

Healthy worker effect in hairdressing apprentices

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Summary

Background. Hairdressers and hairdressing apprentices have a high incidence of occupational hand eczema, owing to excessive wet work and exposure to chemical substances. Hairdressing apprentices, in particular, seem to be at high risk of developing hand eczema. Previous hand eczema and atopic dermatitis are known risk factors for the development of hand eczema in wet work occupations.

Objectives. To estimate the prevalence of hand eczema, eczema on wrists or forearms and atopic dermatitis in a cohort of hairdressing apprentices at the start of their education, and subsequently evaluate any potential healthy worker effect.

Methods. During the first 2 weeks of training, 382 hairdressing apprentices were enrolled in this study. All apprentices completed a self-administered questionnaire, including previously validated questions regarding, for example, previous and present hand eczema, eczema on the wrists or forearms, and atopic dermatitis. For comparison, the questionnaire was sent to a control group matched for age, gender and city code from the general population ($n = 1870$).

Results. Response rates were 99.7% for the hairdressing apprentices (mean age 17.5 years, range 15–39 years, 96.3% females) and 68.3% for the control group (mean age 17.4 years, range 15–39 years, 96.8% females). Previous or present hand eczema were reported by 8.0% of hairdressing apprentices and by 12.5% of the matched control group ($p = 0.009$), and eczema on the wrists or forearms was reported by 5.3% of the apprentices and by 11.9% of the controls ($p < 0.001$). We classified 21.4% of the hairdressing apprentices as having atopic dermatitis versus 29.8% of the matched control group ($p = 0.001$).

Conclusions. These results indicate a healthy worker effect, as there was a lower reported incidence of hand eczema and eczema on wrists or forearms, and there were fewer cases classified as having atopic dermatitis, among hairdressing apprentices than in a matched control group from the general population.

Key words: adolescent; atopic dermatitis; career guidance; hand eczema; hairdresser; hairdressers; hairdressing apprentices; healthy worker effect; selection.

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Hairdressers and hairdressing apprentices have a high incidence of both allergic and irritant occupational hand eczema, owing to excessive wet work and exposure to chemical substances, such as ingredients in hair dye, bleaching products, and permanent wave solutions (1–5). Hairdressing apprentices seem to be at particularly high risk of developing hand eczema (6–10), probably because they often perform the shampooing, and application and rinsing-off of chemicals, in the salons. The incidence of hand eczema in hairdressing apprentices was, in a previous study, estimated to be 35% in a 2-year period (11). Additionally, a relatively high proportion of

the apprentices in a German study who dropped out of training schools stated that skin problems were the main reason for this (8, 9). For comparison, the 1-year prevalence of hand eczema in the general population is estimated to be 7–11% both in the adult population and among younger people (12–15). Histories of hand eczema and atopic dermatitis are known risk factors for the development of hand eczema in wet work occupations (16–21). A Swedish study showed that atopic dermatitis in childhood did not influence the choice of career, but had a significant influence on job change and tripled the risk of developing hand eczema in future work life (16). To our knowledge, only the work of Uter et al. (7–9) has previously investigated the degree of atopic dermatitis and hand eczema among hairdressing apprentices at the beginning of their career, although they did not include a matched control group from the general population. Therefore, a possible selection of hairdressing apprentices because of skin disorders has not been evaluated, as no comparison with the general population was made.

The aim of this study was to estimate the prevalence of hand eczema, eczema on the wrists or forearms and atopic dermatitis among hairdressing apprentices at the time when they enter the training schools. On the basis of these results, we evaluated a potential healthy worker effect.

Materials and Methods

We conducted a questionnaire study among hairdressing apprentices and, for comparison, among a matched control group from the general population.

Study population

During the first 2 weeks of their education, the hairdressing apprentices were enrolled in a follow-up study on occupational hand eczema. The enrolment took place in two phases: in August 2008 ($n = 382$) and in January 2009 ($n = 120$). The data presented include results from the first of the two enrolments of the hairdressing apprentices ($n = 382$) and from a matched control group ($n = 1870$). The apprentices were recruited from all 10 hairdressing schools in Denmark, and all new apprentices present on the day of the inclusion were invited to participate in the study. All apprentices completed a self-administered questionnaire.

