

## A FARMER'S OCCUPATIONAL AIRBORNE CONTACT DERMATITIS MASQUERADED BY COEXISTING ROSACEA: DELAYED DIAGNOSIS AND LEGAL ACKNOWLEDGEMENT

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**Abstract:** A rare case of coexistence of occupational airborne dermatitis with rosacea is presented in a 41-year-old female farmer. Her first dermatitis symptoms appeared at the age of 10 when she started helping her parents on the farm. Uncovered skin areas of the face, neck, décolleté, forearms and the hands gradually became involved. The dermatitis symptoms were provoked by agricultural dusts (especially of flax and dried herbs). For the subsequent 30 years, the work-related disease remained undiagnosed due to the lack of pre-employment and periodical health check in agriculture. She also suffered from protein contact dermatitis of the hands from cow epithelium. About 20 years after the onset of airborne dermatitis, rosacea developed, possibly secondary to the prolonged treatment. Diagnostic tests carried out at our department confirmed hypersensitivity to occupational allergens: type I allergy to storage mites, moulds, and cow epithelium. A cutaneous late-phase reaction on prick tests and serum precipitins to the bacterium *Pantoea agglomerans* (*Erwinia herbicola*) also were found. Among non-occupational hypersensitivities, type I allergy to house dust mites and contact allergy to methylchloroisothiazolinone/methylisothiazolinone (Kathon CG) was found. In connection with these results, the significance of agricultural dusts in farmers' airborne dermatitis is discussed. Also presented are the problems with obtaining acceptance from the State Sanitary Authority for qualification of this case as an occupational disease, which was due to the coexistence of the non-occupational rosacea. Discussed is also the problem of pre-employment exposure to occupational allergens among farmers' children, and the difficulties with delivering occupational health services to self-employed farmers.

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Occupational skin diseases frequently remain undiagnosed for years [51, 63, 65]. Self-employed farmers are especially affected by this problem, because of the lack of periodical health checks and the low awareness of occupational skin diseases among both farmers and their

doctors [52, 66]. The present case demonstrates that the delay may also be caused by the coexistence of a non-occupational skin disease. To illustrate this, legal procedures following the diagnosis and misunderstandings by the authorities are described.

## CASE DESCRIPTION

**Patient's history.** The 41-year-old female patient had been taking part in activities on her parents' farm since the age of 10. After marrying a farmer, she continued her work in agriculture. Throughout her life she was involved in the production of field crops (potatoes, sugar beet, grain, flax), and tending animals (cows, pigs, horses, poultry). She also took part in the commercial production of medical herbs and chrysanthemums.

The first work-related symptoms appeared soon after she started helping her parents on the farm. Initially, this was a moderately itching skin erythema on the face, gradually spreading to other uncovered areas: the neck, décolleté, forearms and the hands. A prolonged inflammation of the skin subsequently developed with erythema, oedema, and fine scaling. The symptoms were provoked by the exposure to agricultural dusts, especially while threshing flax and milling dried herbs (camomile, thyme, dandelion, common valerian, marigold and lovage). Eye redness, nasal itch and sneezing, runny nose, cough and respiratory stridor frequently accompanied these skin symptoms. Additionally, working with cows caused eczema of the hands.

These symptoms were provoked exclusively by the activities on the farm. Initially, there was a complete clearance during periods off-work. After 15-20 years, the disease became persistent. The patient continued working, occasionally seeking medical treatment by general practitioners. In the last decade, inflammatory papules and telangiectasis appeared on the face, which led to the diagnosis of rosacea. As the patient insisted on confirmation of a causal relationship between work and her skin problems, she was finally referred to our department in Lublin.

**Medical examination** on the first visit revealed a pronounced erythema and oedema of the skin with telangiectasis and papules on the face, and erythema with telangiectasis on the décolleté. There was a moderate redness of conjunctivae. Apart from arterial hypertension, no further pathology was found. The patient underwent the standardised diagnostic procedure for farmers' occupational diseases used at our department [68].

