Health Assessment of Self-employed Hairdressers in France

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Abstract: Health Assessment of Self-employed Hairdressers in France: Frederic DESCHAMPS, et al. Occupational Disease Department University Hospital of Reims, France—Objective: Hairdressers have a high incidence of occupational diseases, owing to excessive wet work and exposure to chemical substances. The objective of this study was to assess the prevalence of occupational diseases in a population of self-employed hairdressers, matched for age and sex with a control group of wage-earning hairdressers. Method: A health questionnaire was administered to both groups by an occupational health practitioner. Results: Irritative skin diseases were reported by 1.5% of the self-employed hairdressers versus 9.1% of the wage earners. Conversely, the rates of respiratory diseases and cumulative musculoskeletal injuries were much higher among self-employed hairdressers. Conclusions: This study shows that the overall health of self-employed hairdressers is lower than that of their wage-earning counterparts. This can be attributed to several aspects of work exposure, organization, including longer working hours, fewer protective measures and the absence of preventive medicine in the workplace.

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Key words: Craftsmen, Hairdressers, Health assessment, Occupational epidemiology, Self-employed

There are estimated to be several million hairdressers worldwide, with around one million hairdressers, barbers, and beauticians in Europe alone. Many hairdressers are self-employed. Although their numbers are still growing and they are at risk of long-term disability, owing to a number of risk factors, there is still a dearth of information on the effectiveness of interventions targeting this specific group. Self-employment allows individuals to achieve greater autonomy than employees of organizations. However, the greater pressure associated with ownership of a small business detracts from the advantages of having autonomy, making small business ownership a double-edged sword.

Hairdressers are exposed to numerous risks and diseases. According to data collected by the National Center for Occupational Asthma Monitoring (Observatoire National des Asthmes Professionnels, ONAP) in France in 1996–1999, hairdressing represents the fourth most frequent occupation of patients of both sexes with occupational asthma, and the second most frequent occupation of female patients, accounting for 6.8% of cases.

Hairdressers are exposed to several thousands of chemicals, each with potentially irritant and sensitizing effects on airways, contained in dyes, bleaches, shampoos and hair conditioners. Furthermore, they may also be exposed to volatile solvents, propellants and aerosols in the form of hairsprays, as well as, for example, to the methacrylates and nitrosamines contained in many haircare products.

Hairdressers are extensively exposed to low air concentrations of chemicals liable to cause bronchoconstriction and airway obstruction. The main allergens are p-Phenylenediamine, permanent wave solution ingredients, such as ammonium thioglycolate, and glyceryl monothioglycolate, rubber accelerators, nickel, formaldehyde and bleaching powder. Workplace exposure to these chemicals causes bronchial mucosal inflammation. For example, persulfate salts cause occupational asthma and airway hyperresponsiveness via an immunological mechanism. Bleach and ammonia can cause mucosal membrane irritation and are associated with occupational asthma and chronic bronchitis. Exposure to noxious chemicals can also lead to nasal airway obstruction and occupational rhinitis in hairdressers, with nasal hyperresponsiveness to dandruff, ammonium persulfates, and the ammonium thioglycolate contained in permanent wave solution.

In 2005, hairdressers were identified by the UK's
Health and Safety Executive (HSE) as having the highest incidence of occupational skin diseases in the United Kingdom, with an incidence of 98 per 100,000\(^{[5]}\). They have a high incidence of both allergic and irritant occupational hand eczema, owing to excessive wet work and exposure to numerous substances\(^{[6,7]}\). They are also affected, albeit less commonly, by contact urticaria, infection, oil folliculitis, phototoxicity acne, leukoderma and malignancies\(^{[8]}\). Inflamed and damaged skin is at greater risk of sensitization. Atopic individuals are also more likely to leave the hairdressing profession than nonatopic ones, perhaps because the former have a greater susceptibility to irritants\(^{[9]}\).

The International Agency for Research on Cancer (IARC) recently reassessed that the substances to which hairdressers and barbers are exposed in the workplace are probably carcinogenic, although there is generally only limited evidence for their carcinogenicity\(^{[10]}\). Of particular concern, are the chemicals contained in hair dyes, which are potentially carcinogenic. In the past, an increased risk of bladder cancer was reported among hairdressers who were occupationally exposed to permanent hair dyes containing aromatic diamines-substances that are now banned\(^{[11]}\). There currently seems to be a substantially increased risk of cancer of the lungs, larynx and bladder, and multiple myeloma. The risk is somewhat lower for Hodgkin’s lymphoma, leukemia, and ovarian, breast, kidney and colon cancer\(^{[12]}\).