All apprentices gave informed consent, and the Committee on Biomedical Research Ethics of Copenhagen and Frederiksberg approved the protocol (H-B-2007-096). The study was conducted from August 2008 to March 2009.

Matched control group

For comparison, the questionnaire was sent to a matched control group from the general population. Matching was performed with the social security number, a unique identifier that all Danes have from birth. Each apprentice enrolled in August 2008, except for 8 with invalid social security numbers ($n = 374$), was matched to 5 controls ($n = 1870$). Matching was based on age, gender, and city code.

The questionnaire

Questions concerning a history of hand eczema, e.g. time of onset and symptoms during the last 12 months, were previously validated and adapted from the Nordic Occupational Skin Questionnaire (NOSQ-2002) (22). The following questions were asked: 'Have you ever had hand eczema?', 'Have you ever had eczema on your wrists or forearms?', and 'When did you last have eczema on your hands, wrists or forearms?' Atopic dermatitis was defined according to the UK Working Party's diagnostic criteria. These criteria include five questions concerning specific characteristics of atopic dermatitis, based on the Hanifin and Rajka criteria (23). To obtain the diagnosis of atopic dermatitis, one has to fulfil one major criterion ('Have you ever had an itchy skin condition?') and two of four minor criteria (flexural, neck or facial involvement, age of onset below 2 years, personal history of asthma or hay fever, and a history of a generally dry skin) (24–26).

The development of the questionnaire included a pilot test with 25 hairdressing apprentices and 5 young people not involved in the hairdressing trade.

Statistical analysis

For analysis of a matched dataset, the preferable method is conditional logistic regression. In this analysis, Cox regression was used as conditional logistic regression for comparison of hand eczema, eczema on wrists or forearms and atopic dermatitis in the two cohorts. A p -value < 0.05 was considered to be significant.

All statistical analyses were performed with SPSS (SPSS, Chicago, IL, USA) for Windows (Release 17.0).

Results

The study population comprised 374 hairdressing apprentices recruited from 10 training schools in Denmark; each school provided from 8 to 103 subjects. The participation rate was 99.7% (374 of 375 hairdresser apprentices present on the day of inclusion). The response rate of the matched controls was 68.3% (1277 of 1870 completed

Table 1. Self-reported hand eczema and eczema on wrists or forearms

	Hairdressing apprentices (<i>n</i> = 374), % (no.)	Controls (<i>n</i> = 1277), % (no.)	<i>P</i>
Hand eczema			
Point prevalence	1.1 (4)	3.6 (46)	0.008
1-year prevalence	5.9 (22)	8.7 (111)	0.04
Lifetime prevalence	8.0 (30)	12.5 (159)	0.009
Eczema on wrists or forearms			
Point prevalence	1.6 (6)	2.7 (35)	0.15
1-year prevalence	3.7 (14)	7.0 (90)	0.02
Lifetime prevalence	5.3 (20)	11.9 (149)	<0.001
Atopic dermatitis*	21.4 (80)	29.8 (381)	0.001

The hairdressing apprentices were all enrolled at the time when they start their education at 10 different technical schools in Denmark. The controls were matched to the hairdressing apprentices by age, gender, and city code. Conditional logistic regression was used for the matched comparison. *P* < 0.05 was considered to be significant.

*Atopic dermatitis is based on the UK Working Party's diagnostic criteria.

the questionnaire). Data collected from both cohorts are shown in Table 1.

The mean age was 17.5 years (range 15–39 years) for the apprentices and 17.4 years (range 15–39 years) for the controls, and the median age was 17 years for both groups. Both groups mainly consisted of females: 96.3% of the apprentices and 96.9% of the controls.

In the matched control group, the responders were slightly younger (mean age 17.4 years) than the non-responders (mean age 17.8 years) (*p* = 0.02). Similarly, there were fewer males among the responders (3.1%) than among the non-responders (5.1%) (*p* = 0.04).

