

## Health Disorders among Professional Female Hairdressers in Menoufia Governorate, Egypt: A Cross-Sectional Study

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### Abstract

**Background:** Professional hairdressers are exposed to a variety of chemicals at their workplace. **Objective:** to assess health disorders among professional female hairdressers in Menoufia governorate, Egypt. **Method:** this cross sectional study was conducted on 115 female hairdressers in Menoufia governorate with a similar number of non-exposed controls. All participants were subjected to a predesigned questionnaire regarding respiratory, musculoskeletal, and reproductive manifestations followed by spirometry examinations. Data was collected and tabulated. **Results:** Lower respiratory manifestations including cough, wheezes, dyspnea, and asthma were more among hairdressers ( $p < 0.05$ ) with highly significant reduction in spirometry measurements ( $p < 0.001$ ). Musculoskeletal and Reproductive manifestations were significantly higher among hairdressers ( $p < 0.05$ ) as well. Hairdressers working for more than 9 years were more prone for such disorders. **Conclusion:** Health and safety of professional hairdressers in Egypt has been inadequately provided as proved by development of respiratory, musculoskeletal and reproductive disorders, which mandates the high need for health education, diagnostic and therapeutic interventions to this work group.

**Key words:** *hairdressers, health disorders, spirometry, Respiratory disorders, musculoskeletal.*

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### Introduction

Hairdressers are exposed to a variety of harmful agents at their workplace which include chemical agents in hair cosmetic products such as hair dyes, permanent wave solutions and bleaches, physical agents such as noise and temperature and ergonomic hazards due to inappropriate posture during work, and long working hours.<sup>1,2</sup>

Hairdressers are exposed to multiple allergens and irritants during work particularly with a great amount of wet work with subsequent allergic skin and respiratory manifestations.<sup>3-6</sup>

Musculoskeletal disorders have been reported by hairdressers as Neck pain, wrist/hand pain and low back pain. These

complaints were related to prolonged sitting, use of vibrating tools, reaching far and awkward body postures.<sup>7</sup>

The aim of this study was to assess health disorders among professional female hairdressers in Menoufia governorate, Egypt.

### Method

This cross-sectional study was conducted at the Department of Public Health and Community Medicine, Menoufia Faculty of Medicine, Menoufia governorate, Egypt, between January 2018 and February, 2019.

Shebin El-Kom city was chosen from Menoufia governorate (as it is the capital

and the largest city in this governorate). From 29 hair salons in this city, Total number of female hairdressers was 149. After exclusion of non responders and those who had less than one year of employment, the total eligible female hairdressers were 115 with response rate of 90.6%. An equal number of female controls (115 subjects) of office workers from Faculty of Medicine, Menoufia University, never worked as hairdressers. Women with known respiratory, Gynecological disorders as well as having chronic medical diseases as diabetes mellitus and hypertension were excluded from the study.

A pre-designed questionnaire was filled through personal interviews at the working centers. The questionnaire has four main parts; (1) Personal data including age, residence, educational level and marital status, (2) Occupational data including duration of work in years, working hours per day and work practice data including usage of Personal Protective Equipments (PPEs) as gloves and face masks. (3) Respiratory manifestations including both upper and lower respiratory complaints as running nose, cough, wheezes and difficult breathing. (4) Musculoskeletal manifestations including pain symptoms in the upper & lower limb, neck and back. (5) Reproductive manifestations including preterm delivery (delivery before completed 37 weeks of gestation) and low birth weight (birth weight less than 2500 gm).

#### ***Spirometry measurements:***

All parameters were measured using portable spirometer Spirolab II (Quest medical spirometry and equipment and supplies, MA, USA). The test was done in the sitting position after explanation of the principles of the test. Measurements obtained were expressed as percentage of predicted for standing height, weight, age

and sex of tested participants. Forced expiratory maneuvers were repeated until three acceptable tests were obtained and the best forced expiratory volume in the first second (FEV1), forced vital capacity (FVC), and FEV1/ FVC values were recorded.

