et al, found this economic burden to be significant. They included 427 cases of recently diagnosed mesothelioma and 1904 cases of lung cancer due to asbestos susceptibility. The estimate economic burden was \$831 million Canadian dollars in direct and collateral costs for newly detected cases of mesothelioma and lung cancer. And \$1.5 billion Canadian dollars in life quality expenses based on a value

of \$100,000 per quality-adjusted life per year. Their findings concluded that it must be an important information to make a priority decision in completely banning the manipulation of asbestos as well as the usage of products that contain these minerals in the countries where they handle them presently [11].

How to approach it?

As we know, making the correct diagnosis for asbestosis is very challenging mainly because we make the accurate diagnosis whenever it may be too late to manage it. Autopsies and pathology studies are effective for the detection of a formerly incorrect diagnosis of asbestosis as well as those unidentified cases. The use of images such as chest x-rays or CT scans can give us false-negative diagnosis. This because idiopathic pulmonary fibrosis or tuberculosis can show a similar image as asbestosis. Ndlovu et al, analyzed 149 cases of asbestos-related diseases that were identified clinically. From them, 126 were diagnosed at autopsy and 73 cases (57.9%) were not diagnosed clinically. Also, they found that 77 cases were diagnosed with asbestosis at autopsy rather than 52 diagnosed clinically. This just indicates the high proportion of false-negative diagnosis [12].

Clinically speaking, asbestos-related lung diseases is known to cause small airway obstruction. Yang et al, assessed 281 patients that were diagnosed with asbestosis in China. They performed pulmonary function tests in order to evaluate them. The results demonstrated that the length of exposure was meaningfully correlated with the FEV1/FVC quotient in non-smoking patients with asbestosis. The average duration to the vulnerability of asbestos was 16.3 years. The lung volumes (FVC, FEV1 and TLC) were radically low in patients with higher degrees of asbestosis [13].

An investigation performed by the occupational medicine unit from the University of Siena in Italy, considered the reliability of different dose-effect biomarkers in patients who were exposed to asbestos. The research included 307 male workers, with a range age of 41 to 81 years. Biological samples were obtained using a diagnostic

fiberoptic bronchoscopy. The asbestos exposure biomarkers analyzed consisted in concentrations of amphiboles, chrysotile and ferruginous bodies in the bronchoalveolar lavage. The results showed that these ones were in higher concentrations in patients with the diagnostic of asbestosis as well in railroad industry workers. With these results, they concluded that those mentioned-biomarkers are predictable of previous asbestos exposure even though numerous years has passed from the last exposure. Also, this study confirmed the correlation between greater concentrations of amphiboles in the bronchoalveolar lavage and the incidence of asbestosis [14].

Another study by Matsuzaki et al, indicated that vulnerability to asbestos damages the antitumor immune response. This resulted in improvement of regulatory T cell function and volume, in addition to a reduction of the CXCR3 chemokine receptor in CD4+ T helper cells and weakening the destructing activities of C8+ cytotoxic T lymphocytes and NK cells. They indicated the possibility of using a group of biomarkers or a formula on behalf of the different variations in the immune cells, involving cytokines produced by these cells [15].

What are the Current Research Innovations?

In 2014 a study documented that asbestos hazard status in lung cancer and the irregular methylation in separate differentially methylated regions (DMR) and differentially methylated CpGs (DVMC) were correlated. They recognized novel DNA methylation changes, suggesting that these changes may be located in the progress from the initial exposure to stages with lung cancer. The methylation was visualized in multiple genetic material, including GPR135, TOP and NPTN [16]. Also, the identification of new biomarkers needs to be a priority in the impact for the management and identification of different types of lung cancer attributable to asbestos. For example, the malignant pleural mesothelioma due to asbestos is a very hostile tumor. In this field, the role of micro-RNAs is turn out to be highly relevant. Several studies have been made with the hope to have a new diagnostic approach in these cases, this is because cancer cells release huge amounts of circulating miRNAs [17]. Reason why the discovery and quantification of the cancer-derived miR-

NAs might represent an exceptionally beneficial instrument. Although this sounds wonderful, initial published data from different studies are requiring a correct clinical validation [18,19].

