

Consequences of occupational food-related hand dermatoses with a focus on protein contact dermatitis

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doi:10.1111/j.1600-0536.2012.02101.x

Summary

Background. Protein contact dermatitis is a frequent disorder among hand eczema patients who have occupational food contact. Knowledge about the consequences of having protein contact dermatitis is lacking.

Objectives. To investigate the consequences of having occupational skin disease on the hands resulting from food handling, with a focus on protein contact dermatitis.

Material and methods. One hundred and seventy-eight patients who were identified as having skin disease related to occupational food exposure and who answered a questionnaire concerning the consequences of their skin disease were included in the study. The patients were consecutively examined at Gentofte Hospital, Denmark between 2001 and 2010.

Results. Seventy-five per cent of patients with protein contact dermatitis had to wear gloves at work, and 62.5% reported sick leave lasting for > 3 weeks, as compared with 60.2% and 30%, respectively, of the patients with other occupational food-related hand dermatoses ($p = 0.02$). Sixty-two per cent and 43%, respectively, had to change job because of skin problems ($p = 0.02$). Atopic dermatitis was equally common in the two groups.

Conclusion. We found that the patients with protein contact dermatitis experienced more severe and frequent consequences than patients with other food-related hand dermatoses.

Key words: allergic contact dermatitis; atopic dermatitis; contact urticaria; financial consequences; irritant contact dermatitis; job change; physician consulting; protein contact dermatitis; sick leave; work-related consequences.

Protein contact dermatitis represents a subgroup of occupational dermatoses. Although this disorder is relatively uncommon as compared with allergic and irritant contact dermatitis, we have previously shown that protein contact dermatitis is the second most common occupational dermatosis (22%) in patients who have

food-handling jobs, with irritant contact dermatitis being the most common (57%) (1).

The aim of this patient-based questionnaire study was to investigate the specific consequences of having occupational skin diseases among patients who work with food, with a focus on the consequences of having protein contact dermatitis.

Methods and Materials

Study population

The study population has been previously detailed (1). Briefly, it comprised 372 patients who had occupational

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Conflicts of interest: The authors have declared no conflicts.

Accepted for publication 17 March 2012

food contact at some point, and, in relation to this, skin problems on the hands, and who also had been skin prick-tested with different foods at the Department of Dermato-Allergy at Gentofte University Hospital, Denmark between January 2001 and June 2010 (1).

Questionnaire

A self-administered questionnaire was mailed to the 372 patients. The identification of patients and the questionnaire survey were conducted from September to November 2010; hence, the follow-up time was from 10 years to 3 months. Reminders and additional questionnaires were sent to the non-responders. Only patients who confirmed working with food and who experienced skin problems

resulting from this occupational exposure were included. Non-responders were excluded. Information was obtained about work-related and financial consequences, medical attention, and duration of disease (Table 1).

Clinical diagnoses

On the basis of the information obtained from the questionnaire and results from the skin prick and patch tests, patients were divided into different categories of occupational skin diseases, according to predefined clinical criteria (1): patients who experienced a rapidly clearing wheal-and-flare reaction immediately after skin contact with specific food with no residual signs of irritation or eczema and a positive skin prick test reaction to

Table 1. Questions used in the questionnaire to clarify and describe the consequences of occupational food-related dermatoses

Question category	Group questioned	Question	List of answers
Work-related consequences	All participants	Has the skin disorder on your hands affected your daily work with food? Which of the following statements match your situation?	No affect Because of the skin disorder: – I have to wear gloves – My work tasks have changed – I have difficulties in finding a job – My colleagues are negatively disposed towards me – I have retired
Job change	All participants	Have you, because of your skin disorder, been obliged to find a new job or education without skin contact with food?	Yes No
	Only patients who left their job or education	Did your skin disorder improve after the change?	Yes, markedly Yes, a little No change No, it has become aggravated No, it has become markedly aggravated
Sick leave	All participants	Have you called in sick because of skin problems?	Yes No
	Only patients who have called in sick	For how long have you been absent from work in the past 12 months?	Under 1 week 1–2 weeks 3–5 weeks 6 weeks or more
Financial consequences	All participants	Has your skin disorder had any negative influence on your financial situation?	No Yes, some impact Yes, a certain financial loss Yes, a considerable financial loss
Physician contact	All participants	Have you had any contact with a doctor in the last 12 months because of your skin disorder?	No Yes, once Yes, two to five times Yes, more than five times
Duration of disease	All participants	For how long have you, in total, had skin problems?	<1/2 year 1/2–2 years >2–5 years >5–10 years >10 years Unknown

