Cutaneous Immediate-Type Reactions to Textiles

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The occurrence of immediate skin reactions such as urticaria and angioedema to textiles is extremely rare. The majority of the reported cases occurred after occupational exposure to chemicals, e.g. to reactive dyes or formaldehyde. More common are respiratory symptoms including asthma and rhinitis [1] and contact dermatitis [2, 3], again frequently in occupational settings. However, there may be a considerable number of unrecognized cases, on the one hand because affected patients identify the culprit by themselves and do not seek medical advice, on the other hand because the appropriate diagnostic tests are not performed or the diagnosis is missed. In this chapter, immediately occurring reactions of the skin to different agents present in or on textiles are reviewed.

Risk Factors

Risk situations to develop cutaneous reactions while being in contact by handling or wearing textiles include the following several possibilities. Occupational exposure has been described by far most often, because of the exposure to reactive chemicals used in the manufacturing process. Less frequently, pre-existing skin disorders such as atopic dermatitis, hyperhidrosis which may lead to increased leaking of agents present in clothes, obesity due to increased friction particularly in intertriginous areas, and wearing of new unwashed clothes contribute to the development of skin reactions.

Symptoms

Immediate-type symptoms and signs include stinging, pruritus, erythema, angioedema, urticaria and anaphylaxis. Most often, urticaria followed by
angioedema have been observed. Some patients suffer from several affections, e.g. asthma and urticaria or contact dermatitis from the same compound.

**Pathogenesis**

The pathogenesis of stinging and pruritus is complex and not fully understood. Contact urticaria may be of the non-immunologic or the immunologic, i.e. IgE-mediated type [4]. In some cases the results of skin tests or the presence of specific IgE to an allergen [5] support an immunologic pathogenesis.

**Textile Types and Materials**

A large variety of materials are used to produce textile fibers [6]. These include natural sources such as plants (cotton), animals (wool, silk) and minerals. Man-made fibers are most often synthetic polymers (e.g. nylon). Other materials used for or on clothes include leather, natural rubber latex and metals. Patients may also be exposed to fabrics other than clothes, e.g. in an occupational setting, to blankets to bedsheets.

**Eliciting Agents and Allergens**

**Fibers**

Natural fibers such as silk and an unknown fiber [7], and wool have caused contact urticaria in few cases [6]. More often, coarse wool fibers cause a typical stinging sensation, particularly in patients with an active atopic dermatitis [8]. This symptom is so typical that it is used as a major criteria in scoring systems for the determination of an atopic diathesis [9].

Man-made synthetic fibers have rarely been reported as the cause of immediate symptoms. Two females, 40 and 55 years old, suffered from an acute urticaria after wearing a perlon corset [10]. In the first patient, urticaria was initially limited to the direct contact area but disseminated to other body areas upon re-exposure. In the second case, generalized urticaria developed with the exception of the contact area. Both cases were confirmed by re-exposure. A 21-year-old nurse had contact urticaria to nylon underwear confirmed by wheal-and-flare reaction to a piece of 100% polyamide after 90 min [11]. Finally, a 36-year-old female dressmaker with chronic urticaria had positive patch and scratch tests to a blue polyester fabric. A re-exposure at work was positive [12].
Chemicals

Chemicals used in textile finishes may elicit contact dermatitis [13], however, immediate symptoms are rare. Particularly formaldehyde was the eliciting agent in some cases with angioedema [14] and urticaria [15]. In the latter cases repeated application of formaldehyde on healthy skin was necessary to elicit a positive test reaction. In a case to a textile finishes (Tinofix S), only the commercial compound elicited a strong positive test reaction, whereas the single components were negative [16]. Formaldehyde and the fragrance terpinyl acetate were the culprits in a spray starch associated with urticaria. Skin tests were positive after 15 min but negative after 48 h application [17]. Formaldehyde present in leather also caused recurrent contact urticaria in a woman working with leather dresses [18].

Dyes also more often cause respiratory symptoms in occupational settings [1], urticaria has been rarely described. In 3 workers exposed to reactive dyes, urticaria and angioedema with positive skin prick tests or specific IgE were observed [19]. Two other workers had urticaria and respiratory symptoms to reactive dyes, confirmed by positive prick or scratch tests and in one by specific IgE [5].

Other Components

In rare cases, latex from elastic bedsheets, or the material from etiquettes may play a role. We have observed a 32-year-old female sensitized to latex who suffered from nocturnal asthma and pruritus which cleared after she removed her rubber-latex-containing elastic bedsheets.

Contaminants

Clothes may contain unexpected substances such as plant allergens which then may cause skin reactions. Contact allergens such as poison ivy causing allergic contact dermatitis are most frequently observed, whereas immediate symptoms are rare. A 27-year-old businessman had an acute contact urticaria after wearing freshly laundered cotton pants [20]. The culprit was the marking of the laundry for which Semecarpus anacardium (marking nut) had been used. Dried juice of Semecarpus and a piece of smudged fabric both elicited a wheal reaction after 6 min. Incomplete rinsing of washing powder and soaps may also cause stinging or itching, particularly in patients with pre-existing skin diseases.

Diagnostic Procedures

In patients with suspected immediate reactions to textiles, a thorough history and clinical examination should be performed. It is of great importance
to determine the type of skin reactions such as flush, urticaria, angioedema or dermatitis. In addition, the occurrence of respiratory symptoms such as asthma and rhinitis should be evaluated.

The following skin tests may be performed: open application, rub, skin prick, scratch and scratch-patch tests. In addition, appropriate controls such as histamine and vehicle controls are mandatory. Re-exposure or provocation tests should only be done if skin tests were negative, since generalized reactions are possible. Therefore, all tests should be performed under close supervision by experienced staff. Since the eliciting substances are typically not available in a standardized form, concentration and vehicle, interpretation of tests has to be done with caution, and tests in healthy controls may be necessary. Only few commercial allergens for the determination of specific IgE in vitro are available, e.g. some natural derivatives such as silk (k73, k74), cotton (o1), cotton seeds (k83) and latex (k82), and some chemicals, e.g. formaldehyde (k80) and maleic acid anhydride (k210), which are used as activators in the production of polyesters. Often, sensitivity of these in vitro tests is lower than that of the skin test. A negative result does therefore not exclude a sensitization.

References


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