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PEAK EXPIRATORY FLOW RATE (PEFR) IN HAIRDRESSERS

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Abstract : The present cross sectional study with comparison group was undertaken to assess the lung function of hairdressers by Peak Expiratory Flow Rate (PEFR) using Wright peak flow meter. Total 385 hairdressers and 770 controls were included in the study. PEFR was observed to be reduced in hairdressers compared with controls. The difference was significant ($P < 0.01$) above 45 years of age. Also with increasing duration of exposure observed PEFR was reduced than expected. Above 20 years of length of service, the difference was statistically significant ($P < 0.01$). Smokers in hairdressing occupation had reduced PEFR than in control group, though this difference was not significant. Thus, we conclude that hairdresser's environment adversly affects their lung function and smoking may potentiate the adverse effect.

Key words : hairdressers/barbers Peak Expiratory Flow Rate (PEFR) lung function

INTRODUCTION

Environmental factors influence respiratory morbidities significantly, occupational exposure being among the most important (1). Hairdressers are exposed to a variety of irritative and allergenic substances (2), which can cause respiratory symptoms and diseases (3, 4). These allergens may even worsen the symptoms of people with the reactive airway or asthma (5, 6). The obvious diseases may be preceded by some alteration in respiratory function. There are studies which documented increased respiratory symptoms suggestive of asthma and chronic bronchitis in hairdressers (3, 7). Reduction in PEFR is known with these respiratory conditions (8). It's measurement may give indication to development of overt disease.

Against this background, this study was carried out to measure peak expiratory flow rate in hairdressers as compared with controls not exposed to hairdressing environment.

METHODS

Present study was undertaken in South and Central zone of Nagpur city. Total 385 (99.9%) hairdressers participated in the study out of 419 hairdressers who fulfilled the inclusion criteria. All the hairdressers

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included in the study were males. According to inclusion criteria study subjects should be employee of bigger salons (employing more than 5 employees). Workers in bigger salons were only selected for present study due to their risk of exposure to various chemicals in addition to hairs. Also they were required to work for more than 5 years in occupation, on the assumption that this duration is quite sufficient to lead to occupation related alteration in lung functions and respiratory morbidities. 1:2 controls, frequency matched for age and socioeconomic status (9) were selected from neighbourhood, engaged in other jobs, who had not been exposed to hairdressing environment and to any other work (e.g. like garages, cement shops etc.) in which the exposure to chemicals or organic materials was known to be substantial. Thus there were total 770 controls in the study.

This study was basically designed to study respiratory morbidities in the hairdressers. Along with this we estimated the peak expiratory flow rate using Wright Peak Flow Meter. Three readings were taken for each study subject and best value was recorded. Expected PEFR was calculated using formula given by Dikshit and Jog (10).

Study subject was defined as smoker if he was currently smoking at least one cigarette/bidi/cigar each day.

Statistical analysis

Analysis was carried out by t-test and analysis of variance (ANOVA). To study the association between reduced PEFR and age, exposure to hairdressing environment, duration of exposure, smoking and respiratory morbidity. Unconditional Multiple Logistic Regression Analysis was performed by using "MULTLR" statistical software package. The classification of PEFR into reduced or normal PEFR was based on the calculation of predicted/expected PEFR by formula given by Dikshit and Jog (10).

RESULTS

There were total 385 hairdressers and 770 age and socioeconomic status (frequency) matched controls. Smoking prevalence was almost similar in study population i.e. 43.3% in hairdressers and 44.6% in controls. Average duration of smoking was 8.4 ± 15.3 years and 9.2 ± 14.2 years in hairdressers and controls respectively. Average frequency of smoking was 8.2 ± 10.7 and 9.1 ± 10.1 bidis/cigarettes per day in hairdressers and controls respectively. The difference was statistically nonsignificant.

Significant difference between observed and expected PEFR was observed in hairdressers above 45 years, while in controls no such difference was observed. Mean observed PEFR of hairdressers was significantly lower than mean observed PEFR of controls above 45 years. But there was no difference in mean expected PEFR of hairdressers and controls. Two way ANOVA revealed that there is a significant difference in mean observed PEFR of hairdressers and controls while controlling for age ($P<0.05$) (Table I).

It was also observed that mean observed PEFR was significantly lower in hairdressers working for more than 20 years as compared with controls (Table II).

TABLE I : Mean observed and predicted PEFR (L/min) according to age group among study subjects.

Age groups (in years)	*Hairdressers*			*Controls*		
	n	*Mean observed PEFR (SD)*	*Mean expected PEFR (SD)*	*n*	*Mean observed PEFR (SD)*	*Mean expected PEFR (SD)*
<25	21	563.2(39.2)	569.4(34.5)	42	567.4(35.2)	559.6(39.3)
25–29	60	558.4(32.4)	559.3(34.6)	120	462.6(31.4)	567.4(32.6)
30–34	51	546.6(44.6)	561.4(42.8)	102	556.3(42.6)	559.8(41.7)
35–39	73	533.7(42.1)	546.7(41.6)	146	543.2(46.1)	549.7(48.4)
40–44	71	516.8(51.2)	529.8(41.4)	142	524.8(51.6)	527.8(38.2)
45–49*	57	490.7(48.4)	515.3(39.6)	114	511.6(47.6)	521.7(31.2)
50–54*	34	460.7(34.6)	503.7(39.2)	68	495.2(39.8)	499.5(51.3)
≥55*	18	444.7(38.7)	490.3(41.4)	36	478.9(48.2)	482.6(47.3)

Statistics used was t-test for difference between mean.