In hairdressing, women and men are also exposed to physical and mental stress, and to musculoskeletal injuries arising from repetitive trauma disorders, as they have to stand for long periods\(^{[13]}\). In France, there are 70,000 hairdressing salons employing 160,000 workers, mainly wage-earners (118,800) and self-employed hairdressers (48,200). This last group has rarely the benefit of a specific occupational medical examination and seems neglected by the authorities in terms of health preservation.

No previous reports were found about comparison of the health status of wage earners to that of self-employed belonging to the same occupational branch. The subjective feelings of the medical doctors employed by our preventive medicine department were that the prevalence of diseases, whether or not they were related to work, was significantly higher in hairdressers compared with wage-earning hairdressers.

Wage-earning and self-employed hairdressers have different personal characteristics and different working conditions, which may influence their health status. Time pressure and long working hours could explain the increased incidence of repetitive traumatic disorders, rhinitis and lung disease.

The aim of the present study was to assess the occupational health level of self-employed hairdressers, by identifying the prevalence of work-related diseases and comparing it with data obtained from a group of wage-earning hairdressers.

Methods

A group of self-employed hairdressers was matched with a control group recruited from a random sample of wage-earning hairdressers in the Champagne region in the northeast of France. Two self-employed hairdressers were included for every matched wage earner having the same job. Selection of the two groups was based on the following criterion: at least two consecutive years of full-time hairdressing experience.

Hairdressing apprentices, who seem to be at a particularly high risk of developing allergic diseases\(^{[10]}\), probably because they often perform shampooing, treatment application and rinsing tasks in the salons, were excluded from both groups.

All the self-employed hairdressers were recruited during a single, specific occupational health examination and investigation, paid for by their medical insurance. All of them took part on a voluntary basis. This specific occupational checkup was exceptional and had been recommended only one time during their whole working lives as self-employed hairdressers.

On the other hand, hairdresser employees have a duty to meet an occupational practitioner every year for a specific medical examination.

The wage-earning hairdressers were recruited at an occupational health center during their annual medical examination. All of them took part on a voluntary basis. They were matched with the self-employed hairdressers for sex, county of residence, and age (within the 30–50 year age range to avoid selection bias).

They were not matched for the presence or absence of atopic dermatitis or hand eczema at the beginning of their careers. Other parameters not taken into account in the matching included a history of respiratory disease, and drug intake for allergic respiratory disease.

The same questionnaire, filled out by an occupational physician, was used for both groups, and included questions about the participants’ ages, the numbers of years they had been working, the protective measures they took, their smoking habits, and health status.

Other questions concerned respiratory, skin and musculoskeletal injuries with work-related symptoms. Information about nasal symptoms, if any, was also gathered from the patients, together with times of occurrence at work. Asthma-like symptoms were defined as wheezing, chest tightness, shortness of
breath or coughing, except during a respiratory infection or while doing exercise. Asthma was diagnosed according to World Health Organization guidelines. Occupational asthma was diagnosed when a participant’s clinical history suggested that the symptoms were work-related. Rhinitis-like symptoms were defined as an itchy, runny nose, sneezing and/or red, tearing eyes, except during a respiratory infection, occurring irregularly either almost every day or from time to time. Occupational hand contact dermatitis was defined as clinical eczema or irritative cutaneous diseases with work-related occurrence. In hairdressing, wet work from washing and handling damp hair results in exposure to surfactants that may lead to skin irritation. Regarding musculoskeletal injuries, we focused on disorders in the upper body related to repetitive movements.

Stress levels were rated on a visual analogue scale. A score above 7 was deemed to be high. Medical investigations included a spirometry test, which was performed according to European Respiratory Society guidelines by means of a computerized water-sealed spirometer. Prior to the spirometry test, the required maneuver was demonstrated by the operator, and the participant was encouraged and supervised throughout the pulmonary function testing (PFT). PFT was performed in a standing position with nose clips, as per American Thoracic Society guidelines. The spirometer was calibrated each day prior to the PFTs. The PFT was repeated until each participant had performed it three times with an acceptable technique. All PFTs were performed without a bronchodilator. The figures for the highest forced expiratory volume in one second (FEV1), peak expiratory flow, maximum mid-expiratory flow and maximum expiratory flow (MEF) at 25, 50 and 75% of FVC could be taken from any one of the three PFT series.

