

# The Effect of Cosmetic Talc Powder on Health

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## Abstract

Talc powder is widely used for different purposes worldwide. Effects of talc on the human health is a concern as it has many chemical components. This review is an attempt to present the relevant researches in this field and to summarize the current updates about the topic. Talcum powder exposure has been shown to be a reason in the development of mesotheliomas and carcinoma of the lung in women. Regular cosmetic powders can get attached to larger particles that would deposit in the upper airways of the human respiratory system. The alveolar region is the second most exposed region of the respiratory system. Deposition levels in the tracheobronchial region is the lowest. Cosmetic talc powder, used regularly by women worldwide, can cause detrimental effects on different organ systems of the human body. Awareness on its harmful effects to the users may be useful to reduce the usage to some extent.

**Keywords:** Pleurodesis, pulmonary diseases, talc powder

## INTRODUCTION

Talc belongs to the general mineral family of the layered silicates which are present in nature and are composed of crystalline hydrous magnesium silicate. In combination with magnesite, it is available worldwide. It is also possible to find pure talc. Commercial use is possible after sorting where talc crystals are milled or micronized to fine powders. Talc structure is soft and chemically inactive with bright white color in general. Its color may be changed by staining with iron or impurity by other minerals. It is not specifically deemed dangerous and is classified as an irritant dust in powder form.<sup>[1]</sup>

Two types of talc, industrial and cosmetic, are used in paper, plastics, rubber, paint, and cosmetic manufacturing work.<sup>[2,3]</sup> Furthermore, these substances have been shown to be effective for use through tube thoracostomy. These include cosmetic talc and iodopovidone. These are considered to be safe.<sup>[4]</sup> Cosmetic powder is packaged as a compact powder or a loose powder, which is used for makeup, and contains heavy metals such as Cd, Co, Pb, Cu, and Cr. A study on thirty different brands of talcum powder showed that metals are present in safe limits, but the excess use of talcum powder affects the health of the consumer.<sup>[5]</sup> Some studies have shown that exposure to cosmetic talc grades is considered to be much lower than in talc mills and mines.<sup>[3]</sup> Preservatives and fragrances are added to cosmetic products

to add an attractive aroma and presentation to the customers. Cosmetic powders are of poor antimicrobial quality. They may be the sources for microorganisms to grow and are more contaminated with fungi than with bacteria. Some chemical compounds are added to avoid the microbial growth. However, microorganisms may cause damage or chemical changes in cosmetic products.<sup>[5-8]</sup> A few of the components in the cosmetics can enter the skin and might cause systemic effects.<sup>[9]</sup>

In 2005, a study was done on several facial cosmetics available in Nigeria and it showed that the regular use of cosmetics might end up in escalation in the quantity of trace metal in the human body beyond the safety range, especially in ocular system.<sup>[10,11]</sup> In 2012, the first case of severe endobronchitis using talcum powder was reported in a female patient.<sup>[12]</sup>

A study on rats was done by Shim *et al.* on talc involving both male and female Sprague-Dawley rats with recurrent 4 weeks of toxicity through the inhalational route to the whole body. Rats were given the trial of talc (inhaled) in different concentrations such as 0, 5, 50, and 100 mg/m<sup>3</sup> for

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**How to cite this article:** Al Awam KA, Johnson S, Alonazi A, Aleeh AA, Aldhamen A, Alhaddad A, *et al.* The effect of cosmetic talc powder on health. *Indian J Respir Care* 2019;8:18-21.

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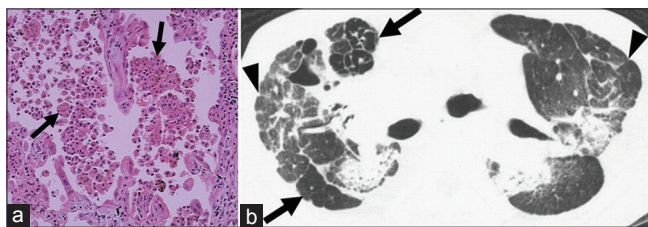
6 h/day, for 5 days a week, for 4 weeks. The study reported no adverse events or death of the rats that were exposed to talc. A reduction in glucose was seen in male rats exposed to 50 and 100 mg/m<sup>3</sup> of talc. Furthermore, insinuation of macrophages both in the walls of the alveoli and spaces adjacent to the terminal and respiratory bronchioles was observed during histopathological analysis. Superoxide dismutase 2, a classic genetic sign of oxidative damage, was present in both male and female rats exposed to 100 mg/m<sup>3</sup> talc. They concluded that macrophage aggregations were prompted by the inhalation of talc. In fact, damage to the lung could be attributed to the oxidative stress.<sup>[13]</sup>

## TALC AND PULMONARY DISEASES

Talc causes four types of pulmonary diseases; three associated with aspiration (talcosilicosis, talcoasbestosis, and talcosis) and one by intravenous administration of talc. The latter is seen in drug abusers who inject medications intended for oral use. Indicatives of pulmonary talcosis seen by high-resolution computed tomography (CT) showed small centrilobular nodules associated with heterogeneous conglomerate masses. These consist of high-density amorphous areas, with or without panlobular emphysema in the lower lobes. Histopathologic studies in a case report showed the presence of birefringent, needle-shaped particles of talc inside the giant cells with areas of pulmonary fibrosis associated with the use of polarized light in talc pneumoconiosis. The authors concluded that CT plays a vital role in the diagnosis of pulmonary talcosis, as indicative configurations may be seen.<sup>[14]</sup> If this kind of pattern is seen in patients with a history of contact with talc or in drug abuser, it is greatly indicative of pulmonary talcosis as shown in Figure 1a and b.<sup>[2]</sup>

