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ORIGINAL ARTICLE

Respiratory Status of Hairdressers in Edo State, Nigeria

Onowhakpor AO, Aigbovorhiuwa DI, Okojie OH

Department of Community Health, College of Medical Sciences, University of Benin, PMB 1154, Benin City, Edo State.

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Respiratory status, Hairdressers, Spirometry

ABSTRACT

Background: Hair salon workers form a part of the informal economy in which work exposure is unregulated and working conditions are below standard. They utilize a variety of hair products which contain chemicals that can predispose them to respiratory diseases. This study was done to determine the prevalence of respiratory symptoms and pulmonary function of hairdressers in Egor Local Government Area of Edo State, Nigeria.

Methods: A descriptive cross-sectional study was conducted among 350 hairdressers selected using cluster sampling technique. Data collection was done using pre-tested structured interviewer administered questionnaire. Pulmonary functions of participants were measured using a spirometer. Data analysis was done using the IBM SPSS version 21.0. Univariate and bivariate analysis were carried out. The level of statistical significance was set at $p < 0.05$.

Results: The mean age (SD) of respondents was 24.27 (3.99) years. Concerning the prevalence of respiratory symptoms, 196 (56.0%) and 61 (17.4%) of the respondents reported nasal congestion and difficulty with breathing. Median FEV_1 (IQR) and mean FVC (SD) were 2.34 (1.97 – 3.23) and 2.87 (0.732) respectively. The median FEV_1/FVC (IQR) was 87.9 (83.0 – 96.0).

Conclusion: The predominant respiratory symptoms reported by respondents were nasal congestion and difficulty with breathing. Majority of the respondents had abnormal lung function results. Thus, the need for relevant government authorities to enact policies which ensure adherence to occupational health and safety standards in the informal sector especially in the areas of pre-employment and periodic lung function examinations.

Correspondence to:
Dr. A. O. Onowhakpor
Department of Community Health
College of Medical Sciences
University of Benin
PMB 1154, Benin City, Edo State
Email: ogbeideamenze@yahoo.com

INTRODUCTION

Beauty salons are an expanding part of the small and medium scale enterprise (SME) sector of the economy, [1] providing services such as hairdressing, barbing, manicure and pedicure, facial make-up, skin toning, massage, etc. Hair salon workers form a part of the informal economy in which work exposure is unregulated and working conditions are below standard.[2, 3] A variety of products such as hair dyes, bleaching solutions, shampoos, skin toning agents, conditioners and hair sprays are used by hairdressers when rendering services. These products contain potentially harmful chemicals namely: resorcinol, aromatic amines, volatile solvents, diaminotoluene, formaldehyde, ammonia, ethanol and thioglycolic acid which may cause bronchoconstriction and airway obstruction.[4-6] Thus, a possible explanation for the high prevalence of respiratory disorders observed among hairdressers in several studies.[7–13] In

addition, studies on lung function among hairdressers also revealed a lower pulmonary function among hairdressers as compared to the control group.[7, 11]

A considerably high number of the young people are engaged in hairdressing and they lack certain securities enjoyed by other workers in the formal economy (e.g. hazard allowances and health insurance), hence they bear the full burden of the adverse effects of work on their health. This emphasizes the need to determine the respiratory function these group of workers as a way of assessing their health status. This study identified the respiratory symptoms and assessed the pulmonary function of hairdressers in Egor Local Government Area (LGA), Edo State.

METHODOLOGY

A cross-sectional descriptive study was carried out among 350 hairdressers in Egor Local Government Area (LGA) of Benin City, in Edo State, Nigeria from May to August 2016. Egor LGA is divided into ten (10) administrative wards. It has a population of 333,899 and it is the most densely populated LGA in Edo State with a population density of 3,638 persons/sq.km. Hairdressing provides employment for a large population of youths in Benin City. The trade is predominated by females although the number of males is gradually increasing. The sector represents an important part of the informal economy of Benin City, although there are no documented statistics on their population in Edo State. The study was carried out among full time hairdressers aged 18-65 years with more than one year work experience and who were non-smokers working in Egor LGA of Edo State.

The minimum sample size (n) was calculated using the Cochrane formula for descriptive studies,[14] p was taken as 29% which was the prevalence rate of breathlessness among hairdressers in Mashhad , NE Iran.[15] A minimum sample size of 316 was obtained and this was increased to 347 after accounting for 10% non-response rate. Respondents were then recruited using cluster sampling technique. Egor Local Government Area was divided into 10 clusters using the 10 wards. One of the wards was selected using simple random technique (balloting) and all the consenting hairdressers in that cluster who were 18 years and above, non-smokers and have been working for at least one year in beauty salons were recruited. Data was collected with the aid of a pre-tested interviewer administered questionnaire adapted from previous similar studies.[7, 11, 15] The questionnaire included items on the respondents' socio-demographic characteristics, present and past occurrence of respiratory symptoms (such as shortness of breath, wheezing, nasal congestion, chest tightness and chronic cough during the past 12 months).

