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Occupational hand dermatitis in food industry apprentices: results of a 3-year follow-up cohort study

Received: 25 September 2000 / Accepted: 20 February 2001

Abstract Objective: The aim of this prospective follow-up study was to quantify the impact of hand dermatitis (HD) in bakers, confectioners and bakery shop assistants, and to investigate related risk factors. Method: Bakers’, confectioners’ and bakery-shop assistants were included in a prospective follow-up study in the region of East Thuringia starting in August 1996. At the beginning of their vocational training 91 apprentices were interviewed and examined in a standardised way. Follow-up examinations and interviews were done after 6 months \((n = 79)\), 12 months \((n = 63)\) and at the end of the training \((n = 69)\) after 36 months. Results: In their case histories 3.3% \((n = 3)\) of the apprentices reported previous HD in childhood and adolescence. The first assessment after 2 to 4 weeks of vocational training revealed HD in 17.5% \((n = 16)\) of the individuals. At the follow-up examination after 6 months, point prevalence of HD was 29.1% \((n = 23)\), after 12 months 27.0% \((n = 17)\) and after 36 months 27.5% \((n = 19)\). Mild to moderate irritant contact dermatitis was the most frequent finding. Finally, an atopic skin diathesis \((>10 \text{ points, “atopy score”})\) \((OR = 4.89; CI 95\% 1.15–20.79)\), previous HD \((OR = 41.1; CI 95\% 4.99–339.13)\) as well as flexural dermatitis \((OR = 6.8; CI 95\% 1.72–27.22)\) proved to be predictive factors for the development of HD. No association was found for respiratory atopy \((OR = 1.29; CI 95\% 0.35–4.7)\) and metal sensitisation \((OR = 1.1; CI 95\% 0.29–4.35)\). Exogenous irritant factors did not show a strong association towards a risk increase. Wet work in general, as well as distinct occupational tasks showed only a tendency for being a risk factor for HD. However, leisure time activities, especially house building and rebuilding \((OR = 5.4; CI 95\% 1.05–27.81)\), were associated with an elevated risk. Conclusions: Endogenous and exogenous factors contribute to the development of HD in bakers’ and confectioners’ apprentices.

Key words Irritant contact dermatitis · Prospective cohort study · Baker · Confectioner · Atopy · Wet work

Introduction

Occupational skin disease (OSD) 5101 has been the second most frequent occupational disease (OD) in the food processing industry over the past years. In 1998, the employers liability insurance for the food processing industry (Berufsgenossenschaft Nahrungmittel und Gaststätten, BGN) registered 944 new imputed cases of OSD 5101 among food industry workers. About one-third of the cases concerned bakers and confectioners. Costs for workers’ compensation, medical treatment and occupational retraining were up to many million deutschmarks [1].

Irritant contact dermatitis is the major problem. Not only senior workers are affected. Hand dermatitis seems to start early, during apprenticeship, as we and others had shown previously [2, 3, 17, 20]. Main risk factors for the development of OSD are high loads of wet work, exposure to irritants and atopic skin diathesis [2, 3, 21]. This paper presents results of the morbidity of hand dermatitis and the impact of potential risk factors for the development of hand dermatitis (HD) in a prospectively followed-up cohort of bakers’, confectioners’ and shop assistants’ apprentices during their 3 years of training, focusing on the whole study period with special emphasis on the final examination.
Material and methods

Bakers’, confectioners’ and bakery-shop assistants’ apprentices were followed up in a prospective cohort study from August 1996 to July 1999, in order for the morbidity of HD to be quantified and associated risk factors identified.

After giving their informed consent to an interview and a dermatological examination of the hands, all food profession apprentices (n = 91) of the occupational school of Gera (East Thuringia) were included in the study in August of 1996. The initial interviews and examinations took place between weeks 2 and 4 after the beginning of their training, due to logistical reasons. At the first follow-up, after half a year of work, 79 apprentices were interviewed and examined, followed by 63 after 1 year, and 69 at the end of training. Changing numbers were due to dropout because of medical or private reasons, withdrawn consent or unavailability at the dates of examination. Only those were included in the data analysis who had been present at every examination time point (n = 63).