## PATHOPHYSIOLOGY

The pathophysiology of talcosis may be similar to that of sarcoidosis. Talc granulomatosis is classically associated with high concentrations of serum anticholinesterase and a large number of lymphocytes in bronchoalveolar lavage. A person who has sarcoidosis must go through a comprehensive interview about exposure to organic or inorganic dusts. Corticosteroids in the treatment modality reduce symptoms



**Figure 1:** (a and b) Dense consolidation at the level of the main bronchi, with dilated bronchi, pericatricial emphysematous changes (arrows), ground-glass opacities, and interlobular septal thickening (arrowheads) in the upper lobe of both lungs seen by axial thin section computed tomography scan (1.5-mm-thick section) in a patient who worked for 8 years in the processing of magnesium silicate

and improve pulmonary function, though the possibility of relapse exists after the completion of treatment.

Substantial similarity in signs and symptoms and imaging and laboratory parameters among patients presenting with pulmonary fibrosis requires a detailed interview and will be the key to identification of the disease.

Shinno *et al.* presented a case series of acute respiratory distress syndrome (ARDS) subsequent to pleurodesis with macroparticle size talc (2018). They found out that advance in the age and presence of any interstitial changes in the lung as shown in CT of the chest are the likely risk elements for the presence of posttalc pleurodesis-ARDS.<sup>[15,16]</sup> Some studies showed successful talc pleurodesis outcomes in patients with abundant malignant pleural effusion by using pleurodesis with thoracoscopic talc insufflations or with talc slurry instillation with similar success rate.<sup>[17]</sup> Success depends on several factors including female gender, Karnofsky Performance Score >70, pleural fluid pH ≥7.34, adenosine deaminase ≥18 IU/l, and pleural fluid cholesterol ≤82 mg/dl.<sup>[18,19]</sup>

A study done in Germany showed a positive association between asbestos, talc, carcinoma of the lung, laryngeal carcinoma, and carcinoma of the stomach among rubber workers. Deaths from noncarcinomatous pulmonary diseases also increased when exposed to talc.<sup>[17,18]</sup> Long-term exposure to talc powder may cause chronic bronchitis and pneumocystis.<sup>[20-22]</sup>

Talcum powder exposure has been shown to be a reason in the development of mesotheliomas and carcinoma of the lung in women.<sup>[23,24]</sup> Exposure to talc free of silica and asbestos causes both pneumoconiosis and chronic respiratory impairment. There are many researches on the effects of talc on different organ systems [Table 1]. Miners and millers exposed to talc free of asbestos and silica developed obstructive pulmonary effects.<sup>[25]</sup>

## SAFER USE OF TALC

Talc is used in the treatment of idiopathic spontaneous pneumothorax although it might result in a mild restrictive

**Table 1: Several studies outlining the effects of talc powder on health**

Researches	Effect of talc on health
Frank C <sup>[15]</sup>	Pulmonary talcosis
Shinno <i>et al.</i> <sup>[16]</sup>	ARDS, ALI
Yildirim <i>et al.</i> <sup>[19]</sup>	Chronic bronchitis
Straif <i>et al.</i> <sup>[20]</sup>	Pneumocystis, pneumoconiosis
Wild <i>et al.</i> <sup>[21]</sup>	Lung cancer and laryngeal cancer
Hildick-Smith <sup>[32]</sup>	
Wegman <i>et al.</i> <sup>[25]</sup>	Ovarian cancer
Karageorgi <i>et al.</i> <sup>[33]</sup>	Endometrial cancer risk
Kuzniar <i>et al.</i> <sup>[31]</sup>	Severe hypoxemia
Genofte <i>et al.</i> <sup>[8]</sup>	Inflammatory response
Lange <i>et al.</i> <sup>[24]</sup>	Impairment of lung function and pleural thickening

ARDS: Acute respiratory distress syndrome, ALI: Acute lung injury

impairment of lung function and pleural thickening as seen in the chest X-ray.<sup>[24]</sup>

There are articles in the literature which conclude that talc is not harmful. Genes GSTM1 and GSTT1 in women can be varied and this variation is found to affect the association of the use of genital talc and the risk of ovarian cancer.<sup>[26]</sup> An analysis of authentic historical Italian cosmetic talc sample by Ilgren *et al.* through selected area electron diffraction combined with energy dispersive X-ray analysis found that Pinerolo Italian cosmetic talc does not cause any cancer risk, which is due to its purity.<sup>[27,28]</sup> Similarly, French and Austrian talc workers were examined for the effects of talc dust on respiratory system using pulmonary function test and chest X-ray, but neither showed any evidence of detrimental effects of talc exposure.<sup>[29]</sup>

Regular cosmetic powders can get attached to larger particles that would deposit in the upper airways of the human respiratory system. The alveolar region was the second most exposed region of the respiratory system. Deposition levels in the tracheobronchial region were the lowest. Both routinely mixed and small talc particles result in an inflammatory response. Both types of particles were seen to be deposited in the lungs, spleen, liver, and kidneys of animal studies.<sup>[30]</sup> The medical thorascopic talc pleurodesis is an analgesic and useful remedy for malignant pleural effusion.<sup>[31]</sup> Use of talc powder in the perineal area is shown to increase the chance of endometrial cancer. This is more prevalent among postmenopausal women.<sup>[33]</sup>

## CONCLUSION

Cosmetic talc powder, used regularly by women worldwide, can cause detrimental effects on different organ systems of the human body. Awareness on its harmful effects to the users may be useful to reduce the usage to some extent. Further research is needed to obtain more evidence regarding its effects on the pulmonary system.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

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