Respiratory Symptoms and Pulmonary Functions of Hairdressers in Lagos, South West Nigeria

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ABSTRACT

Background: Hairdressers are exposed to varities of chemical agents with potential to irritate and sensitise the airways.

This study was conducted in a local government area in Lagos South West Nigeria to determine the prevalence of respiratory symptoms among hairdressers, compare the pulmonary function test of the hairdressers with that of a matched control as well as assess the knowledge attitude and practices of preventive strategies by hairdressers.

Method: The study took place in Ikosi Isheri Local council development area (LCDA), Lagos. The list of hair dressing salons was collected from the LCDA. Informed consent was obtained from the participant with ethical clearance taken from the Research and Ethic Committee of Lagos State University Teaching Hospital as well as from the executive chairman of the LCDA.

Interviewer administered questionnaire was used in obtaining information while the pulmonary function test was done in accordance with American Thoracic Society. (ATS) using the Spirotrac intuitive version v spirometer. Smokers and those with history of asthma were excluded. Data was analysed using the SPSS version 17. The quantitative data was expressed as mean±sd, comparison of mean was done with the student T test or ANOVA. The qualitative data was compared with the chi square and p<0.05 was taken as statistically significant.

Result: Three hundred and forty two females participated in the study which comprised of 228 female hairdressers and 114 controls. The mean age of the hair dressers was 27.96±8.94 years while that of the control was 31.04±8.51 years. The mean duration of hair dressing was 78.64±78.15 months. Respiratory symptoms were common among the hairdressers. The most frequent symptom was frequent sneezing 173(75.9), 116 (50.9) had cough, chest tightness 86(37.7). The mean pulmonary function test was lower in the hair dressers but this was not related to duration of employment in the industry. Ventilatory abnormality among the hairdressers include restrictive pattern in 123(53.9), mixed in 11(9.6), obstructive 9(3.9) and only 55(24.1) had normal pulmonary function compare with 45.6% among the control. Majority of hairdressers do not use any preventive strategies at work and they had poor knowledge of potentil hazards of their occupation.

Conclusion: Hair dressing is a common occupation and is associated with respiratory symptoms and reduced lung function. Adequate attention should be given to appropriate education about potential hazards and preventive strategies in this group of workers.

1. BACKGROUND

Respiratory conditions impose an enormous burden on the society and are among the 10 leading causes of death worldwide.\textsuperscript{1} Multiple determinants serve to increase the burden of Chronic Respiratory Disease (CRDS) some of which include occupational exposures, tobacco smoke and early lung infections.\textsuperscript{(1)}

As part of secondary and tertiary prevention of chronic respiratory diseases early detection of occupational asthma is vital to prevent further progression and ensure cost effective management.

Hairdressers are exposed to chemicals found in hair spray, setting lotion, hair coloring, relaxers etc that are known to have effects on their respiratory symptoms.\textsuperscript{(2-4)} They are exposed to low air concentrations of numerous chemicals in cosmetics products that may cause bronchoconstriction, airway inflammation and airway obstruction. Increased prevalence of respiratory symptoms, hand dermatitis and occupational asthma has been reported in hairdressers.\textsuperscript{(2-5)}

Some of these chemicals include per sulfate salts, bleach, ammonia etc. Work place exposure to various chemicals may be absorbed or inhaled can affect airways directly or cause bronchial mucosa inflammation. However little is known about the prevalence of different types of symptoms that could result from the exposure to chemicals present in the work place, particularly in our environment. Such knowledge will ultimately assist in development of preventive strategies. Thus this study was conceived to determine prevalence of Self reported work related respiratory symptoms among a selected population of hairdressers in Lagos. It is aimed at describing the pulmonary function patterns of this group of workers in Lagos and document preventive strategies as well as knowledge of hazards associated with hair dressing.
2. METHODS
The study was a cross sectional study carried out in Lagos, South West Nigeria. Ethical approval was taken from the ethics and research committee of the Lagos State University teaching Hospital Ijeka as well as that of the local development area where study is been undertaken. Informed and written consent were taken from individual participants.

The list of hair dressing salons was obtained from the Local Government Area and every other hair dressing salon was selected to participate in the study. The participants were hair dressers who had been functioning as one for at least a period of 6 months either as apprentice or stylists and with no previous history of asthma.

A standard questionnaire was administered by trained facilitators which sought information on the demographic characteristics such as age, sex, marital status, duration of employment, current respiratory symptoms, work history and workplace exposures. The medical research council respiratory questionnaire was used to obtain information about cough, phlegm production, chest tightness and breathlessness. Information was obtained about other symptoms such as sneezing, itchy eyes and running nose. Questions about The knowledge and preventive measures taken by respondents were also asked. The pulmonary function test was done using the portable Spirotrac intuitive version V spirometer calibrated daily and done according to the American Thoracic society guidelines. Asthma was defined as episodic breathlessness, associated with cough, waking with shortness of breath or currently taking asthma medications.