The personal history was obtained using a standardised form modified after Diepgen et al. [2]. Age, gender, profession and the size of the bakery were documented. Personal history concentrated on former skin diseases, especially atopic dermatitis, using the “Erlangen atopy score” [3]. To ensure the reliability of the data collected and to minimise interobserver variability, the investigators were trained intensively prior to the study onset. Respiratory atopy was documented as well. Interviews were performed at the time points indicated above.

Occupational exposure was documented qualitatively and quantitatively. A questionnaire for the profession of baker, confectioner and shop assistants was created. The apprentices were asked whether they have to carry out special tasks (cleaning of work place and machines, cleaning of work room and storage rooms, working with, and having skin contact with, wet dough, fruit handling, layer cake and chocolate preparation, oven work), and for how long (< 1 h; 1–4 h; > 4 h).

Skin protection measures were documented: the apprentices were asked whether they used gloves (possible answers: no, yes, if yes: how long) skin protection and skin-care ointments (possible answers: no, yes, if yes: how often). Additionally, skin-cleansing habits were monitored (possible answers: < 10; 10–20 times; > 20 times a day).

Also monitored were leisure time activities and exposure to cleaning, nursing, car maintaining, house building or rebuilding and gardening (possible answers: never, daily, weekly, monthly).

The dermatological examination of the hands was performed by dermatologists trained in allergy and occupational dermatology. Hand dermatitis was defined as mild when erythema and scaling appeared on the dorsal aspects and/or interdigital folds (ID) of the hands; moderate, when infiltration and papules were seen and the affected area enlarged; severe, when vesicles and fissures appeared, additionally. Differential diagnoses were made by clinical course and personal history.

Mean scores and percentages were calculated. Relative risks were calculated using cross-tabs with dichotomous variables. For additional analysis we used logistic regression. We selected internal comparison groups because prevalence comparisons with non-exposed workers tend to be less influenced by healthy worker effect, other sources of selection bias, and confounding. The subgroups were treated as fixed categories. Statistical evaluation was done using the software-package SPSS 8.0 for Windows.

Results

Demographic profile

Ninety-one apprentices were interviewed and examined at the initial examination in August 1996, 79 (87%) at the first follow-up examination after 6 months, 63 (69%) after 1 year and 69 (76%) at the end of training. Different numbers at the time of examination were due to dropouts. Four apprentices dropped out because of medical reasons, two of them because of bronchial asthma (after 12 months) and HD (after 36 months), respectively. Two apprentices cancelled their training because of personal reasons after 6 months. Three apprentices withdrew their consent and another 19 apprentices were not available for at least one examination.

At the end of training the demographic profile resembled that of the initial examination [2]. Thirty-eight (60.3%) apprentices were in training for the baking profession. Forty-eight (76.2%) worked in companies with fewer than 15 employees, ten (15.9%) in large scale enterprises and five (7.9%) in special training centres. Women accounted for 57.1% (n = 36). The mean age at the time of the last examination was 19.5 ± 0.99 years. There was at least one piercing in 68.3% (n = 43), and 20.6% (n = 13) reported metal sensitisation. Forty-one (66.1%) were smokers. Ten (15.8%) apprentices showed an atopic skin diathesis (> 10 score point). Eight (12.7%) apprentices complained about respiratory atopy.

Hand dermatitis in the course of training

Of the trainees, 3.3% (n = 3) reported previous HD in childhood or adolescence. HD – at least in a mild expression – occurred in 17.5% (n = 16) after 2–4 weeks of practical work, in 29.1% (n = 23) after 6 months, in 27.0% (n = 17) after 12 month and in 27.5% (n = 19) at the end of training (Fig. 1). In general, 26 (41.3%) apprentices reported having had HD during training.

Almost one-third of the apprentices developed skin problems within the first months of the vocational training, and continued to have episodes of HD until the end of the training. In most cases the HD was mild or moderate. Severe HD was seen in only two apprentices (dropouts due to HD). Irritant HD was by far the most common diagnosis, (n = 15; 78.9%; four out of them suspected allergic contact dermatitis, additionally)