No information concerning cancer status was sought because this was a cross-sectional study. Participants whose questionnaires were absent or incomplete were excluded from the analyses. All participants were aware of the aim of the study. All of them gave their informed consent.

During visits of a representative sample of hairdressing salons, the presence or absence of local exhaust ventilations was confirmed. The compositions of hair care products were assessed during the same visit and then listed. The Self-employed and employees were also asked about the range, frequency and amount of different hair products used.

Statistical analyses
Age was expressed as a mean. The other variables were expressed as medians (first to third quartiles). Ranges are indicated when used. Data were analyzed by means of the Mann-Whitney U test, X2 test and Spearman’s rank correlation coefficient. p values<0.05 were considered to be significant. Analyses were performed using statistical software (SPSS Statistics for windows, Version 17.0, SPPSS inc., Chicago, IL, USA).

Results
Around 1,000 self-employed hairdressers in Champagne County were invited to benefit from a specific occupational medical examination. A quarter of this population was confirmed to be interesting by this checkup: 88 of them were excluded, essentially because they were under 30 or over 50 years old. More than two-thirds of the hairdressers in the employees group were excluded (273 of a whole population of 385) because most of them were apprentices. For 25 self-employed hairdressers, we had only one matched wage earner with the same occupational and demographic status. No hairdressers in the groups refused to participate in the study.

Consequently, the study sample comprised 199 self-employed hairdressers who were matched with 112 controls. The mean ages were 40.2 years for the self-employed (range 30–50) and 39.4 years for the controls (Table 1). The number of working years was over 20 and did not differ significantly between the 2 groups (23 years). This result was bound to the age range used for recruitment of the 2 populations.

Both groups consisted mainly of women. Only a minority of the self-employed were currently smokers (34.7%). More than half the controls were smokers.

We observed essentially a difference concerning the number of working hours of the self-employed after

### Table 1. Characteristics of the self-employed and wage-earning participants

<table>
<thead>
<tr>
<th></th>
<th>Self-employed hairdressers</th>
<th>Wage-earning hairdressers</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>199</td>
<td>112</td>
<td></td>
</tr>
<tr>
<td>Sex (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>89.4</td>
<td>86.6</td>
<td>0.45</td>
</tr>
<tr>
<td>Male</td>
<td>10.6</td>
<td>13.4</td>
<td></td>
</tr>
<tr>
<td>Mean age (years) (Range: 30–50)</td>
<td>40.2</td>
<td>39.4</td>
<td></td>
</tr>
<tr>
<td>30–34 (%)</td>
<td>26.6</td>
<td>29.5</td>
<td>0.90</td>
</tr>
<tr>
<td>35–39 (%)</td>
<td>26.1</td>
<td>27.7</td>
<td></td>
</tr>
<tr>
<td>40–44 (%)</td>
<td>25.1</td>
<td>22.3</td>
<td></td>
</tr>
<tr>
<td>45–50 (%)</td>
<td>22.1</td>
<td>20.5</td>
<td></td>
</tr>
<tr>
<td>Smokers (%)</td>
<td>34.7</td>
<td>57.9</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>
Almost fifteen percent of the self-employed (14.6%) and none of the employees had to work during the early evening.

The levels and compositions of hair care products used by the 2 groups were not significantly different. Moreover, installation of a local exhaust ventilation system to reduce or avoid exposure to various chemicals, benefited half of the workers in the 2 groups (54%), with the same ratio being observed in both groups. In fact, most of the self-employed and employees worked in the same small hairdressing salons, having an owner (self-employed) and 2 or 3 employees.

We identified several associations between self-employed status and increased prevalence of respiratory disease (Table 2). Atopy was reported by 13.3% of wage earners, and almost two-thirds of them (58.8%) suffered from respiratory diseases. Rhinitis was reported more frequently by self-employed respondents than by wage earners. Furthermore, compared with their wage-earning counterparts, the self-employed hairdressers exhibited significantly lower spirometric parameters (FEV1<80%) (Table 3). But there was no relationship between the lower spirometric values and tobacco consumption. Paradoxically, wage earners had higher spirometric values despite the fact that they were more frequently smokers. By contrast, there was a significantly higher prevalence of irritative contact dermatitis among the wage earners.