food were classified as immunological contact urticaria patients (2–4); patients with similar clinical symptoms, but a negative skin prick test reaction to food were classified as non-immunological contact urticaria patients (2); and patients who were exposed to protein material and who had chronic or recurrent hand eczema as well as a positive skin prick test reaction to food were classified as protein contact dermatitis patients (5–10). An immediate urticarial exacerbation after protein contact might be noted in these patients, but was not a criterion for classification (6–8, 11). Allergic contact dermatitis patients comprised those with hand eczema and positive patch test reactions to ingredients (2, 12). Finally, the category of irritant contact dermatitis included patients who had hand eczema from working with food and other irritants associated with food-related occupations, but did not have positive skin prick or patch test reactions to food ingredients or additives (2).

Patients who had multiple reactions (i.e. immediate reactions, positive skin prick and patch test reactions, and hand eczema) were placed in a separate category, 'multiple diagnoses'.

The category 'non-classifiable' comprised patients for whom classification was not possible, owing to missing information.

Atopic dermatitis was diagnosed from the questionnaire according to the UK Working Party criteria (13).

Statistical methods

Data were processed in the SPSS package (SPSS™ Statistics, Chicago, IL, USA; IBM PASW statistics) for Windows™ (release 18.0). Characteristics of participants were compared by use of the chi-square test and logistic regression analyses. The level of significance was chosen as $p < 0.05$. The comparative analyses were performed between protein contact dermatitis patients and patients with other occupational food exposure-related hand dermatoses (i.e. irritant contact dermatitis, allergic contact dermatitis, contact urticaria, and multiple diagnoses).

Results

Of the 372 patients included in the survey, 258 (69.4%) returned the questionnaire. A total of 178 patients confirmed having handled food occupationally and reported an association with their skin problems. A total of 54 men and 124 women, aged 17–65 years, were included.

Diagnoses

The distribution of diagnoses is shown in Table 2. Atopic dermatitis was observed in 48.6% (85/175) of the

Table 2. The distribution of diagnoses

Diagnosis	% (no.) n = 178
Protein contact dermatitis	28.1 (50)
Other occupational food-related hand dermatoses	
Irritant contact dermatitis	63.5 (113)
Non-immunological contact urticaria	3.9 (7)
Allergic contact dermatitis	1.7 (3)
Immunological contact urticaria	0.6 (1)
Multiple diagnoses	0.6 (1)
Non-classifiable	1.7 (3)

population: 56% (28/50) among patients with protein contact dermatitis, and 45.6% (57/125) among patients with other occupational food-related dermatoses [odds ratio (OR) 1.52, 95% confidence interval (CI) 0.8–2.9, $p = 0.2$].

Consequences of occupational food-related hand dermatoses

All patients (100%) with protein contact dermatitis experienced some work-related consequences of their skin condition, as opposed to patients with other diagnoses (92.7%; $p = 0.05$) (Table 3).

The distribution of specific work-related consequences stratified by diagnoses is shown in Fig. 1. The most frequent consequences in both diagnostic groups were the need for glove use and change of job and work tasks. However, significantly more patients with protein contact dermatitis had to wear gloves and change job because of their skin problems in adjusted analyses (Fig. 1; Table 3). In total, a change of job resulted in improvement of the skin disorder in 84.1% of all cases, without any significant difference between the groups (Table 3). A total of 72 patients had been on sick leave because of their skin problems. Patients with protein contact dermatitis had to take significantly longer sick leave than patients with other diagnoses, as 62.5% of the patients with protein contact dermatitis on sick leave were absent for >3 weeks, whereas 70% of the patients with other diagnoses were absent for <1 week ($p = 0.02$). Of the patients with protein contact dermatitis, 72.3% found that their skin disorder had had a negative impact on their financial situation, as compared with only 52.9% of the patients with other occupational food exposure-related hand dermatoses ($p = 0.02$). In total, 38.2% of all patients had consulted a physician because of their skin problems during the past year. Significantly more patients with protein contact dermatitis reported a need for medical consultation ($p = 0.004$).