The hairdressing apprentices, at the start of their education, reported significantly less hand eczema and eczema on wrists and forearms, concerning both lifetime and 1-year prevalence, than the matched control group. Additionally, the hairdressing apprentices were significantly less often classified as having atopic dermatitis than the matched control group.

To a certain extent, the hairdressing apprentices were already exposed to the work of hairdressers at the time when started their education. Among the hairdressing apprentices, 27.3% had been working in a hairdressing salon, 20.3% within the last 6 months prior to the start of their education. They had worked, on average, for 18.6 hr per week for 10 months in hairdressing salons, mainly cleaning the salon and shampooing the customers' hair.

Discussion

The present study compares the prevalence of atopic dermatitis, hand eczema and eczema on wrists and forearms

in a cohort of hairdressing apprentices, who had just started their education, with that among a matched control group from the general population. To our knowledge, this is the first study to describe the potential healthy worker effect in the hairdressing trade.

The main findings of the study show a significant difference in the prevalence of hand eczema, eczema on wrists and forearms and atopic dermatitis between the two groups. The point prevalence of hand eczema for the apprentices was 1.1%, as compared with 3.6% for the controls (*p* = 0.008), and the 1-year prevalence was 5.9%, as compared with 8.7% (*p* = 0.04). A significant difference was also found for atopic dermatitis.

These results indicate a healthy worker effect in the hairdressing trade in Denmark. There is an ongoing debate, both in public and among professionals, concerning the risk of skin diseases in wet work occupations. It is expected that career guidance will be carried out by general practitioners, dermatologists and healthcare professionals at the primary schools among young people consulting them because of hand eczema or atopic dermatitis. This could explain why the hairdressing apprentices have fewer skin symptoms than the matched control group from the general population.

A previous study among teenagers from the general population estimated the 1-year prevalence of hand eczema to be approximately 10% (14), which is in good agreement with the results from the matched control group in this study. The prevalence of atopic dermatitis in both cohorts in this study is relatively high as compared with studies in the general population. Numerous studies have estimated the prevalence of atopic dermatitis in the general population to be between 15% and 24% (13, 27–29). The relatively high prevalence of atopic dermatitis found in this study could be attributable to the high proportion of females. A sex difference in atopic dermatitis, with a female predominance, has been described in several studies (13, 28, 30, 31). Additionally, the young age of the participants could reduce recall bias, and thereby give a more precise result than studies in the general adult population.

Only a few studies have reported the prevalence of hand eczema in adolescence. In this study, the matched control group is an advantage, as it takes both the young age and the predominance of females in the cohort of hairdressing apprentices into account. All hairdressing apprentices were enrolled in August 2008, and the questionnaires were sent to the matched control group during spring 2009. It is expected that people will have more hand eczema during the winter (32, 33), but as no subjects answered the questionnaire during the winter, this seasonal variation, and thereby a potential overestimation of

the difference in point prevalence of hand eczema, is minimized. The response rate was high in both cohorts. The cohort of hairdressing apprentices is already, to a certain extent, subjected to the specific exposures of hairdressers, which might lead to an increased risk of occupational skin diseases even before they start their education, and thereby contribute to the selection of those who choose to start at the training school. The results are based on self-administered questionnaires, which, although validated, have some limitations. It is possible that the newly started hairdressing apprentices will underreport skin problems, and participation of the controls might be higher among those with a skin disease. This could possibly lead to an increase in the differences between the two groups.

In conclusion, hairdressing apprentices report less hand eczema and eczema on the wrists or forearms,

and less often classified as having atopic dermatitis, than a matched control group from the general population. These results indicate a healthy worker effect in the hairdressing trade in Denmark. The hairdressing apprentices are healthier than the control group from the general population with regard to skin diseases. They have a lower risk profile for the development of hand eczema than the control group, and we therefore need to consider very seriously their development of hand eczema.

The cohort of hairdressing apprentices will be followed and examined for hand eczema during the first part of their training. Future publications on the incidence of hand eczema among hairdressing apprentices and possible preventive strategies are planned.

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