Who is at risk?

Globally, the annual marked demand for asbestos exceeds 2,000,000 metric tons of asbestos [20]. Many authors have predicted a revival of asbestos-related diseases in the upcoming decades, in particular in low-income countries. A study made in Spain, one of the countries with highly exposed communities of asbestos, showed that men have a greater probability of death from an asbestos-related disease after 40 years of exposure, in comparison with women. Also, other high risk death factors include those persons who are between 60 and 80 years of age and people who is cohabiting with an asbestos worker [21].

Another cohort mortality study made by Franco Merlo et al, in Italy, included 3984 shipyard workers. The study was made between 1960 and 1981. The mortality rate from lung and pleural cancer was proportional to the length of employment at the shipyard. The rates for only lung cancer appeared to increase fast for the period of the first 30 years of follow-up and then stopped after 1990. The pleural cancer was rising slowly during the first 40 years of follow-up and then promptly after 1990. These findings interpreted to be a great support in the crucial demand for the prevention of asbestos-related diseases with an execution of an asbestos ban. The public health statements requires an update in order to benefit the health of many people who still under current and frequent exposure [22].

Moreover, the estimation of global burden of mesothelioma is increasing and is becoming a major concern again. A study made by Odgerel et al, descriptively analyze national mortality data in order to calculate the estimation. The study period used was from 1994 to 2013. They studied 230 countries from all the continents, using the WHO Mortality Database regarding mesothelioma deaths. The estimate resulted was 38,400 annual deaths. With this number, mesothe-

lioma due to asbestos exposure is a very serious global health issue and preventive actions must be taken into action [23].

What can we do?

In 2009, Korea forbidden the import, transportation and maneuvering of asbestos [24]. Following that prohibition, the Asbestos Injury Relief Act (AIRA) was declared in the year 2011 and then activated in 2012. The main purpose of that decree was to pay compensation to all those affected from the exposure. The people who have signs and symptoms of any asbestos-related diseases, are be able to apply for an asbestos health care pocketbook. Along with this program, the patients can have access to periodic health examinations [25]. Although this has been a successful strategy, several other Asian countries are still mining and using asbestos even though there is plenty data about its human oncogenic effects [26].

Another country that we may need to mention is Australia. This country has documented the most excessive asbestos use in the globe until the starting of the 1980s. Even though the use of all varieties of asbestos is banned in this country, the incidence of asbestos-related diseases has continued to increase through the decades. The incidence of mesothelioma is about of 40 cases per 1 million people. The projected number of cases of mesothelioma are expected to peak in the 2021, corresponding to the 30-35 years after the ban of amphibole exploit [27].

In the USA asbestos kills 12,000 to 15,000 every year in addition to countless cases of disability. In 2015 there occurred 2597 deaths as a result of mesothelioma, representing a 15 to 20% of total asbestos-related deceases. We know that there is no strict use of asbestos in the USA not withstanding multiple efforts to ban them. The National Institute for Occupational Safety and Health has been commanding these attempts since 1976. Subsequently the use and disclosure of asbestos has declined significantly. However, a legal ban should be implemented [28].

Prevention is the Key

A recent bibliometric analysis made on 2018, showed the gaps in research on asbestosis. The years analyzed were between 1991 and 2016. The results revealed that the areas with most emphasis in this topic are the clinical and the laboratory field. On the other hand, the papers found with orientation to public health area are significantly low. Since asbestosis is a global and serious situation, this concerns us all. It may suggest that the all the public health departments need to keep up and enhance additional importance in the asbestos-related diseases research [29]. This can be related to a lack of research funding for public health, since funding agencies usually opt for superior priority research programs in accordance to their policy directions [30].

Conclusions

Asbestosis is still a major challenge for all the healthcare providers, public health, government and industry areas. As physicians and researchers, we must keep doing our best in order to have accurate diagnosis in early stages of the diseases and a better management. Also, we must remember that the only medicine that can cure is the prevention. Having laws that protect our health is an obligation from our leaders and fighting to have our right to a good health is indispensable. Asbestos have been banned from many countries, and it should be banned globally.

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