The risk of musculoskeletal injuries was significantly higher among the self-employed. This mainly involved shoulder injuries (28.1%) lower back pain (26.6%), neck pain (19.6%), wrist pain (10.1%), finger pain (9%), and elbow pain (8%). Unfortunately, concerning the detailed description of the musculoskeletal injuries, a significant proportion of results was misused and consequently, they could not be operated for employees. Thus, the full results for this group of pathologies were not available, and a full comparison could not be established.

Almost one-tenth (9.5%) of the self-employed hairdressers reported high work-initiated stress levels. This percentage rose to 20% for those who worked after 8 PM. But in aggregate, the stress level did not differ between the two groups.

Discussion

Recruitment of the two study populations was performed differently. But all of the recruited hairdressers volunteered to participate in the study. Nevertheless, a selection bias could be identified, because the self-employed hairdresser had the choice to meet or not meet the occupational practitioner. Consequently, the prevalence of diseased self-employed hairdressers may be higher, but their behaviors may be the inverse of those of the healthy self-employed hairdressers included in the studied group.

This study pinpoints the individual and combined effects of toxic agents on the health of hairdressers in particular, but also on human health in general. To our knowledge, this is one of the first studies to compare self-employed and wage-earning hairdressers.

One of this study’s strong points is the methodology that was used to study the two groups, insofar as the results were not based on self-administered questionnaires, thus sidestepping problems of interpretation.

The proportion of women in our data is similar to that reported in other studies, reflecting female predominance in the hairdressing industry. This is noteworthy, as it has been shown that women are more likely to seek health care than men. The participants were selected from a fairly young population (30–50 years) and had been working as hairdressers for a long time, according to previous observations.

Our results reflect the general trend of this population in most countries. Hairdressers are exposed on a daily basis to harmful chemicals in their working environment. The use of such a large number of different chemicals makes it difficult to investigate

Table 2. Comparison of diseases prevalence among self-employed and wage-earning hairdressers (percentage of the whole population)

<table>
<thead>
<tr>
<th></th>
<th>Self-employed hairdressers n=199</th>
<th>Wage-earning hairdressers n=112</th>
<th>p values</th>
</tr>
</thead>
<tbody>
<tr>
<td>All skin diseases (%)</td>
<td>21.1</td>
<td>15.8</td>
<td>0.28</td>
</tr>
<tr>
<td>Work-related skin allergy (%)</td>
<td>7.0</td>
<td>3.0</td>
<td>0.16</td>
</tr>
<tr>
<td>Work-related skin irritation (%)</td>
<td>1.5</td>
<td>9.1</td>
<td>0.002</td>
</tr>
<tr>
<td>All rhinitis and lung functions (%)</td>
<td>17.2</td>
<td>5.0</td>
<td>0.003</td>
</tr>
<tr>
<td>Work-related dyspnea (%)</td>
<td>11.1</td>
<td>4.9</td>
<td>0.08</td>
</tr>
<tr>
<td>Work-related rhinitis (%)</td>
<td>9.5</td>
<td>1.8</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Musculoskeletal injuries (%)</td>
<td>66.8</td>
<td>29.7</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>
each hazardous substance separately. In this study, we did not have any data on the participants’ exact levels of workplace exposure. But they are thought to be the same because the 2 groups worked in small hairdressing salons, which often contained both groups of hairdressers. Therefore, we cannot assume that similar durations of exposure meant equal doses of exposure. Hairdressers carry out a variety of tasks and may not be continuously exposed to the same agents, especially with regard to potential allergens.

The ONAP study stated that hairdressing brings with it a higher risk of occupational asthma, and in the present study, we found a definite impact of the hairdressers’ jobs on their respiratory health, with significantly higher workplace exposure-induced respiratory symptoms in the self-employed group than in the wage-earning group. We found that self-employed hairdressers had 3 times more rhinitis and respiratory symptoms and twice the number of musculoskeletal injuries than the wage earners. These results could be explained by the fact that the self-employed hairdressers spend more time at work during the week (after 8 PM).

