An-Najah National University
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Occupational self-reported symptoms among female hairdressers in Nablus city: A cross-sectional study

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Dedication

To my Father`s soul, my mother, sisters, and brothers for their unconditional love and support.

To my beloved husband Mahmoud, who was always there for me.

To my lovely kids Yousef, Naya and Ahmad.

Acknowledgement

Firstly, I must thank God (Allah) for his graces and blessing on me to complete this work.

I would like to express my sincere thanks and gratitude to my supervisor, Dr. Hamzeh Al Zabadi whose guidance, help and support were endless throughout this study. I would like also to thank my instructors in the Public health Master program at An-Najah National University for their persistent support and encouragement.

الإقرار

أنا الموقع أدناه مقدم الرسالة التي تحمل العنوان:

Occupational Self-reported Symptoms Among Female Hairdressers in Nablus City: A cross-sectional Study

اقر بأن ما اشتملت عليه هذه الرسالة إنما هي نتاج جهدي الخاص، باستثناء ما تمت الإشارة إليه حيثما ورد، وأن هذه الرسالة ككل، أو أي جزء منها لم يقدم من قبل لنيل أية درجة علمية أو بحث علمي أو بحثي لدى أية مؤسسة تعليمية أو بحثية أخرى.

Declaration

The work provided in this thesis, unless otherwise referenced, is the researcher's own work, and has not been submitted elsewhere for any other degree or qualification.

Student Name: **اسم الطالبة:**

Signature: **التوقيع:**

Date: **التاريخ:**

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List of Abbreviations

IVF	In Vitro Fertilization
LBW	Low Birth Weight
MSD	Musculoskeletal Disorders
PPE	Personal Protective Equipment
SOB	Shortness of Breath

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Abstract

The study aims to measure the prevalence of respiratory, musculoskeletal, skin and reproductive symptoms among a random sample of female hairdressers in Nablus city through a questionnaire. The study further examines the possible association between exposure to occupational factors and the reported symptoms. In total 310 hairdressers were randomly selected from a full list of all hairdressers registered in the Palestinian association of hairdressers in Nablus to participate in this cross-sectional study. The study results revealed that respiratory, skin, musculoskeletal and reproductive symptoms are very prevalent among female hairdressers in Nablus city shortness of breath for example had a prevalence of (34.8%), cough (26.1%), hand dermatitis (23%), neck pain (71.9%), shoulder pain (68.4%), back pain (68.1%), and abortion (26.5%). The study also found a statistically significant association between respiratory and musculoskeletal symptoms and the work duration, wheezing and cough were positively associated with work duration (p- values 0.029, and 0.032 respectively), as were shoulder, elbow, hand, and wrist pain with (p-values 0.047 and 0.007 respectively). However, no statistically significant relations were observed between the reproductive symptoms and the work duration. We recommend improving the work conditions, and raise the level of

knowledge and awareness among hairdressers regarding the importance of using protective equipment and encourage safe handling of chemicals.

Chapter One
Introduction

1.1 Background

Hairdressing is a common worldwide job particularly amongst females (Hassan and Bayomy, 2015). Millions of individuals are employed across the world as hairdressers and cosmetologists (European agency for safety and health at work, 2017). Hairdressers are individuals who work in salons and offer services related to hairstyling , coloring, shampooing, and cutting (Kim et al., 2016).

Hairdressers are exposed to a variety of harmful agents in the workplace. These 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 (Hassan and bayomy., 2015).

In developed countries, occupational diseases are prevalent and many studies have shown high risk of occupational disorders such as asthma among different workers because of exposure to hazardous chemicals and gases (Kogevinas et al., 1999).

In the Middle East countries, including Palestine, hair stylists provide a wide range of services starting from hair shampooing and cutting to coloring, bleaching as well as giving permanent hair waves in addition to other styling services. All these services expose the hairdressers to a

number of factors that could impact their health. For instance, hair cutting often requires to shampoo and clean the hair to facilitate the cutting for which a scissor or a razor are used. Wetting the hair exposes the skin to water while, metallic scissors are made of a combination of elements including nickel (Nemer, 2009).

Hair coloring involves the application of a dye and other associated material to the hair or sections of it using the hands as well as brushes. In hair bleaching, an oxidizing powder i.e. ammonium persulphate or hydrogen peroxide is mixed an alkaline solution like ammonia or potassium and added to the hair shafts to remove the hair pigment (Simmers and Associates, 2007). Hairdressers who offer hair bleach service are at risk of inhaling the fine dust which is produced during the bleach preparation process. Hair shampooing and conditioning are performed before cutting the hair and after the application of dyes and bleaches. Hair waving involves the application of an alkaline solution and an organic acid to give a stable curl to the hair. Finally, hair styling involves the use of different brands of hairsprays, gels, waxes and hair creams (Simmers and Associates, 2007).

In Nablus city; as many as 414 hairdressing salons are registered in the Palestinian association of hairdressers and have license to practice the profession (Association of Hairdressers, 2018). As many as 359 of practicing hairdressers in the city are males and 633 are females. Due to the conservative nature of the Palestinian society, female customers often

attend salons run by female hairdressers; therefore, male hairdressers do not have to perform many of the tasks performed by their female counterparts and which involve the handling of chemical products like bleaches and dyes.

So the research question of this study is (What is the association between duration of work as a hairdresser and the development of respiratory, skin, musculoskeletal, and skin symptoms.

1.2 Significance of the study

Hairdressers are exposed on a daily-basis to a wide range of chemicals in their workplace settings. Dependently, the occupational environment for the personnel might involve unsafe and unhealthy exposures. They could in turn experience a significant health hazard such as respiratory, musculoskeletal, skin and reproductive health outcomes. In Palestine, the information on the prevalence of occupationally-related reported symptoms among Palestinian hairdressers, caused by reactive chemicals used in hairdressing salons is limited. Most of the studies have been conducted in Europe and other developed countries. So there is a need for similar studies in Palestine. It is also important to investigate the associated factors.

As an expected outcome, this study will identify the main adverse health outcomes and this would aid in assisting the authorities responsible for controlling occupational hazards to develop necessary plans for implementation of effective protocols on handling hazardous chemicals. It

would further help raise awareness about occupational hazards and the risks it carries on human health.

1.3 Objectives

1.3.1 General objective

To assess the prevalence of self-reported health symptoms (including respiratory, musculoskeletal, reproductive and skin disorders) and their association with chemical exposure among female hairdressers in Nablus city**.**

1.3.2 Specific objectives

1. To assess the prevalence of self-reported respiratory symptoms among female hairdressers.

2. To assess the prevalence of musculoskeletal symptoms among female hairdressers.

3. To assess the prevalence of dermatitis among female hairdressers.

4. To assess the prevalence of reproductive symptoms among female hairdressers.

5. To identify if there is a relationship between duration of work in years and the development of respiratory symptoms (shortness of breath, cough, chest tightness, eye irritation, runny nose) at work and during exposure to hairspray, dyes, and bleach.

6. To identify if there is an association between duration of work and the development of musculoskeletal symptoms (neck pain, shoulder pain, elbow and hand pain, back pain, knee pain, and leg and feet pain).

7. To address the relationship between duration of work and the development of reproductive symptoms among married hairdressers.

1.4 Research Hypothesis

1. **H1** there is positive association between duration of work in years and the development of respiratory symptoms (shortness of , cough, chest tightness, eye irritation, runny nose).

2. **H1** there is positive association between duration of work and the development of musculoskeletal symptoms (neck pain, shoulder pain, elbow and hand pain, back pain, knee pain, and leg and feet pain).

3. **H1** there is positive association between duration of work and the development of reproductive symptoms among married hairdressers.

Chapter Two
Literature Review

2.1 The most common chemicals found in hairdressing products

Products used in hair styling contain a number of chemicals such as formaldehyde in shampoos, ammonium compounds in conditioners, ammonium polyvinyl acetate and ethanol in hair sprays, persulphate salts, like sodium persulphate and potassium in bleaches, ammonium and potassium in dyes and permanent wave preparations, and hydrogen peroxide in emulsions and creams (The New Zealand Association of Hairdressers, 1997). Hairdressers are exposed to these chemicals either by inhalation or by skin contact (van der Walle and Brunsveld, 1994).

Glyceryl thioglycolate (GTG), ammonium persulfate or nickel sulfate often cause skin problems (van der Walle and Brunsveld, 1994). While persulphate salts used in hair bleaching products cause respiratory problems mainly occupational asthma. Meanwhile, it has been found that if ethanol (usually found in hairspray) is inhaled for 30 minutes it could cause bronchoconstriction (Moscato and Galdi, 2006).