#### **Statistical analysis**

Data were analyzed using IBM SPSS® ver 22 (SPSS Inc, Chicago, IL, USA). The collected data were summarized as mean  $\pm$  SD and range for quantitative data and proportions for qualitative data. Student's *t* test and Fisher's exact test, were used as appropriate. A *p* value  $<0.05$  was considered statistically significant.

#### **Ethical Consideration**

The study protocol was formally reviewed and approved by the Ethical committee for human research at the Menoufia Faculty of Medicine with informed consent obtained from all participants before starting the study. All measures were in accordance with the declaration of Helsinki as revised in 2000.

#### **Results**

The work duration (year) of Hairdressers was ranged 0.5 – 26 with Mean $\pm$ SD (9.8 $\pm$ 6.9) and median 9. The working hours/day of Hairdressers was ranged 2 – 16 with Mean $\pm$ SD (6.8 $\pm$ 2.8).

There was no significant difference between the two groups regarding demographic data as depicted in table (1). Lower respiratory manifestations including cough, wheezes, dyspnea and asthma were more in the study group ( $p<0.05$ ) with highly significant difference regarding all respirometric measurements ( $p<0.001$ ) as shown in table (2).

Musculoskeletal and Reproductive manifestations were significantly higher among hairdressers ( $p<0.05$ ) as revealed in table (3).

Table (1): Socio-demographic characteristics of studied participants

Studied variables	Hairdressers' group (No.=115) N (%)	Control group (No.=115) N (%)	P value
<b>Age</b>			
Mean±SD	30.8±7.4	29.7±7.9	0.29 <sup>#</sup>
Range	19 – 43	18 – 49	
<b>Residence</b>			
• Urban	72 (62.6)	63 (54.8)	0.23 <sup>##</sup>
• Rural	43 (37.4)	52 (45.2)	
<b>Educational level</b>			
• Illiterate and basic	81 (70.4)	74 (64.3)	0.32 <sup>##</sup>
• Secondary and above	34 (29.6)	41 (35.7)	
<b>Marital status</b>			
• Single	32 (27.8)	36 (31.3)	
• Married	65 (56.5)	71 (61.7)	0.22 <sup>##</sup>
• Divorced	12 (10.4)	5 (4.3)	
• Widow	6 (5.2)	3 (2.6)	

<sup>#</sup>t-test. <sup>##</sup>χ<sup>2</sup> test

Table 2: Respiratory Manifestations and Spirometric Measurements of Studied Participants

Studied variables	Hairdressers' Group (No.=115) N (%)	Control group (No.=115) N (%)	P value	OR (95%CI)
<b>Rhinitis</b>	18 (15.6)	11 (9.6)	0.16 <sup>##</sup>	1.75 (0.79-3.90)
<b>Eye irritation</b>	11 (9.6)	6 (5.2)	0.21 <sup>##</sup>	1.92 (0.69-5.38)
<b>Cough</b>	19 (16.5)	9 (7.8)	<b>0.04<sup>##</sup></b>	2.33 (1.01-5.40)
<b>Wheezes</b>	26 (22.6)	12 (10.4)	<b>0.01<sup>##</sup></b>	2.51(1.20-5.26)
<b>Dyspnea</b>	20 (17.4)	10 (8.7)	<b>0.05<sup>##</sup></b>	2.21(1.19-4.96)
<b>Chronic bronchitis</b>	5 (4.4)	2 (1.7)	0.25 <sup>###</sup>	2.57(0.49-13.52)
<b>Asthma</b>	7 (6.1)	1 (0.87)	<b>0.03<sup>###</sup></b>	7.39(1.89-6.05)
<b>FVC%</b>	<b>Mean±SD</b> 79.4±9.6	<b>Mean±SD</b> 83.1±7.2		<b>0.001<sup>#</sup></b>
<b>FEV<sub>1</sub>%</b>	74.8±7.4	85.7±6.9		<b>&lt;0.001<sup>#</sup></b>
<b>FEV<sub>1</sub>/FVC%</b>	80.1±10.7	91.3±11.3		<b>&lt;0.001<sup>#</sup></b>
<b>FEF<sub>25-75</sub>%</b>	71.6±14.3	86.3±12.5		<b>&lt;0.001<sup>#</sup></b>

<sup>#</sup>t-test <sup>##</sup>χ<sup>2</sup> test <sup>###</sup>Fisher's exact

Regarding the duration of employment, hairdressers working for more than 9 years were more prone for respiratory affection (table 4) as well as Musculoskeletal and Reproductive manifestations (table 5).