Moreover, it is interesting to note that although almost all the self-employed participants reported that their symptoms occurred in the workplace, they did not receive diagnoses of occupational asthma or rhinitis. In most cases, the triggering of asthma may be an irritative mechanism. Consequently, we hypothesize that their respiratory symptoms are irritative and transient and related to the frequent presence of irritating factors in their salons (high temperatures, steam, solvents, perfumes, dust, etc.). Paradoxically, the self-employed group had a lower proportion of smokers than the wage-earning group, underlining the negative impact of chemicals on respiratory function while working as a hairdresser.

We found slightly impaired PFT values for the self-employed hairdressers, compared with their wage-earning counterparts. This result may be related to longer weekly exposure times, but it may also reflect the fact that they were unable to pursue their careers as wage earners because of repetitive dyspnea. Therefore, these diseased workers may have switched to working as self-employed hairdressers. This would put them in a better position to manage their exposure to respiratory irritants. Previous chronic lung diseases associated with dyspnea, affecting mainly the self-employed group, may explain why this selected group of workers had to give up tobacco consumption earlier. Moreover, at the time when the data were gathered, unexpected lower tobacco consumption and weaker spirometric values were noticed in the self-employed group.

Occupational skin diseases have significant implications both for individual (functionally, financially and psychosocially) and for the community at large. Hairdressers are widely acknowledged as being at risk of dermatitis as a result of occupational exposure to a variety of chemicals. This can result in hairdressers prematurely leaving their profession due to their morbidity. The self-employed group was healthier than the control group with regard to skin diseases. This result may be the consequence of better work organization, with wage earners being assigned the tasks that cause contact dermatitis through more frequent exposure to water, shampoos, detergents, conditioners, dyes, bleaches or permanent wave solutions. In this study, contact dermatitis included irritant and allergic etiologies. The two are not mutually exclusive and often occur concurrently. Most studies encompassing all occupational skin diseases have shown that the predominant cases are those involving irritative contact representing 65–80% of cases.

| Table 3. Comparison of spirometry results between self-employed and wage-earning hairdressers |
|-----------------------------------------------|-------------------|-----------------|--------|
| Self-employed hairdressers n=199 | Wage-earning hairdressers n=112 | p |
| FVC mean of expected values (%) | 100 | 104 | 0.02 |
| FVC<80% (%) (% of whole population) | 4.2 | 2.4 | 0.47 |
| FEV1 mean of expected values (%) | 97 | 105 | <0.001 |
| FEV1<80% (%) (% of whole population) | 5.3 | 3.6 | 0.56 |
| MEF 25–75 mean of expected values (%) | 106 | 103 | 0.64 |
| MEF 25–75<80 (%) (% of whole population) | 18.8 | 18.1 | 0.88 |

FVC=forced vital capacity; FEV1=forced expiratory volume in 1 second; MEF=maximum expiratory flow.
Hairdressers have a higher risk of cancer than the general population. The fact that this greater risk concerns different anatomical sites can be explained by the existence of multiple exposure pathways (respiratory, dermatological and systemic). Some cancers, such as lung and bladder cancer, may also share the same etiology\textsuperscript{8,9}, although most of them typically have an interval between the beginning of exposure and their onset\textsuperscript{20}. The methodology used in this study made it impossible to assess carcinogenic risks and its consequences.

Our results underline the need to promote occupational health and safety among self-employed workers (as well as wage earners). They probably have poorer knowledge about protective measures, partly owing to the lack of occupational preventive medicine. In fact during their whole working lives, the self-employed hairdressers had only met an occupational practitioner once. Consequently, preventive measures are less known in this group.

It would be possible to introduce the most important protective measures relatively rapidly. For instance, one study found that none of the hairdresser’s salons surveyed in central and suburban areas of a large city had a ventilation system\textsuperscript{21}. Improvements therefore need to be made to ventilation systems in hairdresser’s salons, and health and safety measures aimed at lessening exposure need to be implemented. Primary prevention of allergic contact dermatitis is critical in hairdressers. This must include alerting hairdressers at an early stage in their careers to the potential morbidity associated with the use of hairdressing chemicals, and encouraging appropriate glove use. Roughly only one-third of the hairdressers in Nordic countries report using protective gloves while applying hair dyes\textsuperscript{22}, and few studies advocate cutting hair before dyeing in order to reduce unnecessary contact with chemicals in newly colored hair\textsuperscript{23}.

In conclusion, this study shows that self-employed hairdressers have lower health levels than their wage-earning counterparts matched for age and sex, except for skin diseases.

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