Table (2.1): List of chemicals used in hairstyling products with potential adverse health effects.

Products	Chemical ingredients
Shampoo	Sodium Laureth Sulfate Glycol Distearate Sodium Chloride Citric Acid
Conditioner	Cetrimonium Chloride Cocoamido Propylbetaine Dihydrochloride
Hairspray	SD alcohol Butane Methyllel Propane Hydroflourocarbon Copolymer
Hair dye (permanent hair color)	Cetearyl alcohol Ammonium Hydroxide Stearic Acid Palmitic Acid Sodium Hydrosulfite
Bleaching powder	Ammonium Persulfate Magnesium Carbonate Sodium Lauryl Sulfate Potassium Persulfate
Oxygen cream	Hydrogen Peroxide Cetyl Alcohol Lanoline Sodium Lauryl Sulfate Phosphoric Acid
Straightening cream (relaxer)	Ammonium Thioglycolicate Sodium Hydroxide Sodium Sulfate Glycerine
Styling gel and mousse	Ethanol Aminomethyl Propanol Dimethylaminoethylmethacrylate

Adopted from **(**Nemer, 2009).

2.2 Possible adverse health effects among hairdressers

2.2.1 Respiratory system problems

Hairdressers are exposed to a large number of chemicals with potentially irritant and sensitizing effects on the airways which induce respiratory symptoms and affect lung function. The major respiratory symptoms among hairdressers are; chronic bronchitis, rhinitis, dyspnea, cough and phlegm as well as occupational asthma (Nemer et al., 2015).

2.2.2 Skin health problems

Caroe and colleagues (2016) found that hairdressers are at risk of developing occupational contact dermatitis due to their intense and frequent contact with liquids as well as chemical components contained in hair products like creams, waxes, gels, dyes and bleaches (Caroe et al., 2016). Moreover, hairdressers are at a higher risk of being exposed to nickel; a major skin sensitizer agent which may cause hand dermatitis; especially among females (The New Zealand Association of Hairdressers, 1997). The most prevalent skin problems among hairdressers are irritative contact dermatitis and allergic dermatitis. Dermatitis can be defined as inflammation of the upper layers of the skin due to irritant exposure, it usually presents with redness, swelling, itching, and pain. Severity ranges from mild irritation to severe inflammation. People with a history of skin allergies (for example eczema or asthma patients) are more likely to develop dermatitis (The New Zealand Association of Hairdressers, 1997).

2.2.3 Musculoskeletal system problems

Musculoskeletal disorders (MSD) had been reported by hairdressers and are usually linked to biomechanical, ergonomic and psychosocial professional factors. These symptoms include neck pain, wrist or hand pain and low back pain (Hassan and Bayomy, 2015). MSD also includes pain in the feet, back, neck, shoulders, arms, elbows, wrists, hands and fingers (Simmers and Associates, 2007). Prolonged standing, use of vibrating tools, and awkward body postures may greatly contribute to develop these complaints among hairdressers (Hassan and Bayomy, 2015).

2.2.4 Reproductive health problems

Previous studies showed that female hairdressers are at a higher risk of developing reproductive health problems including changes in the menstrual cycles, infertility, spontaneous abortion, low birth weight (LBW) and preterm delivery (Kim et al.,2016).

2.3 Previous studies on hairdressers

Many studies about occupationally-related health symptoms among female hairdressers were conducted in European countries, but very few in the Arab world.

In 2015, Hassan and Bayomy conducted a study about occupational respiratory and musculoskeletal symptoms among Egyptian female hairdressers. In this study, 80 female hairdressers and 50 matched controls

were selected to assess the prevalence of musculoskeletal and respiratory symptoms in the past 12 months. The authors found that hairdressers with longer duration of work, those who were older, and obese were more likely to report symptoms than controls. The study results found significant associations between frequent hair treatments (bleaching, dye and wave) and hand dermatitis ($P < 0.001$), running nose ($P<0.05$), eye irritation ($P<0.01$) and phlegm ($P<0.05$). According to the results, the most prevalent musculoskeletal pains reported by the hairdressers over the past 12 months were elbow and shoulder pain as well as back pain (13.8 and 12.5 % respectively). The respondents reported that the most frequent chronic pains (7.5%) were back and knee pains while hand and wrist pain led 12.5% of hairdressers to visit a doctor. Meanwhile, shoulder and back pain caused 13.8% of the respondents to take sickness absence from work (Hassan and Bayomy, 2015).

In 2010, a study was conducted in Australia which investigated the most prevalent health problems among all female, Western Australian hairdressers utilizing a survey. The data obtained from the hairdressers group was compared to data obtained from the Australian Longitudinal Study on Women's Health data books. The study found that younger hairdressers were at a higher risk to develop respiratory, musculoskeletal, and skin problems, and general poor health (O'Loughlin, 2010).

Nemer and colleagues (2015) conducted a prospective study about lung function and respiratory symptoms among female hairdressers in Hebron

city, Palestine. The study included 170 female hairdressers who were previously enrolled in a baseline survey in 2008 and were followed up in 2013 to measure changes in reported respiratory symptoms and lung function. The study found that hairdressers reported respiratory symptoms more frequently in 2013 compared with the baseline survey. About 28 (16%) of the hairdressers quit their job during the 5-year follow-up, 8 (28%) of them because of health problems. Hairdressers who had been working for 4 years or more at baseline showed a stronger decline in FEV1 compared with those who worked less than 4 years (difference 13, 95% CI 1 to 25) (Nemer et al., 2015).

A cohort study was conducted in Denmark which investigated occupational dermatitis in hairdressers. A survey was conducted between January, 2006 to September 2011 in order to investigate contact dermatitis among female hairdressers. The study found that atopic dermatitis was prevalent among 36.0% of the study participants. 48.3% of the patients complained of occupational irritant contact dermatitis, whereas 46.7% had their occupational allergic contact dermatitis or combined allergic and irritant contact dermatitis (Caroe et al., 2016).

A meta-analysis study was conducted in 2016 to identify reproductive disorders among cosmetologists and hairdressers and to assess occupational risks for such disorders. Nineteen eligible studies were included in the meta-analysis. The meta-analysis showed a significantly increased risk of infertility (OR= 1.15, 95 % CI =1.03–1.28), 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 (Kim et al., 2016).

In 2011, Bradshaw and colleagues conducted a study in UK of the self-reported health problems among hairdressers, compared to non-hairdressing controls. As many as147 female hairdressers and 67 non-hairdressing controls were recruited in the study. The authors found that musculoskeletal problems were significantly higher among hairdressers, including work-related shoulder pain (OR 11.6, 95% CI 2.4–55.4), work-related wrist and hand pain (2.8, 1.1–7.6), work-related upper back pain (3.8, 1.0–14.9), work-related lower back pain (4.9, 1.5–15.9) and work-related leg/foot pain (31.0, 3.8–267.4). The prevalence of self-reported asthma, chest tightness and wheeze were nearly the same in both groups (hairdressers 16%, controls 17%).On the other hand, there was significant difference in the prevalence of cough among hairdressers as compared to controls (13.2, 1.3–131.5). None of the controls reported the presence of work-related eczema, in comparison to 14 (10%) of the hairdressers (Bradshaw et al., 2011).

In 2009, a study was conducted on self- reported occupational health risks among hairdressers in Izmir, Turkey which included1284 hairstylists from 300 workplaces in Izmir. The results revealed that hair colorings and hair sprays were among the most commonly used products. The most commonly reported symptoms were allergy 35% and musculoskeletal symptoms 32%. The study found that patients with history of allergy were

more likely to report allergic symptoms as were those who were not committed to use personal protective equipment in work place. Only 41.2% of hairdressers used gloves and 15.2% reported the use of protective clothing within the last month (Mandiracioglu et al., 2009).

In 2008, a cross-sectional study was carried out in Sa˜o Paulo (Brazil) to assess the prevalence of work-related musculoskeletal disorders (WRMDs) in hairdressers and to identify associated risk factors. The study included 220 hairdressers. The results showed that WRMDs was prevalent among 71% of the participants. Shoulder was the most commonly affected body part (49%; 95% CI 42.0–55.3), followed by the neck (47%; 95% CI 40.6–53.9) and back (39%, 95% CI 32.2–45.1). The results also showed that the risk factors were associated with psychosocial factors and factors related to discomfort and work fatigue such as uncomfortable posture at work ((OR) 5 3.54; 95% (CI) 1.51–8.30), not feeling comfortable with body/neck/shoulders while working (OR 5 2.78; 95% CI 1.40–5.54) and having 15 years of professional activity (OR 5 3.04; 95% CI 1.17–7.91) (Mussi and Gouveia., 2008).