## Discussion

The current study confirmed respiratory affection among professional hairdressers which was worse with prolonged duration of employment more than nine years rather

than demographic criteria, and these manifestations were further potentiated by the spirometry measurements.

Although most of the beauty centers at Menoufia governorate have mechanical ventilations as fans and air conditioning devices, few professional hairdressers regularly use the personal protective equipments as gloves and face masks which could explain the severity of respiratory complaints during working.

**Table 3: Musculoskeletal and gynecological manifestations of studied participants**

Studied variables	Hairdressers' group (No.=115) N (%)	Control group (No.=115) N (%)	P value	OR (95%CI)
Neck pain	32 (27.8)	11 (9.6)	<b>0.004</b> <sup>##</sup>	3.65(1.73-7.67)
Shoulder pain	37 (32.2)	17 (14.8)	<b>0.002</b> <sup>##</sup>	2.73(1.43-5.22)
Elbow pain	7 (6.1)	2 (1.7)	0.09 <sup>###</sup>	3.66(0.74-18.02)
Wrist and hand pain	29 (25.2)	12 (10.4)	<b>0.003</b> <sup>##</sup>	2.89(1.39-6.01)
Upper back pain	27 (23.5)	7 (6.1)	<b>&lt;0.001</b> <sup>##</sup>	4.73(1.97-11.39)
Lower back pain	42 (36.5)	20 (17.4)	<b>0.001</b> <sup>##</sup>	2.73(1.48-5.05)
Leg/foot pain	35 (30.4)	11 (9.6)	<b>&lt;0.001</b> <sup>##</sup>	4.14(1.98-8.65)
Preterm delivery <37	(n=83) 9 (10.8)	(n=79) 2 (2.5)	<b>0.04</b> <sup>##</sup>	4.68(1.11-22.40)
Low Birth Weight <2500	(n=83) 4 (4.8)	(n=79) 1 (1.3)	0.19 <sup>###</sup>	3.95(0.43-36.13)

<sup>##</sup> $\chi^2$  test <sup>###</sup> Fisher's exact test

Hairdressing practices of bleaching, dye application and wave application have

been linked with occurrence of allergic symptoms among hairdressers.<sup>5,6,8</sup>

**Table 4: Respiratory Manifestations and Spirometry Measurements of Hairdressers Regarding Duration of Employment**

Studied variables	Duration of employment of hairdresser's group (No.=115)		P value	OR (95%CI)
	<9 years (No.=53) N (%)	≥9 years (No.=62) N (%)		
	Mean±SD	Mean±SD		
Rhinitis	8 (15.1)	10 (16.1)	0.88 <sup>##</sup>	1.08(0.39-2.98)
Eye irritation	5 (9.4)	6 (9.7)	0.96 <sup>##</sup>	1.03(0.30-3.58)
Cough	4 (7.5)	15 (24.2)	<b>0.02</b> <sup>##</sup>	3.91(1.21-12.64)
Wheezes	6 (11.3)	20 (32.3)	<b>0.007</b> <sup>##</sup>	3.73(1.37-10.17)
Dyspnea	5 (9.4)	15 (24.2)	<b>0.04</b> <sup>##</sup>	3.06(1.03-9.10)
Chronic bronchitis	0 (0.0)	5 (8.1)	<b>0.03</b> <sup>###</sup>	-
Asthma	0 (0.0)	7 (11.3)	<b>0.01</b> <sup>###</sup>	-
FVC%	78.3±6.2	75.8±3.9	<b>0.01</b> <sup>#</sup>	
FEV <sub>1</sub> %	75.2±4.4	72.3±7.6	<b>0.02</b> <sup>#</sup>	
FEV <sub>1</sub> /FVC%	82.2±7.9	78.2±10.3	<b>0.02</b> <sup>#</sup>	
FEF <sub>25-75</sub> %	73.9±9.3	70.2±8.5	<b>0.03</b> <sup>#</sup>	

