

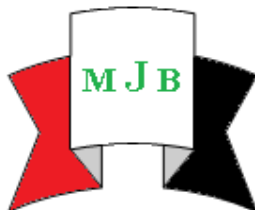
Respiratory Dysfunction in Textile Factory Workers

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Received 31 October 2013

Accepted 25 January 2015

Abstract

Dust generated during the handling and processing of cotton causes ill health of workers. Over 60 million people worldwide work in the textile or clothing industry. Recent studies have recognized the contribution of workplace exposures to chronic lung diseases, in particular chronic obstructive pulmonary disease [COPD]. The study aimed to assess the effect of exposure to cotton dust in textile industry on the respiratory system. A cross-sectional study was conducted among 75 randomly women selected textile factory workers in Al-Madhaya Textile Factory in Babylon Province. Information was collected through interview, in addition to physical examination and some needed investigations were performed including: white blood cell count [WBC], erythrocyte sedimentation rate [ESR], random blood sugar [RBS], blood urea, serum creatinine, electrocardiography [ECG], chest x-ray [CXR] and general urine examination [GUE], in addition to pulmonary function tests using portable medical spirometer, the results were compared to 50 control healthy subjects.

The study showed no significant difference in ages between active and control group, the mean age was 39.6 ± 6.15 years while in control group it was 47.14 ± 11.82 years, all subjects in both groups were females, mean duration of exposure of workers to cotton dust was 15.67 ± 4.86 years, the highest percentage of them complain from shortness of breath [45.3%], some of them had no symptoms [17.3%], respiratory symptoms occurred occasionally [52%], severity of symptoms was moderate restriction in most workers [24%], the study also showed negative non-significant relation between duration of exposure and severity of respiratory impairment. This study provides evidence of a strong relationship between exposure to cotton dust and respiratory impairments. Preventive measures are warranted in order to reduce the high prevalence of respiratory dysfunction and other respiratory disorders in textile manufacturing.

Keywords: textile, cotton dust, respiratory impairment.

الخلاصة:

الغبار الذي يتولد خلال التعامل مع القطن يسبب مشاكل صحية للعاملين فيه. أكثر من ٦٠ مليون انسان على مستوى العالم يعملون في صناعة الانسجة والملابس. دراسات حديثة اثبتت تسبب التعرض في مكان العمل للغبار في حدوث الامراض المزمنة. على الاخص مرض الانسداد الرئوي المزمن. تهدف الدراسة لتقييم تأثير تعرض العمال لغبار القطن في معامل النسيج على الجهاز التنفسي. اجريت دراسة عرضية على ٧٥ امرأة عاملة تعمل في معمل السجاد واللواتي تم اختيارهن عشوائيا. تم جمع المعلومات خلال المقابلة مع العاملات, بالاضافة الى الفحص الفيزيائي وبعض الفحوصات المختبرية التي تضمنت: حساب خلايا الدم البيض, معدل ترسب خلايا الدم الحمر, قياس كلوكوز الدم العشوائي, قياس يوريا الدم, قياس كرياتينين مصل الدم, تخطيط القلب الكهربائي, سونار القلب, اشعة الصدر, وتحليل الادرار العام. بالاضافة الى عمل وظائف الرئة باستخدام جهاز السبايرومتر الطبي المحمول. النتائج تم مقارنتها مع ٥٠ شخصا يمثلون مجموعة السيطرة.

بينت الدراسة عدم وجود فرق معنوي في الاعمار بين المجموعة الفعالة ومجموعة السيطرة. معدل الاعمار في المجموعة الفعالة كان 39.6 ± 6.15 بينما كان 47.14 ± 11.82 سنة في مجموعة السيطرة. كل الأشخاص في المجموعتين كانوا من النساء, معدل فترة تعرض العمال للغبار المنزلي كانت 15.67 ± 4.86 سنة, النسبة الاعلى من العمال كانت تشكو من ضيق في التنفس [45.3%], البعض منهم كان لايشكو من أي اعراض [17.3%], شدة الاعراض كانت من نوع التقييد المتوسط في اغلب العمال [24%], بينت الدراسة ايضا وجود علاقة غير معنوية سالبة بين مدة التعرض وشدة ضيق النفس. تؤكد الدراسة وجود علاقة قوية بين التعرض لغبار القطن ومشاكل عسر النفس. يجب ان تكون هناك وسائل وقاية لتقليل النسب العالية من مشاكل الجهاز التنفسي في معامل النسيج.