Another study was conducted in Finland in 2009 to assess whether working as a hairdresser and cosmetologist during pregnancy increases the risk of adverse pregnancy outcomes. Finnish Medical Birth Registry was used to identify all singletons of hairdressers (n= 510622) and cosmetologists (n= 52490) and those of teachers (n= 518594) as the reference group. The authors found that the risk of low birth weight (adjusted OR 1.44, 95% CI

1.23–1.69), preterm delivery (adjustedOR1.21,95%CI 1.07– 1.38), SGA (adjustedOR1.65,95%CI 1.38–2.07) and perinatal death (adjusted OR 1.62, 95% CI 1.01–1.60) was higher among hairdressers compared to teachers (Halliday-Bell et al., 2009).

Chapter Three
Methods

3.1 Study design

A cross-sectional study was conducted.

3.2 Sample size and study population

A previous study in Palestine, estimated the prevalence of respiratory symptoms namely cough to be (28%), shortness of breath (24%). In another study in a neighboring country (Egypt) respiratory symptoms had a prevalence of (25%) whereas that of controls was about (15%). Therefore, based on these prevalence estimates, sample size was calculated using the equation by (charan and biswas., 2013):

$$\text{Sample size} = \frac{Z_{1-\alpha/2}{}^2 p(1-p)}{d^2}$$

Given:

Z1-a/2 = standard normal variate (at 5% type 1 error (P<0.05) it is 1.96).

p = Expected proportion in population based on previous studies(28%).

D = Absolute error or precision (0.05).

Sample size = $\frac{(1.96)^2 * 0.28(1- 0.28)}{(0.05)^2}$

To achieve a study power of 80% and a confidence level of 95% with p value of (0.05), the sample size was 310 subjects from the total number of female hairdressers working in Nablus city (n= 633). Proportionate stratified random sampling disaggregated by location was used to select the study participants from the list of salons registered with the Palestinian Association of hairdressers in Nablus city. Accordingly, 25% of the participants were selected from Rafidia, 5% from al-Makhfiye and al-Jamea street, 30% from al-Jabal al-Shamali and al-Maajeen, 10% from Ras al-ein, 5% from al-Masaken, 15% from down town Nablus and 10% from Nablus al-Jadeeda.

3.3 Inclusion Criteria

The following inclusion criteria were considered during sampling process:

- Hairdresser should be working as a hairdresser for at least 1 year.

- Age 18 – 50 years old.

3.4 Exclusion criteria

- Hairdresser who started working as a hairdresser for less than one year before sampling.

- Hairdresser who is pregnant at the time of testing.

3.5 Research Instruments

A face to face questionnaire was built from literature and previous studies on female hairdressers. The researcher asked the questions in Arabic but the data was administered into the English form. Respiratory symptoms questions were taken from the internationally standardized questionnaire from American Thoracic Society (Ferris., 1978). Musculoskeletal symptoms questions were taken from the standardized Nordic questionnaire (Kuorinka et al., 1987). Additionally, some questions related to working tasks and exposure were quoted from a study conducted in Palestine in 2009 (Nemer, 2009).

The questionnaire consists of three main parts:

Part one: which includes personal and socio-demographic characteristics: age, marital status, years of education, place of residence, smoking…etc)

Part two: which includes occupational data namely: frequency of hairdressing procedures per week, usage of PPE, ventilation system…etc)

Part three: which assesses the self-reported symptoms of respiratory symptoms (wheezes, cough, shortness of breath…etc), musculoskeletal symptoms (neck pain, back pain…etc), reproductive (infertility, low birth weight…etc) and skin symptoms (contact dermatitis and others) in the last 12 months. Period of field work was between October 2018 to January 2019.

3.6 Ethical and administrative procedures

The study proposal was approved by the Institutional Review Board (IRB) and the scientific research committee of the Master of Public Health Program as well as the faculty of graduate studies scientific research board council at An-Najah National University. An official request was submitted for the Association of Hairdressers office in Nablus in order to facilitate the process of conducting the study. An explanatory letter was attached to each questionnaire that includes the aim, importance, confidentiality and anonymity of the information obtained with voluntary participation.

3.7 Statistical methods (Data analysis plan)

The Statistical Package for Social Sciences (SPSS version 16) was used for data entry and for statistical analyses. Descriptive data was presented with frequencies and percentages. Chi-square ($\chi 2$) tests were applied for comparing differences in categorical variables. Level of statistical significance was set to be $p<0.05$ ($P > 0.05$ is the probability that the null hypothesis is true).

Chapter Four
Results

4.1Socio-demographic characteristics

In this study most of the female hairdressers were in their twenties, married, had completed secondary education(Tawjihi), or had a diploma degree and city residents as shown in table (4.1).

Table (4.1): Socio-demographic characteristics of study participants

Age	**N (%)**
18-23 years	68 (21.9%)
24-29 years	108 (34.8%)
30-35 years	55 (17.7%)
36-41 years	37 (11.9%)
42 years and above	42 (13.5%)
Marital Status	
Single	145 (46.8%)
Married	151 (48.7%)
Others (divorced or widow)	14 (4.5%)
Level of education	
Primary education or less	36 (11.6%)
Secondary education	117 (37.7%)
Diploma	129 (41.6%)
BA	28 (9.0%)
Place of residence	
Refugee camp	7 (2.3%)
Village	46 (14.8%)
City	257 (82.9%)
Smoking status	
Non- smoker	109 (35.2%)
Ex-smoker	8 (2.6%)
Smoker	193 (62.3%)

4.2 Occupational history and exposure

Concerning working conditions about (27%) of them had a duration of work of (1-3) years, whereas (26.8%) and (26.1%) had a work experience of (4-6) years and (7-9) years , respectively. The majority (71.6%) worked for (6-9) hours a day, and for (4-6) days a week (74.8%). The most frequent task done in the salons was cutting, dying and bleaching (54%) followed by cutting alone (20%).The most frequent product used was hair dyes (51%) followed by hairsprays and shampoos (17.4%) each**.** In most of the times work involved strenuous shoulder movements (75.5%), prolonged standing (86.5%) and awkward body postures (85.5%).

4.3 Use of personal protective equipment

About (96.5%) used gloves during work, only (29%) used mask, while none used goggles (eye cover) as shown in the following table.

Table (4.2): Use of personal protective equipment

Use of Gloves	
Yes	299 (96.5%)
No	11 (3.5%)
Use of Face Mask	
Yes	90 (29.0%)
No	220 (71.0%)
Use of Eye Goggles	
Yes	0
No	310 (100%)

4.4 General health problems reported by female hairdressers

The general health problems reported by the female hairdressers are summarized in Table 4.3 below

Table (4.3) General health problems reported by female hairdressers

No.	Type of health problem	frequency	Percent %
1	No co morbidity	274	88.4
2	Respiratory disease like asthma.	4	1.3
3	Heart disease, hypertension, diabetes.	8	2.6
4	Allergic rhinitis and sinusitis.	16	5.2
5	Skin disease like eczema.	2	0.6
6	Musculoskeletal disease	6	1.9
Total		**310**	**100%**

The results shown in table (4.3) indicated that (88.4%) of the female hairdressers had no comorbidity. In addition, (5.2%) of the female hairdressers showed that the allergic rhinitis and sinusitis was the most common health problem that they suffered from. whereas, less than (1 %) of the female hairdressers show that skin disease like eczema was the least common health problem that they suffered from.

4.5 Respiratory symptoms in general and at work among female hairdressers

Table (4.4): Most common respiratory symptoms in general among female hairdressers (n= 310).

No	Respiratory symptoms	Yes	No
		N (%)	N (%)
1	Have you had wheezing or whistling in your chest, at any time in the last 12 months?	44 (14.2)	266 (85.8)
2	Have you been woken up with a feeling of tightness in your chest first thing in the morning at any time in the last 12 months?	36 (11.6)	274 (88.4)
3	Have you at any time in the last 12 months had an attack of shortness of breath that came on during the day when you were not doing anything strenuous?	26 (8.4)	284 (91.6)
4	Have you had an attack of shortness of breath that came on after you stopped exercise at any time in the last 12 months?	57 (18.4)	253 (81.6)
5	Have you at any time in the last 12 months been woken at night by an attack of shortness of breath?	31 (10)	279 (90)
6	Have you at any time in the last 12 months been woken at night by an attack of coughing?	39 (12.6)	271 (87.4)
7	Do you usually cough first thing in the morning?	27 (8.7)	283 (91.3)
8	Do you usually bring up phlegm from your chest first thing in the morning?	21 (6.8)	289 (93.2)
9	Have you brought up phlegm from your chest like this most mornings for at least 3 months each year?	11 (3.5)	299 (96.5)

The results shown in table (4.4) indicated that the most common respiratory symptom in general among hairdressers was related to item (4) “Have you had an attack of shortness of breath that came on after you stopped exercise at any time in the last 12 months?”, as the percentage was (18.4%). Whereas the least common respiratory symptom in general among hairdressers was related to item (9) “Have you brought up phlegm from your chest like this most mornings for at least 3 months each year?”, as the percentage was (3.5%).

