Textile-Related Allergies

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Abstract

One of the most polluting industries in the world is the production of textiles. However, chemical waste products like formaldehyde or thiazolinone, which have the potential to cause allergies, are harmful for human health in addition to having negative effects on the environment. Touch dermatitis typically develops when fabrics come into contact with human skin. Additionally, non-eczemous variations are primarily connected to fabrics. In vivo and in vitro techniques, such as patch testing or cytokine detection assays, can be used to diagnose the patient's potential allergy to these substances. The most recent study focuses on medical fabrics, such as clothing or sutures, to aid in patient diagnosis, therapy, and recovery. Greater properties are offered by sutures and dressings that release oxygen and growth factors and have antibacterial qualities.

Keywords: Allergy • Biocide • Contact dermatitis • Hypersensitivity

Introduction

The textile sector is one of the top industries and has a constantly expanding market. Numerous chemicals and quantities of water are required in the development and production of textiles and clothing, resulting in high levels of pollution that harm not only the environment but also human health. Additionally, it is well known that the aquatic life is adversely affected by textile dyes because their hazardous and non-biodegradable byproducts end up in seas and oceans. Textiles can be dyed using tried-and-true techniques. Optical brighteners, finishing agents, biocides, and flame retardants are frequently utilized with dyes today. The tendency of these colours to penetrate the skin and causes allergies is a significant disadvantage. An inflammatory skin condition known as contact dermatitis is brought on by coming into contact with allergens or irritants. As a result, it may manifest as allergic contact dermatitis or irritating contact dermatitis. Additionally, the second type of contact dermatitis can be divided into eczemous and non-eczemous forms. Additionally, certain allergic skin reactions are type 4 hypersensitive, which causes the immune system to become activated and generate cytokines. There are several in vitro assays, such as cytokine detection assays, or in vivo testing procedures, such the patch test, to determine a compound's allergic or irritating potential. Additionally, some medical fabrics, including sutures, have made strong candidates for the role of antimicrobials. The triclosan coating of the fibers, however, can potentially cause contact dermatitis.

Mechanical stimulation frequently produces non-eczematous contact dermatitis. Examples include scratching neck tags and rubbing collar interlinings. Additionally, sweating brought on by light fabrics increases skin sensitivity, increasing the likelihood of skin irritation. However, when considering how long textiles are in contact with human skin from birth to death, how they are made and used, and how frequently other allergies occur, it can be said that textiles hardly ever cause allergies. Given how closely fabrics and skin are in contact, it is expected that all allergies triggered by textiles fall under the category of contact allergies. However, chemicals used in textile production, such as formaldehyde, metals, and organic dyes, are what trigger allergies. In order to create dimensionally stable and crease-resistant fabrics, formaldehyde is frequently employed as a finishing agent in the textile industry in the form of resins. The emission of formaldehyde is triggered by temperature changes. However, temperature affects how much formaldehyde is released. More formaldehyde is released when the temperature is greater. Additionally, because some of the freed substance is evaporated, not all of it reacts with skin. To trigger an allergic reaction, formaldehyde must be present in amounts of at least 30 ppm.

Numerous metals, including nickel, chromium, and cobalt, are known to cause contact dermatitis. Nickel in particular is widely known for being one of the main contact allergens. For instance, metal nickel can produce "jeans-button allergy," which can also be brought on by zippers or rivets. Certain textile dyes also contain chromium or cobalt in addition to nickel. However, if the dying procedure is done properly, the link between the dye and the metal is so strong that it won't trigger an allergic reaction. Dermatitis from contact with allergens might happen.

Conclusion

For the industry, reducing allergies or discomfort brought on by textile chemicals is crucial. A reduction in allergens can be attained by using chemicals in textile production that are less harmful than those now in use. Additionally, more research is required to identify compounds with threshold potential that could harm consumers' health. Patch testing is therefore typically performed to identify allergies or skin irritants. Not all textile additives, however, are used in the testing process. Therefore, more testing and research approaches are required to identify potential allergens. Regarding medical textiles, the field of intelligent and practical textiles is attracting interest as their usage in industry and medicine becomes more significant in the not-too-distant future. An approach that is both practical and economical is to use smart textile dyes.

The use of photochromic dyes, which may transform textiles from colorless to colored when exposed to ultraviolet radiation, is another intriguing field. Naphtopyran dyes and spirooxazine are two examples of this. Negative photochromic chemicals can also make color more intense in the dark and fade away in visible light. In addition to the dyes already described, thermochromic dyes have the ability to alter their pigmentation in response to temperature variations. The environmental effects of the production chain for various dyeing techniques must also be taken into account. Therefore, creating new techniques for the manufacture of textiles that will change harmful consequences into environmentally beneficial results of the process are prospective contenders for the field's future.