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Review Article

Awareness of Asbestos and Action Plans for Its Exposure can Help Lives Exposed to Asbestos

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ABSTRACT

Despite the fact that asbestos is a known carcinogen to humans, it is still used in industrialized countries, especially Asian countries. The global incidence of asbestos-related diseases (ARDs) due to the past use of asbestos, continues to increase, although many countries have adopted a total ban on asbestos use. The implementation of effective strategies to eliminate ARDs is therefore an important challenge in Asia, where asbestos is still mined and consumed. Collaborative efforts and strategies at the local and international levels are vital, in the pursuit toward the elimination of ARDs in this region.

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1. Introduction

Although asbestos is a known carcinogen to humans [1], it is still a popular raw material in the construction industry, particularly in industrializing countries [2–4]. Historically, global consumption of asbestos from 1920 to 2003 is recorded as 180 million metric tons. The most common type of asbestos used during this period was chrysotile, more commonly referred to as white asbestos [5]. The global asbestos consumption patterns also show that the total volume of consumption has progressively decreased over the years [6,7]. However, the total volume of asbestos use in the top 10 countries of the world increased 56% over the period between 1998 and 2007 [6], out of which the proportion of asbestos use in non-Asian countries decreased, whereas that of Asian countries increased [8]. This trend is consistent with the findings of a recent study [9], which reported that a country's trend of past asbestos use reflects its economic development, because asbestos has comparative advantages of price, easy accessibility, and desirable physicochemical properties.

However, the use of asbestos has resulted in several types of lung diseases, which have mostly been identified in developed countries, where a variety of asbestos-containing materials were extensively produced and used decades ago. Typical malignant neoplasms due to asbestos exposure are the widely reported and recognized malignant mesothelioma and lung cancer [10–12]. Asbestos exposure also causes benign asbestos-related disorders, including asbestosis, diffuse pleural thickening, pleural effusion, and pleural plaques, which are common, and their incidence continues to increase worldwide [13,14]. The World Health Organization now asserts that asbestos causes cancer of the larynx and ovary, with sufficient evidence; and cancer of the stomach, colorectum and pharynx, with limited evidence [15,16].

2. The burden of asbestos-related diseases

Because of the long latency period of asbestos-related diseases (ARDs) [17], and the fact that asbestos-containing materials

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continue to be introduced and/or used in construction sites in developing countries, especially Asian countries, it is expected that an outbreak of ARDs will be seen in this region in the future [4,8]. The major asbestos producers, such as China, Kazakhstan, and Russia, are located in or around this region, where the trade of asbestos thrives on low transport costs and easy access, in a climate of steady economic growth.

The long latency period that is characteristic of ARDs is reflective of the fact that current ARD mortality is the result of historical asbestos use [18,19]. Even among heavily exposed workers, the incidence of mesothelioma mortality up to 29 years after the first asbestos exposure is very low [20]. Current literature reports that around 125 million people are occupationally exposed to asbestos [21], and the global annual mortality due to asbestos-related illness is more than 100,000 cases [16]. Public health concerns about the elevated incidence of malignant mesothelioma in the world have triggered major global action to eliminate ARDs [21–23], particularly in view of projections that the global mesothelioma incidence has not yet reached its peak [24–27]. An important financial impact associated with the historical use of asbestos is that the predicted compensation cost of mesothelioma in the next 40 years will be up to US$200 billion for the United States and US$80 billion for Europe [10]. The estimated compensation cost is a huge financial burden compared to expenditure, of the historical consumption of asbestos in these countries. The elimination of ARDs is therefore important, to determine the relationship between the historical use of asbestos, implementation of asbestos bans, and the incidence of ARDs. The long latency period of mesothelioma and/or lung cancer is possibly one of the reasons for continuing asbestos use, and ignorance of the ARD outbreak projection, in countries where asbestos is still used.

