

Prevalence of Occupational Asthma and Early Bronchial Airflow Impairment Among Hairdressers in Denizli

Denizli İlindeki Kuaförlerde Mesleki Astım Prevelansı ve Erken Hava Yolu Etkilenmesi

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Summary

Objective: To define asthma prevalence among hairdressers in Denizli and to determine the effect of time of exposure to etiologic agents on Pulmonary function tests (PFT)s.

Method: Data were collected from 27 salons, including 151 hairdressers. Respiratory symptoms, duration of exposure to etiologic agents, relation of symptoms to work, and smoking habit were collected by a questionnaire in a person to person interview. PFTs were performed to 31 hairdressers who defined respiratory symptoms. Fifteen hairdressers who described asthma like symptoms agreed to undergo serial measurement of peak expiratory flow (PEF) at work and away from work for a period of three weeks. Control subjects (n=55) were office workers at our hospital and had similar sex, smoking habit, social and economic status.

Results: Our study population comprised 151 hairdressers (66% female) with a mean age of 23.6±8.67 yrs. Among hairdressers 20% defined cough. Other respiratory symptoms were 15% wheezing, 15% dyspnea, and 4% phlegm respectively. The mean FEV₁ of the hairdressers was found to be significantly lower than the control group (p<0.01). There was a negative correlation between the FEF₂₅₋₇₅ and time of exposure of etiologic agents (r =-0.69; p <0.001).

Conclusion: We found the serial PEF based prevalence of occupational asthma among hairdressers in our city as 7.3%. In addition, we observed a negative correlation between FEF₂₅₋₇₅ and duration of exposure to etiologic agents. These findings strongly suggest the importance of continuous medical surveillance in hairdressers. (*Archives of Lung 2007; 8: 14-8*)

Key words: Occupational asthma, hairdressers, pulmonary function tests

Özet

Amaç: Denizli ilindeki kuaförlerdeki astım prevalansını belirlemek ve sorumlu etiyolojik ajanların solunum fonksiyon testlerine (SFT) etkilerini araştırmak.

Metod: Toplam 27 salondaki 151 kuaför çalışmaya katıldı. Solunumsal semptomlar, etiyolojik ajanlara maruziyet süresi, semptomların iş ile ilişkisi ve sigara öyküsü yüz yüze yapılan anketlerle değerlendirildi. Solunumsal semptom tarifleyen 31 kuaföre SFT uygulandı. Astım semptomları tarifleyen 15 kuaför iş yeri ve iş dışında 3 haftalık PEF takibine alındı. Hastanemizde ofis işinde çalışan benzer cinsiyet sigara içme öyküsü ve sosyo-ekonomik durumda olan 55 kişiden oluşan kontrol grubu oluşturuldu.

Bulgular: Çalışma popülasyonundaki 151 kuaförden %66 sı bayandı ve kuaförlerin ortalama yaşları±SD 23.6±8.67 idi. Kuaförlerin %20 si öksürük tarif etmekteydi. Diğer solunumsal semptomlar sırasıyla %15 hırıltı, %15 dispne, ve %4 balgam çıkarma idi. Kuaförlerin ortalama FEV₁ düzeyleri kontrol grubundan anlamlı düzeyde düşüktü (p<0.01). Etiyolojik ajanlara maruziyet ile FEF₂₅₋₇₅ düzeyleri arasında negatif bir korelasyon mevcuttu (r =-0.69; p <0.001).

Sonuç: Kuaförlerde seri PEF ölçümlerine dayalı mesleki astım prevalansını %7.3 olarak saptadık. Olgularda FEF₂₅₋₇₅ ve etiyolojik ajanlara maruziyet süreleri arasında bir negatif korelasyon da bulunmaktaydı. Bu bulgular bize mesleki astım açısından kuaförlerde seri tıbbi kontrollerin yapılması gerekliliğini vurgulamaktadır. (*Akciğer Arşivi 2007; 8: 14-8*)

Anahtar Kelimeler: Mesleki astım, kuaförler, solunum fonksiyon testleri

Introduction

Occupational asthma (OA) is defined as asthma causally and specifically related to exposure to inhaled chemical, physical, and microbiological agents in the form of dust, fumes, gases, and vapours (1).