Table (4.5): Most common respiratory symptoms at work among female hairdressers.

No	Respiratory symptoms at work	Yes	No
		N (%)	N (%)
1	**Do you feel any of the following during your working hours?**		
	A. Breath shortness.	108 (34.8)	202 (65.2)
	B. Cough	81 (26.1)	229 (73.9)
	C. Tightness in the chest.	37 (11.9)	273 (88.1)
	D. Symptoms from the eyes (running)	123 (39.7)	187 (60.3)
	E. Symptoms from the nose (sneezing, runny or blocked)	90 (29)	220 (71)
2	**Do you feel any of the following directly after exposure to spray?**		
	A. Breath shortness	50 (16.1)	260 (83.9)
	B. Cough.	48 (15.5)	262 (84.5)
	C. Tightness in the chest	32 (10.3)	278 (89.7)
	D. Symptoms from the eyes (running)	40 (12.9)	270 (87.1)
	E. Symptoms from the nose (sneezing, runny or blocked)	43 (13.9)	267 (86.1)
3	**Do you feel any of the following during preparation of dye?**		
	A. Breath shortness	60 (19.4)	250 (80.6)
	B. Cough.	49 (15.8)	261 (84.2)
	C. Tightness in the chest.	29 (9.4)	281 (90.6)
	D. Symptoms from the eyes (running)	59 (19)	251 (81)
	E. Symptoms from the nose (sneezing, runny or blocked	56 (18.1)	254 (81.9)
4	**Do you feel any of the following during preparation of bleach?**		
	A. Breath shortness.	55 (17.7)	255 (82.3)
	B. Cough.	36 (11.6)	274 (88.4)
	C. Tightness in the chest	29 (9.4)	281 (90.6)
	D. Symptoms from the eyes (running)	45 (14.5)	265 (85.5)
	E. Symptoms from the nose (sneezing, runny or blocked)	35 (11.3)	275 (88.7)

The results shown in table (4.5) indicated that the most common respiratory symptom that (39.7%) of the female hairdressers feel during working hours

was (symptoms from the eyes (running). In the contrary, the least common respiratory symptom that (11.9%) of the female hairdressers feel during work hours was (tightness in the chest). Concerning the feeling of female hairdressers after exposure to spray, the most common respiratory symptom was (breath shortness), as the percentage was (16.1%), whereas the least common respiratory symptom was (tightness in the chest), as the percentage was (10.3%). Concerning the feeling of female hairdressers during preparation of dye, the most common respiratory symptom was (breath shortness), as the percentage was (19.4%), whereas the least common respiratory symptom was (tightness in the chest), as the percentage was (9.4%). Finally, concerning the feeling of female hairdressers during preparation of bleach, the most common respiratory symptom was (breath shortness), as the percentage was (17.7%), whereas the least common respiratory symptom was (tightness in the chest), as the percentage was (9.4%).

4.6 Hand eczema and its Causes (allergy and irritation)

Table (4.6): Symptoms and Causes of hand eczema (allergy and irritation)

Questions	Yes	No
	N (%)	N (%)
Do you have the symptoms of Hand eczema (Allergy or Irritation)?	72 (23.2)	238 (76.8)
Is it related to your work nature, including wet hands tasks or handling of chemical products?	69 (22.3)	241 (77.7)

The results shown in table (4.6) revealed that (23.2%) of the female hairdressers had the symptoms of hand eczema. (22.3%) of them attributed its cause to their work nature such as wet hand tasks or handling of chemical products.

4.7 Musculoskeletal symptoms in the past year among female hairdressers

Table (4.7): Most common musculoskeletal symptoms in the past year among female hairdressers (n= 310).

musculoskeletal symptoms in the past 12 months	Yes	No
	N (%)	N (%)
Neck pain.	223 (71.9)	87 (28.1)
Shoulder pain.	212 (68.4)	98 (31.6)
Elbow, hand and wrist pain.	125 (40.3)	185 (59.7)
Back pain.	211 (68.1)	99 (31.9)
Knee pain.	82 (26.5)	228 (73.5)
Leg and foot pain.	188 (60.6)	122 (39.4)

The result shown in table (4.7) revealed that (71.9%) of the female hairdressers show that the neck pain was the most common musculoskeletal symptom that they suffered from in the last 12 months.

whereas, (26.5 %) of them show that knee pain was the least common musculoskeletal symptom that they suffered from.

4.7.1 Musculoskeletal symptoms lasting at least three months (chronic) among female hairdressers.

Table (4.8): Most common musculoskeletal symptoms lasting at least three months (chronic) among female hairdressers.

musculoskeletal symptoms	Yes	No
	N (%)	N (%)
Neck pain.	81 (26.1)	229 (73.9)
Shoulder pain.	80 (25.8)	230 (74.2)
Elbow, hand and wrist pain.	61 (19.7)	249 (81.3)
Back pain.	83 (26.8)	227 (73.2)
Knee pain.	35 (11.3)	275 (88.7)
Leg and foot pain.	50 (16.1)	260 (83.9)

The result shown in table (4.8) revealed that back pain was the most common chronic musculoskeletal symptom from which (26.8%) of the female hairdressers suffered at least three months. Whereas, knee pain was the least common chronic musculoskeletal symptom from which (11.3%) of the female hairdressers suffered.

4.7.2 Musculoskeletal symptoms leading female hairdressers to visit a doctor and to get a period of sickness absence in the past year

Table (4.9): Most common musculoskeletal symptom leading female hairdressers to visit a doctor (n= 310).

musculoskeletal symptoms	Yes	No
	N (%)	N (%)
Neck pain.	51 (16.5)	259 (83.5)
Shoulder pain.	44 (14.2)	266 (85.8)
Elbow, hand and wrist pain.	30 (9.7)	280 (90.3)
Back pain.	45 (14.5)	265 (85.5)
Knee pain.	21 (6.8)	289 (93.2)
Leg and foot pain.	18 (5.8)	292 (94.2)

The result shown in table (4.9) revealed that neck pain was the most common musculoskeletal symptom which led (16.5%) of the female hairdressers to visit a doctor in the past year. whereas, leg and foot pain was the least common musculoskeletal symptom leading (5.8%) of them to visit a doctor.

Table (4.10): Most common musculoskeletal symptom leading female hairdressers to a period of sickness absence.

musculoskeletal symptoms	Yes	No
	N (%)	N (%)
Neck pain.	21 (6.8)	289 (93.2)
Shoulder pain.	23 (7.4)	287 (92.6)
Elbow, hand and wrist pain.	20 (6.5)	290 (93.5)
Back pain.	30 (9.7)	280 (92.3)
Knee pain.	11 (3.5)	299 (96.5)
Leg and foot pain.	8 (2.6)	302 (97.4)

The result shown in table (4.10) revealed that back pain was the most common musculoskeletal symptom leading (9.7%) of the female hairdressers to get a period of sickness absence in the past year. whereas, leg and foot pain was the least common musculoskeletal symptom which led (2.6%) of them to get a period of sickness absence.

4.8 Reproductive symptoms among married female hairdressers in the past year

Table (4.11): Most common reproductive symptom that married female hairdressers complained in the past year (n= 151).

reproductive symptoms	Yes	No
	N (%)	N (%)
Infertility	10 (6.6)	141 (93.4)
Usage of IVF technique.	9 (6)	142 (94)
Low birth weight.	15 (9.9)	136 (90.1)
Fetal death.	5 (3.3)	146 (96.7)
Abortion.	40 (26.5)	111 (73.5)
Preterm delivery.	7 (4.6)	144 (95.4)

The result shown in table (4.11) revealed that abortion was the most common reproductive symptom of which married female hairdressers complained in the past year, as the percentage was (26.5%). Whereas, fetal death the least common reproductive symptom of which they complained in the past year, as the percentage was (3.3%).