Occupational hand dermatoses related to occupational food exposure were long-lasting disorders, as 61.2% of

Table 3. Consequences of protein contact dermatitis and other occupational hand dermatoses

Consequence	Total n = 175 % (no.)	Protein contact dermatitis patients n = 50 % (no.)	Patients with other diagnoses n = 125 % (no.)	Crude OR [†] (95% CI)	Adjusted OR (95% CI) [†]	p-value*
Any work-related consequence	94.7 (162/171)	100 (48/48)	92.7 (114/123)	—	—	0.05
Wearing gloves was necessary	64.3 (110/171)	75 (36/48)	60.2 (74/123)	2.0 (0.9–4.2)	2.3 (1.1–5.1)	0.07
Changed job because of skin problems	48.5 (83/171)	62 (31/50)	43 (52/121)	2.2 (1.1–4.3)	2.1 (1.1–4.2)	0.02
Changed work areas	25.7 (44/171)	35.4 (17/48)	22.0 (27/123)	2.0 (0.9–4.0)	1.9 (0.9–4.1)	0.7
Has retired	7.0 (12/171)	10.4 (5/48)	5.7 (7/123)	1.9 (0.6–6.4)	3.3 (0.7–16.0)	0.3
Difficulties in finding a job	3.5 (6/171)	4.2 (2/48)	3.3 (4/123)	1.3 (0.2–7.3)	1.2 (0.2–7.1)	0.8
Colleagues were negative	2.9 (5/171)	2.1 (1/48)	3.3 (4/123)	0.6 (0.07–5.8)	0.6 (0.06–6.1)	0.7
Skin disorder after job change						
Major or minor improvements	84.1 (69/82)	87.1 (27/31)	82.4 (42/51)	1.5 (0.4–5.2)	1.4 (0.4–5.2)	0.6
No improvements	12.2 (10/82)	12.9 (4/31)	11.8 (6/51)	1.1 (0.3–4.3)	1.3 (0.3–5.1)	0.9
Exacerbation	3.7 (3/82)	0 (0/31)	5.9 (3/51)	—	—	0.2
Sick leave						
Yes	42.4 (72/170)	45.8 (22/48)	41.0 (50/122)	1.2 (0.6–2.4)	1.3 (0.6–2.6)	0.6
<1–2 weeks	60.7 (34/56)	37.5 (6/16)	70.0 (28/40)	0.3 (0.08–0.9)	0.6 (0.3–0.6)	0.02
≥3 weeks	39.3 (22/56)	62.5 (10/16)	30.0 (12/40)	3.9 (1.2–12.1)	3.9 (1.0–15.8)	0.02
Any financial impact of the skin disorder	58.3 (98/168)	72.3 (34/47)	52.9 (64/121)	2.3 (1.1–4.8)	2.2 (1.0–4.8)	0.02
Degree of financial impact						
Little negative financial impact	41.8 (41/98)	41.2 (14/34)	42.2 (27/64)	1.0 (0.4–2.2)	0.9 (0.4–2.2)	0.9
A certain financial loss	38.8 (38/98)	35.3 (12/34)	40.6 (26/64)	0.8 (0.3–1.9)	0.8 (0.3–1.8)	0.6
A considerable financial loss	19.4 (19/98)	23.5 (8/34)	17.2 (11/64)	1.5 (0.5–4.1)	1.9 (0.8–5.6)	0.5
Doctor contact within the last 12 months						
Yes	38.2 (66/173)	55.1 (27/49)	31.5 (39/124)	2.7 (1.4–5.3)	2.9 (1.4–6.0)	0.004
Yes, once	31.8 (21/66)	29.6 (8/27)	33.3 (13/39)	0.8 (0.3–2.4)	0.9 (0.3–3.0)	0.8
Yes, two to five times	36.4 (24/66)	37.0 (10/27)	35.9 (14/39)	1.1 (0.4–2.9)	1.2 (0.4–3.5)	0.9
Yes, more than five times	31.8 (21/66)	33.3 (9/27)	30.8 (12/39)	1.1 (0.4–3.2)	0.9 (0.3–2.9)	0.8
Duration of skin disorder						
<5 years	38.8 (64/165)	28.3 (13/46)	42.9 (51/119)	0.5 (0.3–1.1)	0.5 (0.2–1.0)	0.8
≥5 years	61.2 (101/165)	71.7 (33/46)	57.1 (68/119)	—	—	—