The FEV1, FVC, FEV1/FVC were computed as well as the predicted values based on the age and sex. The reference values for Africans were used. This was as calibrated on the machine. Post bronchodilator responses were documented. The control were recruited in the same neighborhood from traders, civil servants and nursing staff of the primary health care of the LGA. The data was analyzed using the SPSS version 17. The quantitative data were expressed as mean ±sd (age in years, duration of employment, pack years etc. histograms / bar charts were generated for subjects of interest while qualitative data were expressed as proportion, percentages and compared using the Chi square. The mean were compared using the student T test. P >=0.05 were considered statistically significant.

3. RESULT
A total of 342 people participated in the study. This includes 228 female hair dressers and 114 controls. The mean age of the Hairdressers was 27.96±8.94 years while that of the control was 31.04±8.51 years. The mean duration of practice of hair dressing was 78.64±78.15 months, mean duration at work daily 10.46±1.84 hours, spending an average of 6.48±0.8 days per week at work. Table 1 shows the demographic characteristics of the participants. There was no statistically significant difference between the mean age of the hairdressers and that of the control. Figure I show the age distribution of the hairdressers. Frequent sneezing is the most frequent complaint among the hairdressers occurring in 173(75.9) compared with 32(28.1) in the control. Cough was present in 116(50.9) of the hairdressers compared with 28(24.1) in the control, other symptoms included chest tightness 86(37.7) and 16(14) of the control. The prevalence of the other symptoms is as shown in Figure II. Table 2 show the pulmonary function test of the participants. There exists a statistically significant difference in the Mean Pulmonary Function Tests (PFTs) of the two groups. The Mean PFT values were much lower in the hair dressers compared with the control groups. P<0.05

The pulmonary function across duration of employment in the hairdressing industry is illustrated by table 3. There is no statistically significant difference across the three groups. Thus duration of employment did not affect the PFT. Restrictive ventilator pattern is common in both study groups. Restrictive defect was found in 123(53.9) of the hairdresser compared with 45(39.5) of the control. 55(24.1%) of the hairdressers had normal ventilatory pattern compared with 52(45.6), obstructive and mixed ventilatory defect were seen in 9 (3.9%) and 41 (18.9%) of the hairdressers and 11 (9.6%) and 06 (5.3%) respectively. The chi square = 32.73, P<0.05. This is shown by figure III.

The hairdressers largely do not use any preventive strategies at work. Only 3(1.3%) used face mask at work while mixing chemicals while 25(11%) used hand gloves with 12(5.3%) used googles. Many of the hairdressers lack adequate knowledge on the hazards of their occupation. This is illustrated by figure IV.

4. DISCUSSION
Hair dressers are exposed to a broad range of irritative and allergenic chemicals at work however there are limited studies done in our environment on prevalence of respiratory symptoms and their pulmonary functions in this group of workers.

In this study we found that there is frequent upper and lower respiratory symptoms among hairdressers in Lagos Nigeria. This is similar to other studies done elsewhere (5-10) although it is not possible to draw any definite conclusions about causal relationship. It may be that this is a result of occupational exposure to hair dressing chemicals used by them. Experimental studies of harmful effect of hair care product on airway epithelium provide a
possible likely explanation of the increase prevalence of respiratory symptoms among hairdressers. The French Observatoire National des Asthmes Professionnels (ONAP) study stated that hairdressing has a higher risk of occupational asthma.\textsuperscript{(10)} Leino et al found a considerable difference in the prevalence of chronic bronchitis in hairdressers, compared to a control group in Finland.\textsuperscript{(5)} Hollund et al studied 100 hairdressers and 95 office workers and did not find any significant difference in the prevalence of respiratory symptoms in the past year however they found that older hair dressers over 40 years reported more symptoms such as wheezing and breathlessness in the past year than office workers of the same age. \textsuperscript{(7)}