4.9 Association between respiratory symptoms in general and at work and the number of working years.

Table (4.12): Chi square results for the differences in respiratory symptoms among female hairdressers according to the number of working years variable (n= 310).

Working years General respiratory symptoms	Response	(1- 3) years (n= 84)	4- 6 years (n= 83)	7- 9 years (n= 81)	10 years and above (n= 62)	K^2	p-value
		N (%)	N (%)	N (%)	N (%)		
Q1- Have you had wheezing or whistling in your chest, at any time in the last 12 months?	Yes	5 (11.4)	16 (36.4)	10 (22.7)	13 (29.5)	9. 01*	0.029*
	No	79 (29.7)	67 (25.2)	71 (26.7)	49 (18.4)		
Q2- Have you been woken up with a feeling of tightness in your chest first thing in the morning at any time in the last 12 months?	Yes	5 (13.9)	12 (33.3)	12 (33.3)	7 (19.4)	4. 09	0.252
	No	79 (28.8)	71 (25.9)	69 (25.2)	55 (20.1)		
Q3- Have you at any time in the last 12 months had an attack of shortness of breath that came on during the day when you were not doing anything strenuous?	Yes	8 (30.8)	3 (11.5)	8 (30.8)	7 (26.9)	_	0.319
	No	76 (26.8)	80 (28.8)	73 (25.7)	55 (19.4)		
Q4- Have you had an attack of shortness of breath that came on after you stopped exercise at any time in the last 12 months?	Yes	12 (21.1)	12 (21.1)	15 (31.6)	15 (26.3)	0.263	0.263
	No	72 (28.5)	71 (28.1)	63 (24.9)	47 (18.6)		

Q5- Have you at any time in the last 12 months been woken at night by an attack of shortness of breath?	Yes	6 (19.4)	5 (16.1)	12 (38.7)	8 (25.8)	4.89	0.180
	No	78 (28)	78 (28)	69 (24.7)	54 (19.4)		
Q6- Have you at any time in the last 12 months been woken at night by an attack of coughing?	Yes	3 (7.7)	12 (30.8)	14 (35.9)	10 (25.6)	8.80*	0.032*
	No	81 (29.9)	71 (26.2)	67 (24.7)	52 (19.2)		
Q7- Do you usually cough first thing in the morning?	Yes	2 (7.4)	10 (37)	6 (22.2)	9 (3.33)	8.19*	0.042*
	No	82(29)	73 (25.8)	75 (26.5)	53 (18.17)		
Q8- Do you usually bring up phlegm from your chest first thing in the morning?	Yes	2 (9.5)	4(19)	8 (38.1)	7 (3.33)	6.30	0.098
	No	82 (28.4)	79 (27.3)	73 (25.3)	55 (19)		
Q9- Have you brought up phlegm from your chest like this most mornings for at least 3 months each year?	Yes	0 (0)	4 (36.4)	3 (27.3)	4 (36.4)	_	0.171
	No	84 (28.1)	79 (26.4)	78 (26.1)	58 (19.4)		

* Significant level for differences at ($p \leq 0.05$).

The results of chi square shown in table (4.12) revealed that there were statistically significant differences in the respiratory symptoms relating to (Q1, Q7) among female hairdressers according to the number of working years variable in favor of (4-6 years). Furthermore, significant differences were noticed in (Q6) in favor of (7- 9 years). Finally, no significant differences were noticed in the other questions according to the number of working years variable.

Table (4.13):Chi square results for the differences in the feeling of respiratory symptoms during work hours among female hairdressers according to the number of working years variable (n= 310).

Working years Respiratory symptoms during working hours	Response	(1- 3 years (n= 84)	4- 6 years (n= 83)	7- 9 years (n= 81)	10 years and above (n= 62)	K^2	p-value
		N (%)	N (%)	N (%)	N (%)		
Breath shortness.	Yes	25 (23.1)	27 (25)	36 (33.3)	20 (18.5)	4.62	0.202
	No	59 (29.2)	56 (27.7)	45 (22.3)	42(20.8)		
Cough.	Yes	18 (22.2)	19 (23.5)	27 (33.3)	17(21)	3.64	0.303
	No	66 (28.8)	64 (27.9)	54 (23.6)	45 (19.7)		
Tightness in the chest.	Yes	6 (16.2)	8 (21.6)	13 (35.1)	10 (27)	4.59	0.204
	No	78 (28.6)	75 (27.5)	68 (24.9)	52 (19)		
Symptoms from the eyes (running).	Yes	34 (27.6)	34 (27.6)	34 (27.6)	21 (17.1)	1.13	0.769
	No	50 (26.7)	49 (26.2)	47 (25.1)	41 (21.9)		
Symptoms from the nose (sneezing, runny or blocked).	Yes	23 (25.6)	21 (23.3)	27 (30)	19 (21.1)	1.48	0.687
	No	61 (27.7)	62 (28.2)	54 (24.5)	43 (19.5)		

***** Significant level for differences at ($p \leq 0.05$).

The results of chi square shown in table (4.13) revealed that there were no statistically significant differences in the feeling of respiratory symptoms during working hours among female hairdressers due to the number of working years variable.

Table (4.14):Chi square results for the differences in the feeling of respiratory symptoms after exposure to spray among female hairdressers according to the number of working years variable (n= 310).

Working years Respiratory symptoms after exposure to spray	Response	(1- 3) years (n= 84)	4- 6 years (n= 83)	7- 9 years (n= 81)	10 years and above (n= 62)	K^2	P-value
		N (%)	N (%)	N (%)	N (%)		
Breath shortness.	Yes	6 (12)	9 (18)	18 (36)	17 (34)	14.79*	0.002*
	No	78 (30)	74 (28.5)	63 (24.2)	45 (17.3)		
Cough.	Yes	7 (14.6)	9 (18.8)	15 (31.3)	17 (35.4)	11.97*	0.007*
	No	77 (29.4)	74 (28.8)	66 (25.2)	45 (17.2)		
Tightness in the chest.	Yes	3 (9.4)	5 (15.6)	13 (40.6)	11 (34.4)	12.35*	0.006*
	No	81 (29.1)	78 (28.1)	68 (24.5)	51 (18.3)		
Symptoms from the eyes (running).	Yes	6 (15)	9 (22.5)	12 (30)	13 (32.5)	6.65	0.084
	No	78 (28.9)	74 (27.4)	69 (25.6)	49 (18.1)		
Symptoms from the nose (sneezing, runny or blocked).	Yes	8 (18.6)	7 (16.3)	14 (32.6)	14 (32.6)	8.11*	0.044*
	No	76 (28.5)	76 (28.5)	67 (25.1)	48 (18)		

***** Significant level for differences at ($p \leq 0.05$).

The results of chi square shown in table (4.14) revealed that there were statistically significant differences in (breath shortness, tightness in the chest) after exposure to spray among female hairdressers due to the number of working years variable in favor of (7- 9 years). In addition, significant differences were noticed in (cough, symptoms from the nose) in

favor of female hairdressers working (10 years and above). Finally, there were no significant differences in (Symptoms from the eyes (running) among female hairdressers according to the number of working years variable.

Table (4.15): Chi square results for the differences in the feeling of respiratory symptoms during preparation of dye among female hairdressers according to the number of working years variable (n= 310).

Working years Respiratory symptoms during preparation of dye	**Response**	**(1- 3) years (n= 84)**	**4- 6 years (n= 83)**	**7- 9 years (n= 81)**	**10 years and above (n= 62)**	**K^2**	**p-value**
		N (%)	**N (%)**	**N (%)**	**N (%)**		
Breath shortness.	Yes	68 (27.2)	75 (30)	61 (24.4)	46 (18.4)	8.16*	0.043*
	No	16 (26.7)	8 (13.3)	20 (33.3)	16 (26.7)		
Cough.	Yes	10 (20.40)	9 (18.4)	18 (36.7)	12 (24.5)	0.13	0.133
	No	74 (28.4)	74 (28.4)	63 (24.1)	50 (19.2)		
Tightness in the chest.	Yes	8 (27.6)	5 (17.2)	10 (34.5)	6 (20.6)	0.58	0.583
	No	76 (27)	78 (27.8)	71 (25.3)	56 (19.9)		
Symptoms from the eyes (running).	Yes	17 (28.8)	16 (27.1)	15 (25.4)	11 (16.6)	0.16	0.983
	No	67 (26.7)	67 (26.7)	66 (26.3)	51 (20.3)		
Symptoms from the nose (sneezing, runny or blocked).	Yes	13 (23.2)	13 (23.2)	17 (30.4)	13 (23.2)	1.52	0.677
	No	71 (28)	70 (27.6)	64 (25.2)	49 (19.3)		

***** Significant level for differences at ($p \leq 0.05$).

The results of chi square shown in table (4.15) revealed that there were statistically significant differences in (breath shortness) during preparation of dye among female hairdressers according to the number of working years variable in favor of (4- 6 years). Whereas, there were no significant differences in the another respiratory symptoms among them according to the number of working years variable.