CI, confidence interval; OR, odds ratio; no., number.

*p-value calculated with a chi-square test.

†Crude and adjusted ORs calculated with logistic regression analyses.

Patients with other diagnoses include those with irritant contact dermatitis, allergic contact dermatitis, immunological contact urticaria, and non-immunological urticaria, and patients with multiple diagnoses. Significant values are written in bold type.

all patients reported that the duration of their disease exceeded 5 years, and there was no statistically significant difference between the groups (Table 3).

Discussion

Occupational food contact is among the top five causes of occupational skin disease in Denmark (14–16). In a previous study, diagnostic criteria and the distribution of diagnoses in occupational skin diseases caused by food handling were discussed in detail (1). In the current study, we investigated the work-related consequences of having occupational food-related hand dermatoses, with a focus on the consequences of having protein contact dermatitis.

We found that skin diseases resulting from occupational food contact can have profound and far-reaching consequences, especially for those patients who have

protein contact dermatitis. Almost all patients reported that their skin disorder led to work-related consequences, such as the use of gloves and change of job and work tasks. Regarding glove use, we identified the workers for whom the use of gloves became a consequence of their skin problems. It must be assumed that these workers did not wear gloves before skin problems appeared. The use of gloves may be an indicator of the severity of skin problems. Overall, occupational food-related hand dermatoses led to change of job in almost half of the patients. Previous studies have compared the risk of job changes resulting from skin disorders in different occupational categories. A Finnish study reported that 56% (29/52) of the patients with food-related occupations changed job because of occupational irritant or allergic contact dermatitis, making them the occupational group with the highest frequency of job change (16). Likewise, a Danish study of patients with food-related occupations reported