The exact mechanism of respiratory reaction to chemicals is still unclear, although a few studies have reported the roles of various factors. The methacholine-inhalation test showed airway hyper-responsiveness in hairdressers.\textsuperscript{(11)} The clinical and immunological studies carried out with hairdressers reported that they developed respiratory symptoms about one year after being employed in a hairdressing salon, after exposure to persulphate salts, which are common constituents of hair bleach.\textsuperscript{(11)} Majority of our study population have been on the job for more than one year Parra et al clearly showed that exposure to hair bleach containing potassium persulphate is mainly responsible for the development of respiratory disorders in hairdressers. Hair bleaching products containing persulphates dissolved in hydrogen peroxide which cause airway hyper-responsiveness to acetylcholine in rabbits. \textsuperscript{(11-12)} In our study the mean forced expiratory volume in one sec and forced vital capacity and mean Peak expiratory flow rate were much lower compared to the control. This is similar to the findings of Iwatsubo et al \textsuperscript{(6)} They found significant deterioration of baseline values of lung function tests in hairdressing apprentice group compared to the control but however did not show any statistically significant difference in respiratory symptoms. Our study showed that ventilatory abnormalities are frequent in hairdressers compared to the control. Hamid and Froozan found 8.3\% and 74.5\% of hairdressers to have obstructive and restrictive diseases compared with 4.7\% and 40.6\% in the control. We reported similarly high prevalence of restrictive lung disease in both the study group and the control, this may be due to the reference values used which were those for Africans and South Indians and not derived from the Nigerian population. Moscato et al in Italy in the follow up study of 47 hairdressers between 1996-2004 found that about 51\% of them had occupational asthma and that in 87.5\% of all with occupational asthma it was due to persulfate and 545 of them had occupational rhinitis. Although we had a prevalence study, frequent sneezing occurred in a significant proportion of the hairdressers studied when compared with the control. In India, 385 hairdressers were studied versus 770 control and it was found that the peak expiratory flow rate observed was lower in hairdressers compared with the control and this is similar to our findings. In that study it was noted that the difference was greater in those older than 45 years and those with longer duration of service as hairdressers \textsuperscript{(15)} which is at variance with our finding where the duration of occupation did not statistically significantly affect the lung functions however the older hair dressers have lower FEV1 and FVC though not statistically significant. The PEFR was lower significantly in older hairdressers \textsuperscript{p=0.02}. This may be related to the effect of age on pulmonary function test rather than the occupation. There is need for further evaluation of this finding to explain the rationale for this.\textsuperscript{(15)}

5. CONCLUSION
Hair dressing is a common occupation worldwide and Nigeria inclusive. it is significantly associated with respiratory symptoms and abnormal pulmonary function tests. the hair dressers widely lack adequate knowledge about the potential hazard of their occupation as well as the preventive strategies to reduce risks. there is therefore a need for education concerning the existence of risk in workplace for all hairdressers. the government should increase commitment to provide adequate information about this to practitioners in the industry. there is need for further research into potential hazards in workers not in organised private sectors particularly this group as well as other artisans.

LIST OF TABLES
1. Demographic characteristic of participant
2. Pulmonary function test of participant
3. Baseline pulmonary function of hairdressers by duration of employment in hairdressing industry

6. ACKNOWLEDGEMENT:
This is to acknowledge all the artisans and the controls who took part in this study. Without them this study would not have been possible.
### Table 1: Demographic Characteristics of the participants

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Hairdressers N=228</th>
<th>Control N=114</th>
<th>P value</th>
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</thead>
<tbody>
<tr>
<td>Age Mean age(years)</td>
<td>27.96±8.94</td>
<td>31.04±8.52</td>
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<tr>
<td>Mean duration of occupation</td>
<td>6.55±6.51</td>
<td>5.89±4.99</td>
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### Table 2: Pulmonary Function Test of the Participants

<table>
<thead>
<tr>
<th>Pulmonary function test L/Min</th>
<th>Hair Dressers N=228</th>
<th>Control N=114</th>
<th>P value</th>
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<tbody>
<tr>
<td>Mean Predicted FEV1</td>
<td>2.68±0.40</td>
<td>2.80±0.48</td>
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<td>Mean Predicted FVC L/</td>
<td>2.93±0.38</td>
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<td>Mean Predicted PEFR±sd</td>
<td>413.85±32.52</td>
<td>413.97±44.53</td>
<td>0.97</td>
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<tr>
<td>Mean obtained FEV1±sd</td>
<td>1.44±0.52</td>
<td>1.85±0.57</td>
<td>0.000</td>
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<tr>
<td>Mean Obtained FVC±sd</td>
<td>1.70±0.49</td>
<td>2.11±0.54</td>
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<tr>
<td>Mean obtained PEFR±sd</td>
<td>184.77±84.10</td>
<td>259.75±91.04</td>
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<td>Post broncho-dilatory Obtained FEV1±sd</td>
<td>1.44±0.34</td>
<td>2.20±0.47</td>
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<td>Obtained FVC±sd</td>
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<tr>
<td>PEFR±sd</td>
<td>184.77±84.10</td>
<td>326.37±91.98</td>
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</table>

### TABLE 3: Baseline Pulmonary Functions in hairdressers by duration of employment in hairdressing industry

<table>
<thead>
<tr>
<th></th>
<th>6months-120 months N=134</th>
<th>61months – 120months N=38</th>
<th>Greater than 120 months N=56</th>
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<tr>
<td></td>
<td>Mean</td>
<td>SE</td>
<td>95%CI</td>
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<tr>
<td>FEV1</td>
<td>1.43±0.55</td>
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<tr>
<td>FVC</td>
<td>1.7±0.46</td>
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<tr>
<td>PEFR</td>
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<td>176.21-204.67</td>
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7. REFERENCE