Table (4.16):Chi square results for the differences in the feeling of respiratory symptoms during preparation of bleach among female hairdressers according to the number of working years variable (n= 310).

Working years Respiratory symptoms during preparation of bleach	Response	(1- 3) years (n= 84)	4- 6 years (n= 83)	7- 9 years (n= 81)	10 years and above (n= 62)	K^2	p-value
		N (%)	N (%)	N (%)	N (%)		
Breath shortness.	Yes	12 (21.8)	10 (18.2)	17 (30.9)	16 (29.1)	5.88	0.118
	No	72 (28.2)	73 (28.6)	64 (25.1)	46 (18)		
Cough.	Yes	9 (25)	7 (19.4)	13 (36.1)	7 (19.4)	2.44	0.486
	No	75 (27.4)	76 (27.7)	68 (24.8)	55 (20.1)		
Tightness in the chest.	Yes	6 (20.7)	7 (24.1)	8 (27.6)	8 (27.6)	1.51	0.679
	No	78 (27.8)	76 (27)	73 (26)	54 (19.2)		
Symptoms from the eyes (running).	Yes	15 (33.3)	9 (20)	10 (22.2)	11 (24.4)	2.49	0.478
	No	69 (26)	74 (27.9)	71 (26.8)	51 (19.2)		
Symptoms from the nose (sneezing, runny or blocked).	Yes	9 (25.7)	8 (22.9)	11 (31.4)	7 (20)	0.68	0.878
	No	75 (27.3)	75 (27.3)	70 (25.5)	55 (20)		

***** Significant level for differences at ($p \leq 0.05$).

The results of chi square shown in table (4.16) revealed that there were no statistically significant differences in the respiratory symptoms during preparation of bleach among female hairdressers according to the number of working years variable.

4.10 Association between musculoskeletal symptoms among female hairdressers and the number of working years.

Table (4.17):Chi square results for the differences in musculoskeletal symptoms among female hairdressers according to the number of working years variable (n= 310).

Working years Musculoskeletal symptoms	Response	(1- 3) years (n= 84)	4- 6 years (n= 83)	7- 9 years (n= 81)	10 years and above (n= 62)	K^2	p-value
		N (%)	N (%)	N (%)	N (%)		
Neck pain	Yes	54 (24.2)	59 (26.5)	62 (27.8)	48 (21.5)	4.24	0.237
	No	30 (34.5)	24 (27.6)	19 (21.8)	14 (16.1)		
Shoulder pain	Yes	50 (23.6)	53 (25)	61 (28.8)	48 (22.6)	7.98*	0.047*
	No	34 (34.7)	30 (30.6)	20 (20.4)	14 (14.3)		
Elbow, hand and wrist pain	Yes	26 (20.8)	27 (21.6)	38 (30.4)	34 (27.2)	12.5*	0.007*
	No	58 (31.4)	56 (30.3)	43 (23.2)	28 (15.1)		
Back pain	Yes	51 (24.2)	60 (28.4)	54 (25.6)	46 (21.8)	3.91	0.271
	No	33 (33.3)	23 (23.2)	27 (27.3)	16 (16.2)		
Knee pain	Yes	10 (12.2)	12 (14.6)	28 (34.1)	32 (39)	38.19*	0.000*
	No	74 (32.5)	71 (31)	53 (23.1)	30 (13.2)		
Leg and foot pain	Yes	49 (26.1)	50 (26.6)	45 (23.9)	44 (23.4)	3.84	0.279
	No	35 (28.7)	33 (27)	36 (29.5)	18 (14.8)		

***** Significant level for differences at ($p \leq 0.05$).

The results of chi square shown in table (4.17) revealed that there were statistically significant differences in the musculoskeletal symptoms (shoulder pain, elbow, hand and wrist pain) among female hairdressers according to the number of working years variable in favor of (7- 9 years). Also, significant differences were found in (Knee pain) among them in favor of (10 years and above). No significant difference were seen in another musculoskeletal symptoms among female hairdressers due to the number of working years variable.

4.11 Association between reproductive symptoms among married female hairdressers and the number of working years

Table (4.18): Chi square results for the differences in reproductive symptoms among married female hairdressers according to the number of working years variable (n=151).

Working years reproductive symptoms	Response	(1- 3) years (n= 29)	4- 6 years (n= 34)	7- 9 years (n= 36)	10 years and above (n= 52)	K^2	p-value
		N (%)	N (%)	N (%)	N (%)		
Infertility	Yes	1 (10)	3 (30)	3 (30)	3 (30)	_	0.808
	No	28 (19.9)	31 (22)	33 (43.4)	49 (34.8)		
Usage of IVF technique.	Yes	1 (11.1)	3 (33.3)	2 (22.2)	3 (33.3)	_	0.840
	No	28 (19.7)	31 (21.8)	34 (23.9)	49 (34.5)		
Low birth weight	Yes	2 (13.3)	4 (26.7)	1 (6.7)	8 (53.3)	_	0.239
	No	27 (19.9)	30 (22.1)	35 (25.7)	44 (32.4)		
Fetal death	Yes	2 (40)	0 (0)	0 (0)	3 (60)	_	0.208
	No	27 (18.5)	34 (23.3)	36 (24.7)	49 (33.6)		
Abortion	Yes	7 (17.5)	10 (25)	12 (30)	11 (27.5)	1.86	0.602
	No	22 (19.8)	24 (21.6)	24 (21.6)	41 (36.9)		
Preterm delivery	Yes	1 (14.3)	1 (14.3)	1 (14.3)	4 (57.1)	_	0.638
	No	28 (19.4)	33 (22.9)	35 (24.3)	48 (33.3)		

* Significant level for differences at ($p \leq 0.05$).

The results of chi square shown in table (4.18) revealed that there were no statistically significant differences in the reproductive symptoms among married female hairdressers according to the number of working years variable.

Chapter Five
Discussion

This study is one of the very few studies about health risks associated with hairdressing profession conducted in Palestine and in the Arab world in general.

In this study most of the female hairdressers were in their twenties, married, had completed secondary education (Tawjihi), or had a diploma degree and city residents.

Concerning working conditions about (27%) of them had a duration of work of (1-3 years), whereas (26.8%) and (26.1%) had a work experience of (4-6 years) and (7-9 years), respectively. The majority (71.6%) worked for (6-9 hours) a day, and for (4-6 days) a week (74.8%). The most frequent task done in the salons was Cutting , dying and bleaching (54%) , followed by cutting alone 20%.The most frequent product used was hair dyes (51%) followed by hairsprays and shampoos (17.4%) each. These results are similar to the results of the Turkish study (Mandiracioglu et al., 2009), which found that hair colorings and hair spray were among the most commonly used products. Hair dyes usually contain hazardous chemicals basically ammonia which can impose negative health effect on the respiratory system, other chemicals like ethanol which is a basic component of hair spray can cause nose, eye, and throat irritation.

In most of the times work involved strenuous shoulder movements (75.5%), prolonged standing (86.5%) and awkward body postures

(85.5%).These practices can adversely affect the musculoskeletal system in terms of neck, shoulder, elbow pain and less frequently back and knee pain. Regarding the use of protective equipment about (96.5%) used gloves during work, only (29%) used mask, while none used goggles (eye cover). Not adhering to these protective measures may leave the hairdresser vulnerable to respiratory, eye, and skin symptoms. These results are consistent with a previous study in Palestine which found that the prevalence of gloves usage was (91.8%), mask (11.2%), and goggles only (1.8%) (Nemer et al., 2009).

It was found that the most common health problem in hairdressers was allergic rhinitis and sinusitis (5.2%) as illustrated in table (4.3) and thus those subjects are at a higher risk to develop respiratory disease due to their work as a hairdresser. This result is consistent with the Turkish study conducted in 2009 **(**Mandiracioglu et al., 2009)**,** which found that Allergic symptoms were more frequent in those having history of allergy.

It was also found that the most common respiratory symptom among hairdressers in the last 12 months in general was shortness of breath after exercise (18.4%) as illustrated in table (4.4). This result is consistent with the results of a previous study conducted in Palestine (Nemer et al., 2009), which found that shortness of breath is the most common symptom that hairdressers suffer from with a percentage of (46%) . Besides, as shown in table (4.5) the most common respiratory symptom that (39.7%) of the female hairdressers feel during working hours was (Symptoms from the

eyes). This result agrees with the result of a previous study conducted in Egypt (Hassan and Bayomy, 2015) Which found that there were significant association between frequent hair treatment and eye irritation (p-value <0.01).