**Skin prick tests** with a broad range of occupational and common allergens (Allergopharma, Reinbek, and Biomed, Cracow) revealed immediate skin reactions (type I allergy) to the storage mites *Lepidoglyphus destructor* (+++), *Acarus siro* (++) and *Tyrophagus putrescentiae* (+), as well as to cow epithelium (+), horse epithelium (+), poultry feathers (+), and fungi *Curvularia lunata* (+), *Helminthosporium halodes* (+), *Pullularia pullulans* (+), *Serpula lacrymans* (+), *Candida albicans* (+). There were also positive reactions to house dust (+), the house dust mites *Dermatophagoides farinae* (+++) and *Dermatophagoides pteronyssinus* (+++). Cutaneous late phase reaction to the antigen of bacterium *Pantoea*

*agglomerans* (*Erwinia herbicola*) was observed in the form of an inflammatory papule of 3-mm diameter that appeared approximately 8 h after prick tests and was still present 16 h later.

**Intracutaneous tests** with wood dusts and plant fibres (Allergopharma) revealed an immediate positive reaction to flax dust (a wheal of 23-mm diameter after 15 min). Patch tests with European standard series, plant series (Chemotechnique, Malmö), pesticide series (IMW, Lublin) and rubber series (Jaworski, Katowice) revealed hypersensitivity to Cl+Me-isothiazolinone 0.01% aqueous solution (Kathon CG). This was a (++) reaction [53] on days 3, 4 and 5.

**Alkali resistance test** of the uninvolved skin [16] revealed a moderately decreased buffering capacity.

**In vitro tests.** Total IgE amounted to 1285 kU/l exceeding 10 times the normal level (120 kU/l). The Ouchterlony precipitation test was carried out, as described previously [79], with antigens of airborne microbes typical for farm environment. The test included antigens of *Aspergillus fumigatus*, *Candida albicans*, *Saccharopolyspora rectivirgula* (*Micropolyspora faeni*), *Thermoactinomyces vulgaris*, *Streptomyces albus*, *Arthrobacter globiformis*, *Pantoea agglomerans*, *Acinetobacter calcoaceticus*. Precipitin antibodies against *Pantoea agglomerans* and *Candida albicans* were detected in the patient's serum.

**The final diagnosis** of two occupational skin diseases was made: airborne contact dermatitis from allergens present in agricultural dusts (storage mites, flax allergens, *Pantoea agglomerans* and moulds), and protein contact dermatitis of the hands from cow epithelium. Additionally, the non-occupational rosacea and allergy to house dust mites and Kathon CG were confirmed.

**Further legal procedures.** According to Polish legal regulations (detailed discussion in [66]), the above diagnosis of occupational skin diseases was submitted to the State Sanitary Authority for acceptance. The first instance – the County Sanitary Inspector, rejected the case based on the fact that the patient's first symptoms appeared before her official employment as a farmer, and that she was allergic also to non-occupational allergens, such as house dust mites and Kathon CG.

An appeal followed at the higher instance – the Province Sanitary Inspector. We pointed on the fact that farmers' children, from their early years, live on the farm, which is an occupational environment. This "pre-term" occupational exposure should not discriminate them from compensation rights. As a matter of fact, Polish law and legal precedents support this view: Farmers' insurance for occupational accidents is automatically extended on their family members living and working on the farm, including children. We also stressed that coexistence of a non-

occupational disease does not exclude the patient's rights for compensation for impairment caused by the occupational disease of the same organ. The Province's Sanitary Inspector accepted the above arguments and the farmer was declared eligible for compensation.

## DISCUSSION

The coexistence of occupational and non-occupational skin diseases is rarely reported. A case of occupational contact dermatitis that coexisted with psoriasis has been previously described in a nurse [22]. Recently, we have also observed a farmer, whose occupational contact dermatitis to thiuram was masqueraded by pre-existing psoriasis [65]. Thiuram is a component of seed protectants and pesticides, which are relevant sensitizers in agriculture [50, 66, 69].

In the above-described farmer, the first symptoms of the work-related disease appeared already at the age of 10, shortly after starting activities on her parents' farm. This observation points to important issues related to occupational safety and health in agriculture. First, children of farmers start their "occupational career" very early while helping their parents on the farm. For rural children, the farm is a domestic environment and they are keen on copying their parents' activities [33]. In this way, however, the children become exposed to occupational allergens long before starting any formal employment. The second important issue is the lack of pre-employment health checks for farmers at the time they officially start the profession.

A combination of the above may lead to a situation that a "newly employed" farmer has already a burden of long-lasting occupational exposure, or even an occupational disease, as in the described case. Unfortunately, without any intervention, the disease could further develop. Altogether, it was over 30 years before the proper diagnosis was established. Without much exaggeration one may say that a farmer sees an occupational health professional for the first time when it has already come to submitting a compensation claim. Such a situation leaves no space for primary and secondary prevention, which are crucial for occupational safety and health [4, 54].