Spirometry was performed on all participants using the ST75 spirometer (Fukuda, Sangyo, Japan). The device is a portable one capable of running on rechargeable batteries. It has a reusable flow sensor and it gives full lung function reports both for pre and post bronchodilator and bronchial challenge tests. The device is also equipped with a 35 character width internal thermal printer.[16] Lung function tests (LFT) were performed in a standing position, with nose-clips, according to the American Thoracic Society guidelines.[17, 18] The spirometer was calibrated daily before use by the first participant and after the 8th participant or after 4 hours of continuous usage. The calibration was done using a validated three-litre calibration syringe with an accuracy of ± 15 mL or ± 0.5%.With each subject, forced expiratory manoeuvers were repeated until three acceptable test were obtained. All the lung function tests were performed without bronchodilators. Participants were given instructions on the

forced maximal expiratory manoeuvers. The LFTs taken included peak expiratory flow rate (PEFR), forced vital capacity (FVC), forced expiratory volume in 1 second (FEV1), and FEV1/FVC ratio.

Ethical clearance for the study was obtained from the Research and Ethics Committee of the College of Medicine, University of Benin. Informed consent was obtained from the respondents before administering questionnaires or performing lung function tests. Data were entered and analysed with IBM SPSS version 21.0 software. Univariate, bivariate (Chi-square test) and logistic regression analysis were done. The self-reported respiratory symptoms, FEV, FVC, FEV1/FVC were the primary outcome measures. Spirometry results were regrouped as follows:

FVC: Elevated (> 120% of predicted); Normal (80% - 119%); Mildly reduced (60% - 79%); Moderately reduced (40% - 59%); Severely reduced (< 40%).

FEV1: Elevated (> 120% of predicted); Normal (80% - 119%); Mildly reduced (70% - 79%) ; Moderately reduced (60% - 69%); Moderately severely reduced (50% - 59%); Severely reduced (35% - 49%); Very severely reduced (< 35%) .[17]

FEV1/FVC Ratio: Elevated **(**> 105% of predicted); Normal (95% - 105%) ; Mildly reduced (85% - 94%); Moderately reduced (65% - 84%); Moderately severely reduced (40% - 64%) ; Severely reduced (< 40%).

Thereafter, FEV1/FVC ratio was regrouped into 'Normal' (> 95% predicted) and 'Abnormal' (< 95% and > 105% of predicted) for purpose of further analysis. The socio-demographic characteristics and occupational history of participants constituted the independent variable while FEV1/FVC ratio the dependent variable. The level of significance was set at $p < 0.05$.

RESULTS

A total of 350 hairdressers participated in the study. One hundred and fifty-five (44.3%) of the respondents were within the age group 25-29 years with a mean age of 24.27 years. Females accounted for 269 (76.9%) of the hairdresser population. (Table 1) Two hundred and fifty-eight (74.1%) of hairdressers had worked for 1 to 5 years. In addition, 202 (57.7%) of the respondents had worked for less than 8 hours daily. (Table 2)

Table 1: Socio-demographic characteristics of hairdressers

Variable	Frequency (n = 350)	Percent
Age group (years)		
< 20	55	15.7
20 – 24	116	33.1
25 – 29	155	44.3
30 – 34	19	5.4
≥ 35	5	1.4
Sex		
Male	81	23.1
Female	269	76.9

Mean age [SD] hairdressers: 24.27 [3.99] years

Table 2: Occupational history of hairdressers

Variable	Frequency (n = 350)	Percent
Duration of work (years)		
1-5	258	74.1
6-10	78	22.4
11-15	11	3.2
>15	1	0.3
Daily working duration (hours)		
≤ 8	202	57.7
>8	148	42.3

Concerning the prevalence of respiratory symptoms, nasal congestion and difficulty with breathing were encountered by 196 (56.0%) and 61 (17.4%), of the respondents respectively. Fifty-four (15.4%) had a history of shortness of breath when climbing stairs. Other reported respiratory symptoms included chest tightness 19 (5.4%), chronic cough 17 (4.9%), wheezing 16 (4.6%) and shortness of breath with walking 5 (1.4%). (Table 3)

Table 3: Prevalence of respiratory symptoms among hairdressers

Respiratory symptoms	Frequency (n = 350)	Percent
Nasal congestion	196	56.0
Difficulty with breathing	61	17.4
Shortness of breath with climbing stairs	54	15.4
Chest tightness	19	5.4
Chronic cough	17	4.9
Wheezing	16	4.6
Shortness of breath with walking	5	1.4

Median FEV1 and mean FVC was 2.34 and 2.87 respectively. The median FEV1/FVC ratio was 88% (Table 4) Three hundred and eleven (88.9%) of the respondents had abnormal lung function results. Two hundred and forty five (91.1%) of the female respondents had abnormal lung function results as compared to 66 (81.5%) of the male respondents who also had abnormal lung function results (p = 0.016). Nineteen (95.0%) of the respondents who had worked ≥ 10 years had abnormal FEV1/FVC ratio when compared with those who had worked for ≤ 10 years (p = 0.369). (Table 5)