<sup>#</sup>t-test

<sup>##</sup> $\chi^2$  test

<sup>###</sup>Fisher's exact

Exposure to volatile solvents, propellants and aerosols in hair sprays inside the hairdressing centers in addition to different hair creams products containing formaldehyde, methacrylate's and nitrosamines, were proven to be incriminated in respiratory and allergic manifestations among hairdressers.<sup>9</sup>

Neck pain, wrist/hand pain and low back pain were commonly reported by the hairdressers in this study. These complaints were related to prolonged sitting, use of vibrating tools, reaching far and awkward body postures as previously reported.<sup>7</sup>

Worsening of symptoms and pulmonary function at workplace, and alleviating the

**Table 5: Musculoskeletal and Gynecological Manifestations of Hairdressers Regarding Duration of Employment**

Studied variables	Duration of employment of hairdresser's group (No.=115)		P value	OR (95%CI)
	<9 years (No.=53) N (%)	≥9 years (No.=62) N (%)		
Neck pain	10 (18.9)	22 (35.5)	<b>0.04</b> <sup>##</sup>	2.37(1.01-5.60)
Shoulder pain	12 (22.6)	25 (40.3)	<b>0.04</b> <sup>##</sup>	2.31(1.02-5.24)
Elbow pain	1 (1.9)	6 (9.7)	0.08 <sup>###</sup>	5.57(0.65-47.85)
Wrist and hand pain	8 (15.1)	21 (33.9)	<b>0.02</b> <sup>##</sup>	2.88(1.15-7.21)
Upper back pain	7 (13.2)	20 (32.3)	<b>0.02</b> <sup>##</sup>	3.13(1.20-8.15)
Lower back pain	11 (20.8)	31 (50.0)	<b>0.001</b> <sup>##</sup>	3.82(1.67-8.75)
Leg/foot pain	15 (28.3)	20 (32.3)	0.65 <sup>##</sup>	1.21(0.54-2.69)
	(n=36)	(n=47)		
<b>Preterm delivery &lt;37</b>	4 (11.1)	5 (10.6)	0.95 <sup>###</sup>	0.95(0.24-3.83)
<b>Low Birth Weight &lt;2500</b>	1 (2.8)	3 (6.4)	0.45 <sup>###</sup>	2.39(0.24-23.95)

<sup>##</sup> $\chi^2$  test <sup>###</sup>Fisher's exact test

symptoms at home, indicate that they may be related to occupational exposure as demonstrated in a previous cohort study.<sup>10</sup>

Also, a previous cross-sectional study was conducted on 80 female hairdressers and 50 matched controls in Egypt has demonstrated significant associations between hairdressing and both respiratory and musculoskeletal manifestations which was significantly increased with advancing age and higher body mass index.<sup>11</sup>

In this study, reproductive affection was more prominent regarding preterm delivery with all its complications in the neonate including mortality.

A recent meta-analysis revealed a significantly increased risk of fetal death (OR 1.14, 95 % CI 1.04-1.24), and preterm delivery (OR 1.04, 95 % CI 1.00-1.07) among hairdressers and cosmetologists.<sup>12</sup>

The larger cohort included as well as spirometry evaluation constitute the main strength of this study.

Inability to address other health disorders among hairdressers as infertility with its respective investigations was unintended limitation of the current study.

Future research should focus on the type of educational training considering the perceived benefits and disadvantages particularly regarding ventilation and personal protective equipments, while developing plans to decrease health hazards among professional hairdressers.

## Conclusion

Health and safety of professional hairdressers in Egypt has been inadequately provided as proved by development of respiratory, musculoskeletal and reproductive disorders; which mandates the high need for health education, diagnostic and therapeutic interventions to this work group.

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**Conflicts of Interest:** None declared

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