3. The asbestos situation in Australia

The authors chose to examine the asbestos-related situation in Australia in this paper, because Australia recorded the highest asbestos use (kg per capita) in the world until the early 1980s [19], when authorities banned the use of amosite and crocidolite, and imposed a much later ban on the use of chrysotile in 2003 [28]. However, although the use of all forms of asbestos has been removed from the market, the incidence of ARDs has continued to increase over the decades [27,29]. The number of mesothelioma cases in Australia between 1986 and 2000 was 5,176, with an incidence of 40 cases per 1 million inhabitants [28]. A more recent study estimated the number of mesothelioma cases in the state of New South Wales, Australia, during the period 2004–2060 to be 6,779, with a peak of 196 cases in 2014 [27]. They also predicted the number of mesothelioma cases to peak between 2014 and 2021, which corresponds to 30–35 years after the ban of amphibole use. In other words, the incidence of ARDs in Australia is not expected to decrease immediately after the ban of amphibole use, and this is evident in the increasing incidence of pleural plaques. Pleural plaques are also related to asbestos exposure, but have a relatively shorter latency period, of 15–20 years. They may occur at low lifetime cumulative exposures, and can also be considered a sign of asbestos exposure and a precondition for the diagnosis of lung disease [28,30]. A recent study found that the presence of pleural plaques may be an independent risk factor for pleural mesothelioma [31]. Based on the annual reports of the Workers' Compensation Dust Diseases Board (DDB) of New South Wales, Sydney, Australia (where the DDB is a statutory authority that provides compensation to workers with dust diseases employed in New South Wales), 4,413 new cases of pleural plaques were deemed noncompensable between 2001 and 2007 [32]. The annual breakdown numbers of pleural plaques caused by asbestos exposure are 630 in 2001–2002, 754 in 2002–2003, 753 in 2003–2004, 690 in 2004–2005, 817 in 2005–2006, and 769 in 2006–2007. In addition, a voluntary notification scheme operated in New South Wales between June 2001 and December 2008 reported that pleural plaques were the most frequently reported condition (1,218 cases), followed by mesothelioma (919 cases) [33]. In light of the fact that amosite and crocidolite asbestos use was banned in the 1980s, the sustained rise in ARD incidence, particularly that of pleural plaques, is an indication of the asbestos exposure effect after the ban. This raises the suspicion of the contribution of chrysotile asbestos to the incidence of pleural plaques [34], because amphibole was phased out in the 1980s. It is obvious, therefore, that any immediate effect of the ban of asbestos on mesothelioma mortality trends (or ARDs) is expected to be minimal, because of the long latency of ARDs.

4. Future concerns of asbestos use in Asian countries

The use of asbestos has evidently decreased in the industrialized world, but it has increased dramatically in many developing countries, especially in Asian countries, creating a high-risk "incubator" of ARDs. More attention should therefore be paid to the evaluation and prevention of health hazards caused by asbestos in Asian countries. Increased efforts to manage ARDs in Asian countries are also inevitable, because although industrialized countries have successfully implemented regulatory controls and/or bans, the mortality caused by asbestos exposure in the world continues to increase [23,27]. Furthermore, asbestos continues to be circulated, although there is sufficient evidence about its human carcinogenic effects; evidence shows that controlled use of asbestos is impossible, and that there are no safe levels for exposure to asbestos fibers.

5. Summary

Overall, the implementation of effective strategies to manage ARDs remains an important task in Asia, where asbestos is still mined and used. In order to incorporate effective and sustainable strategic initiatives at local levels, several core requirements include the acquisition of a reliable funding source, appropriate experts, the putting in place of monitoring mechanisms, well-designed training programs and their feedback evaluation systems, and participation of the appropriate stakeholders together with development of relevant policies that reflect the respective country's situation. The best option to eliminate ARDs is to phase out asbestos from the market, with the provision of alternative substitutes. Although this may seem simple, it is very likely to require collaborative endeavors and efforts, at both international and local levels.

Conflict of interest

No potential conflict of interest relevant to this article was reported.

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