Another problem emerging from this case report is the misinterpretation of the coexisting non-occupational disease (rosacea), and non-occupational allergy to house dust mites and Kathon CG by the Sanitary Authority officer. In fact, a coexistence of non-occupational and occupational diseases of the same organ should not affect one's compensation rights, irrespective of possible difficulties with determining which part of the impairment was actually work-related. Such information may be required by insurance agencies in order to calculate the amount of worker's compensation [66, 82].

Diagnostic considerations should also involve the fact that allergic contact dermatitis of the face may sometimes have a rosacea-like appearance. This was observed in allergy both to occupational substances [7, 27], external

drugs [8, 34] and cosmetics [1, 6]. In the farmer described here, the non-occupational rosacea was most probably secondary to the treatment of the occupational dermatitis of the face. Such a possibility must be considered, especially in the case of prolonged treatment with topical corticosteroids [15]. Also, the contact allergy to Kathon CG in our patient was most probably secondary to the previous treatment. Kathon CG is a commercial name for the combination of 5-chloro-2-methyl-4-isothiazolinone (methylchloroisothiazolinone, MCI) and 2-methyl-4-isothiazolinone (methylisothiazolinone, MI). It is widely used as a preservative in cosmetics and external drugs [49]. As many as 20% of patients with dermatitis become allergic to Kathon CG already in childhood [61]. Kathon CG may also cause occupational allergy, e.g. in the milk industry, where it is used to prevent the decay of milk samples [20]. Our patient, however, was not exposed to this preservative in occupational settings.

The very high level of total IgE, together with positive skin prick tests and the patient's history indicate that she was atopic. There is an ongoing discussion whether atopy is a risk factor for occupational dermatitis [24, 26, 55, 58, 83]. Atopy promotes type I occupational allergy [37, 70], which played important role in the described case, whereas type IV allergy seems independent on atopy [62]. Type III allergy to *Pantoea agglomerans* also probably played a role in the patient's disease, which is suggested by the cutaneous late phase reaction to *P. agglomerans* on skin prick test, and by the presence of specific precipitins in the patient's serum [2]. *Pantoea agglomerans* (*Erwinia herbicola*) is an epiphytic, endotoxin-producing, Gram-negative bacterium that is abundantly present in dusts from grain [9, 60], flax [31], herbs [12] and other plant materials [11, 14, 19]. It induces a potent immunologic response in agricultural workers exposed to grain [10, 57], flax [56] and herbs [13, 18], and may cause allergic pulmonary disorders in farmers [32, 36, 38].

Farmers are exposed to large quantities of agricultural dusts during their work. These dusts consist of varying amounts of non-organic material, organic particles of plant and animal origin, as well as living and dead microorganisms [9, 11, 14, 21, 25, 30, 39-43]. The organic dusts relevant to our patient (herb dusts, flax dust, and mite particles) were previously studied mostly for their relationship to farmers' respiratory diseases, where their pathogenic role has been well documented [13, 23, 35, 36, 44, 45, 47, 48, 56, 57]. The same airborne agents, however, settle also on the skin and may trigger local inflammatory reactions [5, 17, 28, 29, 64, 67, 71, 77-81]. This is referred to as airborne dermatitis, defined as an inflammatory reaction (either allergic or irritant) initiated by airborne agents that settle on the skin [3]. Cases of occupational airborne dermatitis caused by plant material were previously reported in agriculture and food-processing industries [72, 74, 75, 79].

The patient's hand dermatitis was caused by type I (IgE-dependent) allergy to cow epithelium. This variant of allergic contact dermatitis is referred to as protein

contact dermatitis. Typical clinical features and previous reports on protein contact dermatitis to cow epithelium are discussed elsewhere [63, 76]. Cross-reactivity may occur between allergens of the cow and other animals: goats, sheep, and deer [46, 59, 63, 73].

Irrespective of the involved patomechanisms, a pre-employment medical check of the described patient at the age of 18-20 most probably would have detected the already present work-related symptoms, thereby avoiding the next 20 years of disease and final disability. This example shows how urgent is the need for introducing health checks in agriculture.

## CONCLUSIONS

The rare case of coexistence of occupational airborne dermatitis and rosacea was presented. This unusual case raises important questions about the interpretation of the coexistence of occupational and non-occupational skin diseases.

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