On the other hand, shortness of breath was the most prevalent respiratory symptom after exposure to hair spray (16.1%), followed by cough (15.5%).After exposure to dyes most of the hairdressers complained of shortness of breath (19.4%),followed by eye symptoms (19%), whereas they complained mostly of shortness of breath during reparation of bleach (17.7%), followed by eye symptoms (14.5%), these results are in concordance with the results of a previous study conducted in Egypt (Hassan and Bayomy, 2015) Chest tightness was the least commonly reported symptom during work and after exposure to hair spray, dyes, and bleach. This result agrees with the result of a previous study conducted in UK (Bradshaw et al., 2011), which found that the frequency of chest tightness is nearly the same among both hairdressers and the control group.

Table (4.6) showed that the prevalence of Dermatitis among hairdressers was (23.2%) , (22.3%) of them attributed its cause to their work nature such as wet hand tasks or handling of chemical products. A higher prevalence (36%) was reported in a study conducted in Denmark (Caroe et al., 2016), and a lower prevalence (10%) was reported in a study in UK (Bradshaw et al., 2011), these differences can be explained by the extent of adherence to personal protective equipment like the use of gloves, it may

also be explained by different chemical composition of products used in salons in different countries.

We found that neck pain was the most common musculoskeletal pain that hairdressers complained of in the last 12 months (71.9%), followed by shoulder and back pain (68.4%), (68.1%) respectively. This result is partially consistent with the results of a previous study conducted in Egypt (Hassan and Bayomy, 2015), where the most common affected body part was the shoulder (13.8%)and back (12.5%), it somehow agrees with another study conducted in Brazil (Mussi and Gouveia., 2008), where the most common site was the shoulder (49%), followed by the neck (47%), these differences can be explained by work environment factors such as the height of the chair which mainly affect the neck , limited space, uncomfortable posture of the hairdresser.

The most common chronic pain in this study was back pain (26.8%) , and it was the most common cause of sick absence(9.7%) as well. This result agrees with the Egyptian study (Hassan and Bayomy, 2015), which found that the most frequent chronic pain was back pain (7.5%), and led to a period of sickness absence in (13.8%) of hairdressers.

The most common reproductive problem was abortion (26.5%) , followed by low birth weight(9.9%) , this result agrees with the results of a previous study conducted in Finland (Halliday-Bell et al., 2009), which found that the risk of low birth weight (adjusted OR 1.44, 95% CI 1.23–1.69) was higher in hairdressers than in teachers (control group).

It was found that there was a significant association between duration of work (years of experience) and wheezing or whistling in the chest , cough at night, and early morning cough (p-value s: 0.029, 0.032, 0.042 respectively), this result is consistent with the results of the British study (Bradshaw et al., 2011), which found that work-related cough was significantly more frequently reported in hairdressers than in controls (13.2, 1.3–131.5).

Besides, respiratory symptoms (shortness of breath, chest tightness, cough, and runny nose) after exposure to spray (p-values:0.002, 0.006, 0.007, and 0.044 respectively) , and shortness of breath during preparation of dye (p-value 0.043) were greater among hairdressers who had a longer duration of work (above 4 years).These results are consistent with the Egyptian study (Hassan and Bayomy, 2015), whereas no statistical significance was noticed in respiratory symptoms after exposure to bleach.

Regarding the musculoskeletal symptoms shoulder pain, elbow hand and wrist pain, and knee pain were positively associated with number of working years in favor of (above 7 years) of work (p-values:0.047, 0.007, 0.000 respectively)., these results are similar to the results of the Egyptian study (Hassan and Bayomy, 2015) and British study (Bradshaw et al., 2011) in shoulder elbow and hand pain but not with the knee pain, this can be explained by other factors affecting the hairdresser like unsuitable shoes, improper posture, problems in the foot (like flat foot) , obesity, osteoarthritis which may lead to knee pain.

Finally, there were no statistically significant differences in the reproductive symptoms among married female hairdressers according to the number of working years. This result is inconsistent with a meta-analysis study (Kim et al., 2016) which revealed a significantly increased risk of infertility (OR= 1.15, 95 % CI =1.03–1.28), 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 and this can be due to the conservative community which we live in that does not allow females to engage in sexual life before marriage, and so these results applied only to the married hairdressers who constitute less than half of the sample size (small sample size).

Conclusion

This study had described adverse health outcome in relation to work conditions among female hairdressers in Palestine. We concluded that most of the hairdressers are not committed to use personal protective equipments at work including gloves, mask, and goggles, and therefore they are highly susceptible to develop negative health symptoms.

The prevalence of respiratory symptoms during work and especially when dealing with hair spray and dyes is considered high in concordance with previous studies in Egypt and UK , these products contain extremely hazardous chemicals including ammonia, persulphates , and ethanol that can affect human`s respiratory system and skin as well. Hence, dermatitis among hairdressers is common most probably due to these chemicals and wet work.

Hairdressers also complained of musculoskeletal symptoms mainly neck and shoulder pain in concordance with previous studies, which can be attributed to poor work environment , limited space, being forced to change positions and take awkward postures, lack of height adjustable chairs, and other ergonomic factors which can contribute greatly to develop these symptoms.

Recommendations

1. Improve work environment conditions including: sufficient space, good ventilation, adjustable chairs.

2. Raise the level of knowledge and awareness among hairdressers , and stressing on the usage of protective equipment to encourage safe handling of chemicals.

3. To conduct more studies in the future to further investigate other associated factors like socio-demographic factors.

4. Encourage authorities responsible for controlling occupational hazards and to develop necessary plans for implementation of effective protocols on handling hazardous chemicals among female hairdressers.

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Appendix 1: The study questionnaire

I. General information(socio-demographic factors)	
Age (year)	() 18-23 () 24-29 () 30-35 () 36-41 () 42- and above
Marital status	() Single () Married () Others(divorced or widow)
Level of education	() Primary education or less () Secondary education () Diploma () BA () High education(Msc. PhD)
Residential area	() Refugee camp () Village () City
Smoking Status	() Non-smoker () Smoker () X-smoker
II. Occupational history and exposure	
How many years have you been working in hairdressing?	() 1 – 3 years () 4 – 6 years () 7--9 years () ≥ 10 years
How many hours a day do you work on average?	() 2 – 5 hours () 6 – 9 hours () ≥10 hours
How many days a week do you work?	() 1–3 days () 4-6 days () 7 days
How many clients a week is it in average in the salon?	() 1-10 clients () 11-20 clients () 21-30clients () ≥ 31 clients
Did you work in any other job? If yes specify	() No () Yes
What kind of job?	1.Domestic 2.Office work
What are the most frequent tasks done	1. Cutting 4. Straightening

in this salon?	2. Dying 5. Styling and Finishing 3. Bleaching 6.Cutting,dying,and bleaching
What are the products mostly used in this salon?	1. Shampoo and Conditioner 4. Henna 2. Hairspray 5. Bleaching powder 3. Hair dyes 6. Straightening creams
Strenuous shoulder movement	() No () Yes
Prolonged standing	() No () Yes
Awkward back postures	() No () Yes
Use of protective methods	
Do you use any of the following during work? Gloves	() No () Yes
Face mask	() No () Yes
Goggles	() No () Yes
III. Adverse health outcome	
General Health Status	
Do you suffer from any health problem or disease? If yes, specify	() No () Yes
What health problem do you suffer from?	1. Respiratory Disease like Asthma. 2. Heart Disease, Hypertension, Diabetes. 3. Allergic Rhinitis and sinusitis. 4. Skin Disease like Eczema. 5. Musculoskeletal Disease.
Respiratory symptoms	
Have you had wheezing or whistling in your chest, at any time in the last	() No () Yes

12 months?	
Have you been woken up with a feeling of tightness in your chest first thing in the morning at any time in the last 12 months?	() No () Yes
Have you at any time in the last 12 months had an attack of shortness of breath that came on during the day when you were not doing anything strenuous?	() No () Yes
Have you had an attack of shortness of breath that came on after you stopped exercise at any time in the last 12 months?	() No () Yes
Have you at any time in the last 12 months been woken at night by an attack of shortness of breath?	() No () Yes
Have you at any time in the last 12 months been woken at night by an attack of coughing?	() No () Yes
Do you usually cough first thing in the morning?	() No () Yes
Do you usually bring up phlegm from your chest first thing in the morning?	() No () Yes
Have you brought up phlegm from your chest like this most mornings for at least 3 months each year?	() No () Yes
Respiratory symptoms at work	
Do you feel any of the following during your working hours: A. Breathe shortness. B. Cough C. Tightness in the chest. D. Symptoms from the eyes (running) E. Symptoms from the nose	 () No () Yes () No () Yes () No () Yes () No () Yes () No () Yes