Introduction

Air pollution is a major occupational problem in various industries. Occupational lung disease is recorded in accounts of ancient history [1, 2]. Industries associated with the processing of cotton are most associated with worker exposure to cotton dust [3]. The earliest steps of textile processing release a greater deal of dust in the air, and long-term exposure can leave mill workers with respiratory disorders [4, 5].

Invisible small cotton dust particles enter into the alveoli of the lung through inhalation and accumulate in the lymph causing damage to the alveoli and reducing the capacity of retain oxygen. As the cotton dust accumulates, the worker develops a brown lung and suffers from dyspnea [6, 7].

In general, information is lacking concerning the health effect of cotton dust exposure and its control strategies among textile workers in our country. This study is intended to explore the dimensions of the respiratory problem in a textile factory in order to provide useful information for any possible cotton dust control strategies in the country.

Patients and Methods

A cross-sectional study was undertaken to measure prevalence of respiratory symptoms among workers in Al-Madhatiya Textile Factory in Babylon Province. The study was conducted in Al-Hashimiya General Hospital in Babylon Province in the period from November 2013 to April 2014.

The study involved taking two groups, workers group included 75 workers in the factory and control healthy subject group [50 subjects], all of them were females, full history and physical examination were done to all subjects in both groups, the history included the following questions: age, materials used in the work, duration of exposure, types and duration of symptoms, family history of allergy, any chronic diseases, smoking, use of

personal protective devices, history of allergy before work Shilling grading of occurring of symptoms [4] which included:

Grade [0]: no symptoms, grade [1]: occasional symptoms, grade [2]: symptoms on first day of the work, grade [3]: symptoms on all days, and grade [4]: severe permanent impairment.

Some needed investigations were performed to exclude other non-respiratory diseases including: packed cell volume [PCV], white blood cell count [WBC], erythrocyte sedimentation rate [ESR], random blood sugar [RBS], blood urea, serum creatinine, electrocardiography [ECG], chest x-ray [CXR] and general urine examination [GUE].

Pulmonary function tests were performed using Mir spirometer and the following parameters were measured: Forced expiratory volume in first second [FEV1], forced vital capacity [FVC] and FEV1/FVC ratio.

Statistical Analysis

All calculations and analysis were performed using the Statistical Package for the Social Sciences [SPSS version 18]. Some continuous variables were expressed as mean $\pm$ standard deviation [SD] while others were expressed as number and percentage. Student's 't' test was used to compare mean of continuous variables between two groups. Chi square test was used to analyze categorical data. For all tests $p \leq 0.05$ was considered statistically significant.

Simple linear regression was used to find the correlation and the correlation coefficient [r] was calculated.

Results

Study included 75 workers and 50 control healthy subjects, the ages of workers ranged from 28 to 53 years and the mean age was 39.6 ± 6.15 years, all workers in this factory were females and for better statistical comparisons all control group were females as shown in table. No worker found to be smoker, all

workers did not use protective device at work. The mean duration of exposure of workers to dust was 15.67 ± 4.86 years and ranged from 3 to 21 years. All of them were working with textile material only.

Table (1) shows percentages of duration of respiratory symptoms in the workers which ranged from no symptoms to 20 years duration, duration of symptoms of [2] years represent the highest percentage.

Table (1): distribution of Duration of respiratory symptoms

Duration of respiratory symptoms	No. [%]
No symptoms	15 [20%]
1 week	1 [1.3%]
1 month	13 [17.3%]
2 month	1 [1.3%]
5 month	2 [2.7%]
1 year	1 [1.3%]
2 year	15 [20%]
3 year	8 [10.7%]
4 year	8 [10.7%]
5 year	3 [4%]
6 year	1 [1.3%]
7 year	2 [2.7%]
10 year	1 [1.3%]
15 year	1 [1.3%]
20 year	3 [4%]
Total	75 [100%]

Regarding complaints of workers, the predominant percentage of them complained from only shortness of breath

[45.3%], some of them had no symptoms [17.3%] as illustrated in table (2).