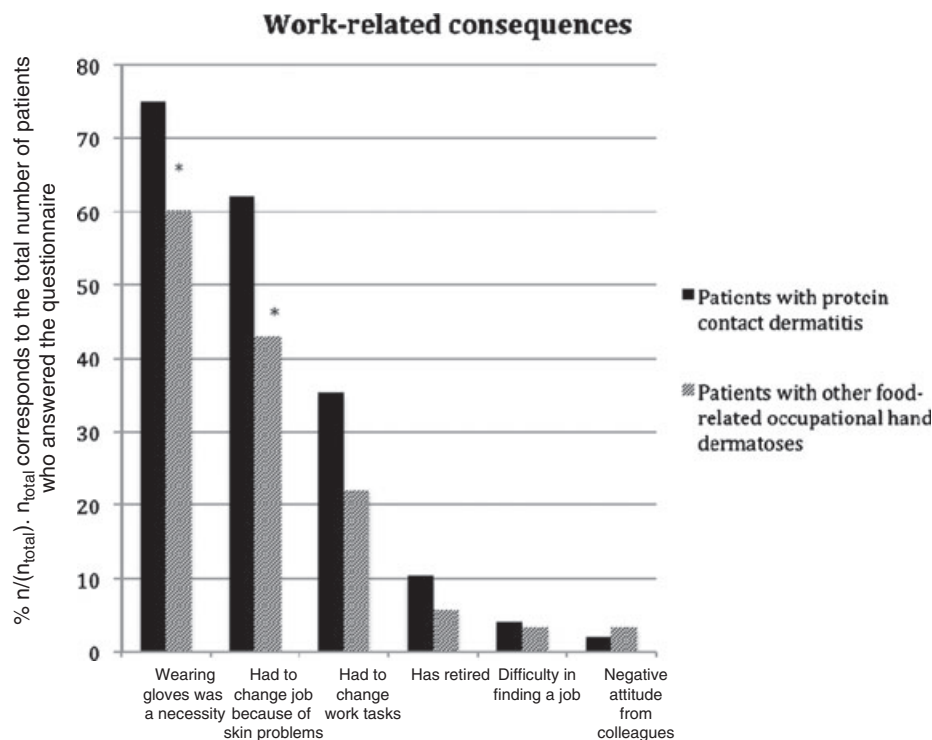


Fig. 1. Work-related consequences of occupational hand dermatoses based on the questionnaire answers (Table 1). The category 'patients with other food-related occupational hand dermatoses' included patients with irritant contact dermatitis, allergic contact dermatitis, immunological and non-immunological urticaria, and multiple diagnoses. *Significant difference ($p < 0.05$).

that 34.8% (39/112) of the patients changed job because of occupational irritant and/or allergic contact dermatitis or contact urticaria, a significantly higher proportion of patients than in other exposed occupations (17). Most of the patients in our study who did change job (84.1%) experienced improvements in their skin condition after doing so. However, in a minority (15.9%) of the patients, no improvements were seen. This could be attributable to a more severe state of skin disease in patients changing their jobs or to continued skin exposure to allergens and irritants in domestic food handling or food handling in a new job (14, 15). The combination of contact with highly irritating ingredients, prolonged and frequent contact with less irritating ingredients, frequent hand washing and the use of gloves are factors that explain why food-related occupations are so severely affected by skin diseases (2, 15).

Atopic dermatitis was found in 48.1% of our population, which is consistent with previous studies concerning patients with occupational food-related hand dermatoses. The frequency of atopic dermatitis was 57–60.5% among bakers with skin disease, 46.5–48% among cooks, and 39% among butchers (18, 19). Atopic dermatitis is a well-established risk factor for the

development of hand dermatitis in general (6, 20) and also in our cohort. The frequencies of atopic dermatitis in individuals in other exposed occupations, such as hairdressers and mechanics, are often lower than the frequency in food-related occupations (16, 19, 21). This may indicate that occupational food contact constitutes a massive exogenous exposure that affects atopic dermatitis patients, so that even the less susceptible among this group develop symptoms (19).

We compared the consequences for patients with protein contact dermatitis and patients with other diagnoses, which, because of the sample size, mainly consisted of irritant contact dermatitis patients. It was shown that protein contact dermatitis patients were more extensively affected. First, they had to use gloves and experienced work-related consequences significantly more often than patients with other occupational food-related hand dermatoses. This difference might be caused by differences in immediate symptoms. The majority of protein contact dermatitis patients in this study experienced an acute urticarial reaction immediately after food contact. Immediate reactions in relation to occupational exposure to food may result in direct work-related consequences and enhanced glove use. Second, more protein contact

dermatitis patients had to change their job because of skin problems, and they were absent from work on sick leave for significantly longer. Third, more patients with protein contact dermatitis than patients with other diagnoses experienced a negative financial impact, and they consulted a physician more frequently. The negative financial consequences could be attributable to the longer sick leave and higher frequency of job change.

The more severe consequences experienced by protein contact dermatitis patients, presumably because of the different aetiology, highlights the importance of considering protein contact dermatitis as a distinct clinical entity (1). The negative consequences were not explained by coexisting atopic dermatitis, as no significant association was found between protein contact dermatitis and atopic dermatitis (UK criteria) in our study. The presence of filaggrin

gene mutations in the protein contact dermatitis patients might be another factor not accounted for, a possible association that should be investigated in future studies.

Conclusion

We found that occupational food exposure is associated with negative consequences. Patients with protein contact dermatitis were more extensively influenced by work-related consequences, job changes, and a negative financial situation, and had more frequent contact with doctors as an indicator of more severe disease, than patients with other occupational food-related hand dermatoses. These findings emphasize the importance of diagnosing protein contact dermatitis, as this is an entity with more severe implications.

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