Many occupations have been reported as a risk factor for asthma, including hairdressers (2-5). Hairdressers are exposed to several reactive agents with potentially irritant and sensitizing effects on the airways (6). Some of the frequently used irritant and allergic chemicals in hairdressing include persulphates (S2O8), reactive dyes, epilating substances, formaldehyde, latex, cosmetic agents, henna, hair creams and gels (2). These agents produce type I and type IV hypersensitivity reactions and provoke asthma, however, the molecular mechanism is still not clear (2,4,5,7-9). Among these possible etiological agents in hairdressers' asthma, the main focus has been on persulphates used in bleaching powder. While some studies showed a higher risk of occupational asthma with frequent use of these etiological agents compared to infrequent use (2,10,11), the others couldn't define this relation (12). Few asthma studies have been published from developing countries, where occupational factors are distinct from industrialized countries. There is only one study from Turkey which defines questionnaire-based prevalence of asthma among hairdressers (2).

We planned this study to define asthma prevalence among hairdressers depending on pulmonary function tests (PFTs) and peak expiratory flow (PEF) follow-up results. We also aimed to determine the effect of time of exposure to etiological agents on PFTs.

Method

This study was conducted at the city of Denizli, located in western Turkey. All subjects were volunteers who gave informed written consent to their participation in the study. The study was approved by the Institutional Review Board.

Data were collected from 27 salons, including 151 hairdressers. In terms of avoiding collection bias, all data, including questionnaires, were collected by two experienced pulmonologists. Demographic data, allergic and respiratory symptoms, duration of symptoms, duration of exposure to etiological agents, relation of symptoms to work, health history including allergic status and smoking habit, were collected by a questionnaire modified from American Thoracic Society Questionnaire (13). The questionnaire was administered in a person to person interview.

Pulmonary function tests were performed to 31 hairdressers who defined respiratory symptoms. PFTs were conducted according to American Thoracic Society criteria (14), while the patients were at rest and seated in the up-

right position with a portable spirometer (MIR Spirobank). The forced vital capacity (FVC), forced expiratory volume in 1 second (FEV₁), and forced expiratory flow at 25% to 75% of the FVC (FEF₂₅₋₇₅) were determined.

Fifteen hairdressers who described asthma like symptoms agreed to undergo serial measurement of peak expiratory flow (PEF) at work and away from work for a period of three weeks.

A detailed smoking history was obtained from each hairdresser and control subject. Smoking status was defined as never-smoker, former-smoker, and current-smoker. A never-smoker was defined as one who had never smoked before or smoked less than 100 cigarettes in his/her lifetime and was not a current-smoker (15). A former-smoker was defined as one who had previously smoked more than 100 cigarettes in his/her lifetime and had quit smoking more than 1 year before diagnosis. Smokers who claimed to have quit within the year before diagnosis were classified as current-smokers because their ability to sustain prolonged abstinence from smoking was in question.

Hairdressers who reported work related asthma symptoms and PEF variability which was higher than 20% during work days and improved during weekend or holidays were diagnosed as occupational asthma.

Control subjects (n=55) were office workers at our hospital and had similar sex, smoking habit, social and economic status.

We used SPSS statistical software package version 10.1 (SPSS, Inc, Chicago IL). Student t test and Pearson Correlation were used to compare parametric values. Chi-square test was used to compare non-parametric values. A p value of < 0.05 defined statistical significance.

Results

Our study population comprised 151 hairdressers (66% female and 34% male) with a mean age of 23.6±8.67 yrs. The demographics of the hairdressers and the control group in Table 1. Control group comprised 55 office workers (67% female and 33% male) with a mean age of 29.8±8.7 yrs. Smoking habits of the hairdressers and control group are presented in Table 2.