(sneezing, runny or blocked)	
Do you feel any of the following directly after exposure to spray: A. Breathe shortness B. Cough. C. Tightness in the chest D. Symptoms from the eyes (running) E. Symptoms from the nose (sneezing, runny or blocked)	 () No () Yes () No () Yes () No () Yes () No () Yes () No () Yes
Do you feel any of the following during preparation of dye: A. Breathe shortness B. Cough. C. Tightness in the chest. D. Symptoms from the eyes (running) E. Symptoms from the nose (sneezing, runny or blocked)	 () No () Yes () No () Yes () No () Yes () No () Yes () No () Yes
Do you feel any of the following during preparation of bleach: A. Breathe shortness. B. Cough. C. Tightness in the chest D. Symptoms from the eyes (running) E. Symptoms from the nose (sneezing, runny or blocked)	 () No () Yes () No () Yes () No () Yes () No () Yes () No () Yes
Skin problems	
Do you have the symptoms of Hand eczema (Allergy or Irritation)	() No () Yes
Is it related to your work nature, including wet hands tasks or handling of chemical products?	() No () Yes
Musculoskeletal Symptoms	
In the past 12 months have you suffered from**:**	

Neck pain: which had continued for at least a few hours	() No () Yes
Did it last for at least three months (chronic)	() No () Yes
Did it lead to visit a doctor	() No ()Yes
Did it lead to a period of sickness absence	() No () Yes
Shoulder pain that had continued for at least a few hours	() No () Yes
Did it last for at least three months (chronic)	() No () Yes
Did it lead to visit a doctor	() No () Yes
Did it lead to a period of sickness absence	() No () Yes
Elbow, hand and wrist pain which had continued for at least a few hours	() No () Yes
Did it last for at least three months (chronic)	() No () Yes
Did it lead to visit a doctor	() No () Yes
Did it lead to a period of sickness absence	() No () Yes
Back pain which had continued for at least a few hours	() No () Yes
Did it last for at least three months (chronic)	() No () Yes
Did it lead to visit a doctor	() No () Yes
Did it lead to a period of sickness absence	() No () Yes
Knee pain which had continued for at last a few hours	() No () Yes
Did it last for at last three months (chronic)	() No () Yes

Did it lead to visit a doctor	() No () Yes
Did it lead to a period of sickness absence	() No () Yes
Leg and foot pain which had continued for at least a few hours	() No () Yes
Did it last for at least three months (chronic)	() No () Yes
Did it lead to visit a doctor	() No () Yes
Did it lead to a period of sickness absence	() No () Yes
Reproductive Symptoms	
Have you ever complained of one of the following in the past 12 moths:	
Infertility	() No () Yes
Usage of IVF technique	() No () Yes
Low Birth weight	() No () Yes
Fetal death	() No () Yes
Abortion	() No () Yes
Preterm delivery	() No () Yes

Appendix 2: IRB approval letter

An-Najah
National University
Faculty of medicine
&Health Sciences
Department of Graduate
Studies

جامعة النجاح
الوطنية
كلية الطب وعلوم الصحة
دائرة الدراسات العليا

IRB Approval Letter

Study Title:

"Occupational Self-reported Symptoms Among Female Hairdressers in Nablus City: A cross-sectional Study"

Submitted by:
Ruba S.Abu shanab , Dr Hamzeh Al Zabadi

Date Reviewed:

23rd April, 2018

Date Approved:

7rd May 2018.

Your Study titled **"Occupational Self-reported Symptoms Among Female Hairdressers in Nablus City: A cross-sectional Study"** with archived number (5) May 2018 was reviewe by An-Najah National University IRB committee and was approved on 3 May, 2018

Hasan Fitian, MD

IRB

IRB Committee Chairman

An-Najah National University

نابلس - ص.ب 7 او 707 || هاتف 14/8/7/4/2342902(09) (970) || فاكسميل 2342910 (09) (970)

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Appendix 3: University letter to the Association of hairdressers

An-Najah
National University
Faculty of Graduate Studies

جامعة
النجـــاح الوطنية
كلية الدراسات العليا

التاريخ : 2018/7/18م

حضرة السادة نقابة اصحاب صالونات التجميل المحترمون
نابلس

تحية طيبة وبعد ،

الموضوع: تسهيل مهمة الطالبة/ ربى سمير علي ابو شنب، رقم تسجيل (11558303)،
تخصص ماجستير الصحة العامة

الطالبة/ ربى سمير علي ابو شنب، رقم تسجيل 11558303، تخصص ماجستير الصحة العامة، في كلية الدراسات العليا، بصدد إعداد الأطروحة الخاصة به بعنوان:

(الأعراض المهنية المبلغ عنها ذاتيا بين مصففات الشعر في مدينة نابلس: دراسة مقطعية)
(Occupational Self-reported Symptoms Among Female Hairdressers in Nablus City: A Cross-sectional Study)

يرجى من حضرتكم تسهيل مهمتها من اجل توزيع استبيان وجمع معلومات وعمل مقابلات مع مصففات الشعر (النسائية) في مدينة نابلس. وذلك لاستكمال مشروع البحث.

علماً المعلومات سوف تستخدم لاغراض البحث العلمي و لاستكمال مشروع البحث.

شاكرين لكم حسن تعاونكم

واقبلوا فائق الاحترام

د. محمد سليمان شتيه
عميد كلية الدراسات العليا

جامعة النجاح الوطنية
كلية الدراسات العليا
نابلس - فلسطين

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جامعة النجاح الوطنية

كلية الدراسات العليا

الأعراض المهنية المبلغ عنها ذاتيا بين مصففات الشعر في مدينة نابلس: دراسة مقطعية

إعداد

ربى سمير أبو شنب

إشراف

د. حمزه الزبدي

قدمت هذه الأطروحة استكمالاً لمتطلبات الحصول على درجة الماجستير في الصحة العامة بكلية الدراسات العليا في جامعة النجاح الوطنية في نابلس–فلسطين

2019

الأعراض المهنية المبلغ عنها ذاتيا بين مصففات الشعر في مدينة نابلس: دراسة مقطعية

اعداد

ربى سمير أبو شنب

إشراف

د. حمزه الزبدي

الملخص

تهدف الدراسة إلى قياس مدى انتشار الأعراض التنفسية والعضلية والجلدية والتناسلية بين عينة عشوائية من مصففات الشعر في مدينة نابلس باستخدام استبيان مسحي. تبحث الدراسة أيضا في العلاقة المحتملة بين التعرض للعوامل المهنية والأعراض المبلغ عنها. تم اختيار 310 مصففات شعر بشكل عشوائي من قائمة كاملة لجميع مصففات الشعر المسجلات في نقابة مصففات الشعر الفلسطينية في نابلس للمشاركة في الدراسة المقطعية. تكشف نتائج الدراسة أن الأعراض التنفسية والجلدية والعضلية والإنجابية منتشرة جداً بين مصففي الشعر في مدينة نابلس حيث بلغ معدل انتشار ضيق التنفس (34.8٪) والسعال (26.1٪) والتهاب الجلد اليدوي (23٪) وآلام الرقبة (71.9٪)، وآلام الكتف (68.4٪)، وآلام الظهر (68.1 ٪)، والإجهاض (26.5٪). كما وجدت الدراسة أيضا علاقة ذات دلالة إحصائية بين أعراض الجهاز التنفسي والعضلي ومدة العمل حيث ارتبط كل من الصفير والسعال بشكل إيجابي مع مدة العمل (القيمة الاحتمالية 029 .0، 032 .0 على التوالي)، وكذلك ارتبطت آلام الكتف والكوع واليد والرسغ أيضا بشكل إيجابي مع مدة العمل (القيمة الاحتمالية 0.047 , 0.007 على التوالي) . فيما لم تجد الدراسة أي علاقة ذات دلالة إحصائية بين الأعراض الإنجابية ومدة العمل. لذلك نوصي بتحسين ظروف العمل ورفع مستوى المعرفة والوعي بين مصففات الشعر فيما يتعلق بأهمية استخدام معدات الوقاية وتشجيع التعامل الآمن مع المواد الكيميائية.