DISCUSSION

Hair dressers are exposed to a variety of hair products which contain irritant and allergic chemicals and which are capable of causing respiratory symptoms.[19, 20] Studies have reported that 35 different airborne compounds which are respiratory irritants are found in hairdressing saloons.[21, 22] In this study, the prevalent respiratory symptoms reported by respondents were nasal congestion and difficulty with breathing. Contrary findings were observed in a study conducted in Lagos, Nigeria among hairdressers which reported sneezing and cough as the main respiratory symptoms. [23] Another study in North East, Iran among hairdressers reported mainly cough and breathlessness. [15] The occurrence of these respiratory symptoms may be the resultant effect of continuous exposure to sprays, aerosols and fumes from creams used for hair treatment. The exposure to these chemicals is worsened by poor ventilation and non-use of personal protective equipment observed in most salons.[24] This emphasizes the role of work environment in addition to occupation on the respiratory status of individuals.[25] The presence of respiratory symptoms and continuous exposure to these hazardous chemicals in the workplace of respondents may overtime lead to deteriorating lung function and its sequelae.

Majority of the respondents had abnormal lung function readings indicating the presence of obstructive and restrictive pulmonary disorders. In this study the median FEV_1/FVC (IQR) was 87.9 (83.0 – 96.0). This was lower than findings reported in studies conducted in Larissa, Central Greece [92.0 (10.3)] [11] and higher than that reported in Karnataka, India [75.55 (3.20)].[26] This finding shows that the development of respiratory disorders among respondents may be related to the work environment. It may be attributed to their chronic exposure to fumes and airborne chemicals found in hair products, which can cause inflammatory changes in the airways and eventually lead to impairment in lung function and reduced life expectancy.

Table 4: Lung function readings among hairdressers

Lung function readings	FEV1 n (%)	FVC n (%)	FEV1/FVC n (%)
Elevated	0 (0.0)	0 (0.0)	137 (39.1)
Normal	93 (26.6)	143 (40.9)	39 (11.1)
Mildly reduced	105 (30.0)	161 (46.0)	28 (8.0)
Moderately reduced	104 (29.7)	46 (13.1)	125 (25.7)
Moderately severely reduced	20 (5.7)	0 (0.0)	21 (6.0)
Severely reduced	28 (8.0)	0 (0.0)	0 (0.0)
Very severely reduced	0 (0.0)	0 (0.0)	0 (0.0)

n = 350
Median FEV1 (IQR) = 2.340 (1.97 – 3.23); Mean FVC (SD) = 2.87 (0.732); Median FEV1/FVC (IQR) = 87.9 (83.0 – 96.0)
FEV1: Forced expiratory volume in 1 second
IQR: Inter-quartile Range
FVC: Forced vital capacity
SD: Standard Deviation
PEFR: Peak expiratory flow rate

Table 5: Determinants of lung function among hairdressers

Variable	FEV1/FVC ratio		OR (95% CI)	p-value
	Normal n (%)	Abnormal n (%)		
Age (years)				
< 25	22 (9.4)	211 (90.6)	0.994 (0.510 – 1.934)	0.985
≥ 25	17 (14.5)	100 (85.5)		
Sex				
Male	15 (18.5)	66 (81.5)	2.320 (1.152 – 4.672)	0.018
Female	24 (8.9)	245 (91.1)		
Daily working hours (hours)				
≤ 8	13 (10.2)	114 (89.8)	0.864 (0.427 – 1.748)	0.684
> 8	26 (11.7)	197 (88.3)		
Duration of work (years)				
≤ 10 years	38 (1.5)	292 (88.5)	2.473 (0.322 – 18.999)	0.384
>10 years	1 (5.0)	19 (95.0)		
Total	39 (11.1)	311 (88.9)		

OR = Odds Ratio; CI = Confidence Interval

Sex was significantly associated with abnormal lung function. It was observed that more females had abnormal lung function values than the males. Of note are that majority of the individuals who engage in hairdressing as a profession are women. This high prevalence of abnormal lung function among women can be explained by the fact that apart from their hairdressing occupation, women are also engaged in household cooking with the risk of indoor air pollution from cooking fuels. This further increases their exposure to hazardous substance and their likelihood of having respiratory symptoms and pulmonary abnormalities.[27] Majority of the respondents with greater than 10 years of work experience had an abnormal lung function although this was not statistically significant. This may simply be due to the fact that with increasing number of years spent on

the occupation, there is also an increased time of exposure to hazardous substances found in hair dressing creams. This finding reveals that with increased number of years on the occupation, hairdressers are more likely to suffer progressive decline in lung function which can subsequently lead to COPDs later in life. Study limitations include the use of self-reported health data as regards history of respiratory symptoms may have introduced recall bias. Also, the lack of environmental air data confirming exposures limits association of the pulmonary function readings to the work environment.

In conclusion, the most prevalent respiratory symptoms reported by respondents were nasal congestion and difficulty with breathing. Majority of the respondents had abnormal lung function results. Adherence to occupational health and safety standards in the informal sector is therefore advocated especially in the areas of pre-employment and periodic lung function examinations.

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