Table 1. The demographics of the hairdressers and the control group

	Hairdressers (n=151)	Control group (n=55)	p
Age (yr)	23.6±8.67	29.8±8.7	<0.001
Gender			NS
Female (n)	100	37	
Male (n)	51	18	
Smoking (pac-yrs)	5.75±7.95	7.5±6.5	NS
*NS: Not Significant, p>0.05			

Among hairdressers 20% defined cough. Other respiratory symptoms were 15% wheezing, 15% dyspnea, and 4% phlegm respectively. These symptoms were not significantly different between the study and the control group. The respiratory and allergic symptoms among the hairdressers and the control group are presented in Table 3. Hairdressers had been employed for a mean of 126.38 ± 92.2 (range; 6-516) months. Sixty-one (40%) hairdressers' respiratory and allergic complaints were started after they had begun to practice their job. The latency period was 50,8 months. Fifty-five (90%) of these hairdressers defined decreasing of their complaints when they were away from work. Six cases (4%) was diagnosed as asthma by a chest physician before. In the study population; 10 cases (7%) was diagnosed as having occupational disease; 8 (75%) contact dermatitis and 2 (25%) occupational asthma. According to questionnaires, 41 (27%) hairdressers had contact dermatitis and 26 (17%) had allergic rhinitis. Family history of asthma was defined at 18 (11.9%) hairdressers and family history of allergic rhinitis was defined at 6 (4%) hairdressers.

PFTs were performed to 31 hairdressers who defined respiratory symptoms. The results of the PFTs of the hairdressers and control group are presented in Table 4. Despite the control group had older ages than the hairdressers, the mean FEV₁ of the hairdressers was found to be significantly lower than the control group ($p < 0.01$). There was a

negative correlation between the FEF₂₅₋₇₅ and time of exposure of etiologic agents ($r = -0.69$; $p < 0.001$).

Of the fifteen hairdressers, nine defined PEF variability higher than 20% during work days and was improving during weekend or holidays. With 2 other hairdressers already diagnosed as having occupational asthma we may conclude that PEF follow-up based occupational asthma prevalence among hairdressers at the city of Denizli is 7.3%.

Discussion

We found the serial PEF based prevalence of occupational asthma among hairdressers in Turkey as 7.3%. Questionnaire-based allergic rhinitis and contact dermatitis prevalence among hairdressers were 17% and 27%, respectively. The mean FEV₁ of the hairdressers who defined respiratory symptoms was found to be significantly lower than the control group. Interestingly, there was a negative correlation between the FEF₂₅₋₇₅ and time of exposure of etiologic agents.

Asthma acquired in the workplace is a diagnosis that is frequently missed unless the health care professional is aware of the possibility. The diagnosis requires a defined occupational history, especially in relation to exposure to sensitizing agents; absence of asthma symptoms before beginning employment; and a documented relationship between development of symptoms at the workplace and reduction of these on withdrawal from the workplace. A confirmation of occupational asthma may be successfully achieved by lung function measurement, such as serial measurement of PEF at work and away from work (16). The prevalence of occupational asthma among hairdressers was reported between 4.5% and 22% depending on the used methodology (2-4,17). In our study, we found serial PEF-based occupational asthma prevalence as 7.3%. We know that in our

Table 2. Smoking habits of hairdressers and control group

Smoking Habits	Hairdressers (%)	Controls (%)
Current-smoker	73 (48)	25 (45)
Former-smoker	6 (4)	3 (6)
Never smoked	72 (48)	27 (49)

Table 3. Respiratory and allergic symptoms of hairdressers and control group

Complaints	Hairdressers n (%)	Control group n (%)	p
Irritation of eyes	58 (38)	11 (20)	<0.0001
Eczema	41 (27)	11 (20)	NS*
- for metal ornaments	26 (63)	11 (100)	NS
- for occupational agents	24 (59)	0	<0.0001
Sneezing and serous nasal secretion	32 (21)	12 (22)	NS
Urticaria	22 (14)	4 (7)	NS
Respiratory Complaints			
Cough	30 (20)	11 (20)	NS
Wheezing	23 (15)	6 (11)	NS
Dyspnoea	22 (15)	6 (11)	NS
Sputum production	6 (4)	6 (11)	NS