1. Mean observed PEFR in hairdressers vs controls : Difference was significant above 45 years of age.*
2. Mean expected PEFR in hairdressers vs controls : No significant difference.
3. Mean observed PEFR vs expected PEFR in hairdressers : Difference was significant above 45 years of age.*
4. Mean observed PEFR vs expected PEFR in controls : Difference was nonsignificant.

TABLE II : PEFR(L/min) according to length of job.

Length of job (years)	*Hairdressers*			*Controls*		
	n	*Mean observed PEFR (SD)*	*Mean expected PEFR (SD)*	*n*	*Mean observed PEFR (SD)*	*Mean expected PEFR (SD)*
5–9	72	554.3(54.7)	558.4(56.8)	156	560.2(54.4)	559.9(55.3)
10–14	80	532.8(52.8)	540.3(54.3)	144	534.1(52.6)	550.3(54.7)
15–19	62	506.4(48.6)	511.6(51.1)	151	518.7(48.9)	519.6(52.6)
≥20*	171	462.7(43.7)	491.3(43.2)	319	490.8(32.1)	501.4(44.3)

*Difference between :

1. Mean observed PEFR in hairdressers vs controls : Significant ($P<0.01$).
2. Mean observed PEFR vs Mean expected PEFR in hairdressers : Significant difference ($P<0.01$).

Though the observed PEFR in hairdressers who smoke was less than controls who smoke, the difference was not significant (Table III).

There were total 109 hairdressers aged 45 years more. 44 (40.4%) were working for more than 15 years and 65 (59.6%) were working for more than 20 years. Smoking

TABLE III : PEFR according to smoking habits among study subjects.

Smoking habit	Hairdressers			Controls		
	n	*Mean observed PEFR(SD)*	*Mean expected PEFR(SD)*	*n*	*Mean observed PEFR(SD)*	*Mean expected PEFR(SD)*
Smokers*	167	516.2(42.4)	536.4(49.7)	343	524.3(59.7)	532.1(56.9)
Ex smokers	38	509.1(49.7)	530.1(47.8)	92	516.7(49.3)	537.3(51.2)
Non smokers	180	538.2(51.7)	550.4(52.6)	335	541.3(53.4)	553.2(54.5)

*Difference between :

1. Mean observed PEFR in Hairdressers vs controls : Marginally non significant (t=1.8).
2. Mean observed PEFR vs Mean expected PEFR in Hairdressers : Significant ($P<0.01$).

prevalence was 13 (29.5%) and 15 (23.1%) respectively in these groups. Average duration of smoking was 16.2 (± 8.4) years and 19.7 (± 6.3) years respectively. Frequency of smoking in these groups was 7 (± 13.4) and 7.4 (± 12.6) bidis/cigarettes per day respectively. Table IV shows results of Unconditional Multiple Logistic Regression Analysis. A full model included age, exposure to hairdressing environment, duration of exposure (≥ 20 years or <20 years), smoking and respiratory morbidity as a risk factor for reduction in PEFR at $\alpha = 0.1$. The full model identified significant association of age, exposure status, duration of exposure, smoking and respiratory morbidity at $\alpha = 0.1$ level. Final model confirmed their significance except smoking and exposure status at $\alpha = 0.05$.

TABLE IV : Results of Unconditional Multiple Logistic Regression Analysis.

Risk factors	*Odds ratio*	*95% Cl*	*P-value*
	Full model		
Age	1.19	0.72–1.56	0.0495
Exposure to hairdressing environment	1.27	0.68–2.24	0.0598
Duration of exposure	1.75	0.98–4.38	0.0431
Smoking	1.94	0.69–4.61	0.2634
Respiratory morbidity	2.82	1.34–6.43	0.0102
	Final model		
Age	1.42	1.12–1.96	0.0312
Exposure to hairdressing environment	1.61	0.84–2.48	0.0794
Duration of exposure	1.63	1.25–3.43	0.0121
Respiratory morbidity	3.14	1.98–5.32	0.0014

DISCUSSION

Peak Expiratory Flow Rate is an acceptable indicator for lung capacity in field situation (11, 12). We observed that PEFR was reduced significantly in older subjects only. This may be because longer duration of exposure is required to decrease lung functions significantly. In fact, we observed that PEFR decreased with increasing duration of exposure. Smoking could have confounded observed difference between PEFR in cases and controls, as observed PEFR was significantly lower in smokers. But similar frequency of smokers in both the groups had reduced the confounding effect to a larger extent. Reduced PEFR in hairdressers who smoke than controls who smoke indicates the synergistic effect of smoking with other environmental factors in reducing the PEFR. The non significant difference may be due to younger subjects in the smokers group.

Multivariate analysis showed age, duration of exposure and respiratory morbidities as risk attributes for reduced PEFR in hairdressers. Exposure to hairdressing environment is not observed to be the risk factor for reduced PEFR. But its marginal nonsignificance may suggest need to evaluate its role in detail. This could be explained by the fact that reduction in PEFR required prolonged duration of exposure, observed in the present study.

In conclusion, hairdressing environment could be the risk attribute for reduced lung functions, though very prolonged exposure (may be more than 20 years) is required to produce the significant changes. Reversibility of this change remains to be studied. Also smoking may have synergistic adverse effect along with hairdressing environment on lung functions. Further studies to evaluate the specific role of different environmental pollutants in hairdressers occupation in Indian set up is needed. Moreover, further studies in female beauticians may be needed to evaluate the effect of gender difference.

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