*NS- Not Significant, $p > 0.05$

Table 4. The mean PFTs of the hairdressers who defined respiratory symptoms and the control group

PFT	Hairdressers Actual value (% predicted)	Controls Actual value (% predicted)	p
FEV ₁	2794.7±466.1 ml (84.6%)	3100.6±743.2 ml (93.1%)	< 0.01
FVC	3378.7±572.4 ml (90.0%)	3723.0±707.3 ml (93.8%)	NS*
FEV ₁ / FVC	82.7±9.3	84.6±7.8	NS
PEF	4264.7±1020.4 ml/s (60.7%)	5638.2±2219.4 ml/s (74.4%)	< 0.0001
FEF ₂₅₋₇₅	3050.0±878.0 ml/s (72.6%)	3485.8±117.1 ml/s (82.1%)	<0.001

NS*- Not significant

city asthma prevalence amongst adults older than 15 years is 2.71% (18). According to these data, the asthma prevalence in hairdressers was more than twice that in the general population in Denizli.

Chemical agents such as persulphates, other bleaching agents, and dyes have been found responsible as etiological risk factors for occupational asthma among hairdressers (7,8,19,20). However, while some studies have showed a higher risk of occupational asthma with frequent use of these etiological agents compared to infrequent use (2,10,11), the others couldn't define this relation (12). In our study, we showed a negative correlation between the FEF₂₅₋₇₅ and duration of exposure to etiologic agents. Small airways are involved in the pathogenesis of asthma (21). FEF₂₅₋₇₅ might be considered as a measure of the caliber concerning distal airways, particularly in subjects with normal FEV₁ (22). Thus FEF₂₅₋₇₅ may be envisaged as a marker of initial bronchial impairment (23). To the best of our knowledge, the relation between FEF₂₅₋₇₅ and duration of exposure to etiological agents is presented here for the first time in the literature amongst hairdressers.

One can assume that respiratory symptoms amongst hairdressers would be higher than the normal population since hairdressers are exposed to reactive agents with potential irritant and sensitizing effects. However, respiratory symptoms were not significantly different between the hairdressers and the control group. Approximately 50% of the hairdressers were active smokers. Depending on this issue we selected a control group with similar smoking habits. The reason why we could not find any differences in the frequency of respiratory symptoms between the hairdressers and the control group might be due to the high prevalence of smoking in both groups. Similar to our findings, in Hollund et al.'s study (24), the prevalence of respiratory symptoms did not differ significantly between hairdressers and office workers after adjusting for age, atopy, and smoking. Brisman et al. (25) evaluated three respiratory symptoms; wheeze, dry cough and nasal blockage in 3957 female hairdressers and 4905 women from the general population. The cumulative prevalences at the beginning of their observation period for the three respiratory symptoms were not significantly different in the hairdressers and the control group. All these observations are similar with our findings.

The most common occupational disease among hairdressers is contact dermatitis (3,26,27). In the different articles the contact sensitization prevalence varies between 19% and 51%. In our study, the questionnaire-based prevalence was 27%.

A limitation of our study was that not all the hairdressers who defined respiratory symptoms underwent serial PEF measurements. The main reason for this situation was; most of the hairdressers were working everyday of the week and they did not have any vacation or time to

be away from their jobs. Another limitation of our study was that our control group consisted only 55 people which is a number of one third of the hairdressers. Similar to hairdressers, control group also comprised subjects who were smoking. Both control and study group had high amount of smoking habits. This high prevalence of smoking among subjects might not reflect the real ratio of occupational asthma. Despite these limitations, our study has the strength that to the best of our knowledge, this is the first study to demonstrate a negative correlation between FEF₂₅₋₇₅ and duration of exposure to etiological agents.

Conclusion

Hairdressers are at high risk of occupational asthma. We found the serial PEF based prevalence of occupational asthma among hairdressers in our city as 7.3%. In addition, we observed a negative correlation between FEF₂₅₋₇₅ and duration of exposure to etiological agents. These findings strongly suggest the importance of continuous medical surveillance in hairdressers.

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