Table (2) : Types of respiratory symptoms

Respiratory symptoms	No.	%
No symptoms	13	17.3
All respiratory symptoms	12	16.0
Cough	2	2.7
Cough and shortness of breath	7	9.3
Cough and sputum	1	1.3
Cough, sputum, and shortness of breath	2	2.7
Sneeze	2	2.7
Shortness of breath	34	45.3
Shortness of breath and sneeze	2	2.7
Total	75	100.0

Respiratory symptoms that occurred occasionally account for the highest percentage of workers (table 3).

Table (3): Occurrence of symptoms during the work days

Occurrence	No.	%
No symptoms	13	17.3
Occasional	39	52.0
First day from the work	2	2.7
All days of work	21	28.0
Total	75	100.0

Figure (1) shows that the predominant percentage of workers had no previous

history of allergy before they start the work in the factory [92%].

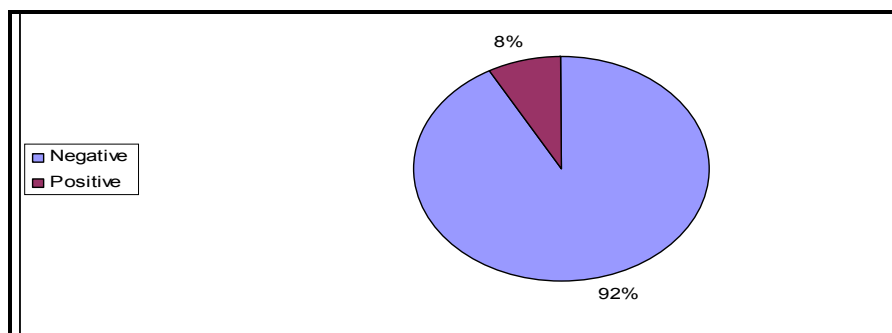


Figure (1): Distribution of allergic history before the work

The highest percentage of workers had no family history of allergy [57%] as shown in figure (2).

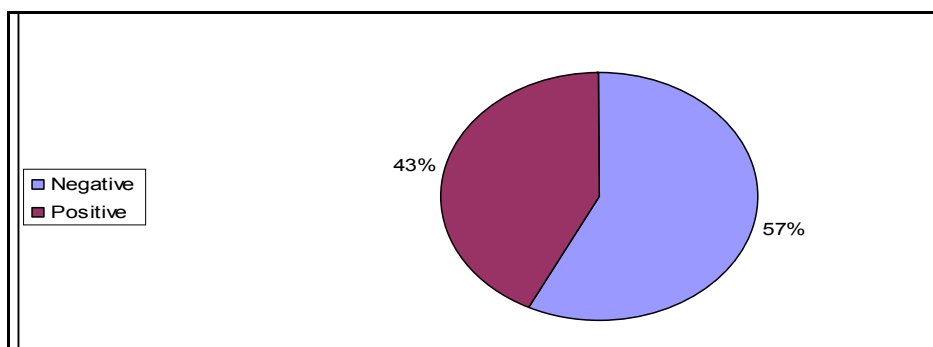


Figure (2): Distribution of family history of allergy among workers

According to spirometric examination, table [4] showed that most of workers had normal spirometry [34.7%], while most of

the patient's workers had moderate restriction [24%].

Table (4): Grading of severity of respiratory symptoms

Grade	No.	%
Normal	26	34.7
Mild restriction	14	18.7
Moderate restriction	18	24.0
Severe restriction	15	20.0
Very severe restriction	1	1.3
Severe obstruction	1	1.3
Total	75	100.0

The study revealed that there was a significant difference between both groups regarding severity of respiratory symptoms as revealed in table (5).

Table (5): Comparisons of severity of respiratory dysfunction between both groups

	Workers group mean± SD	Control healthy group mean± SD	P value
FVC% pred. *	74.09±19.754	98.94±11.000	0.000

FVC% pred. *: forced vital capacity as per cent predicted

The study revealed negative non-significant relation between duration of exposure to irritants in the factory and

severity of respiratory impairment as determined by level of FVC% predicted as shown in figure (3).

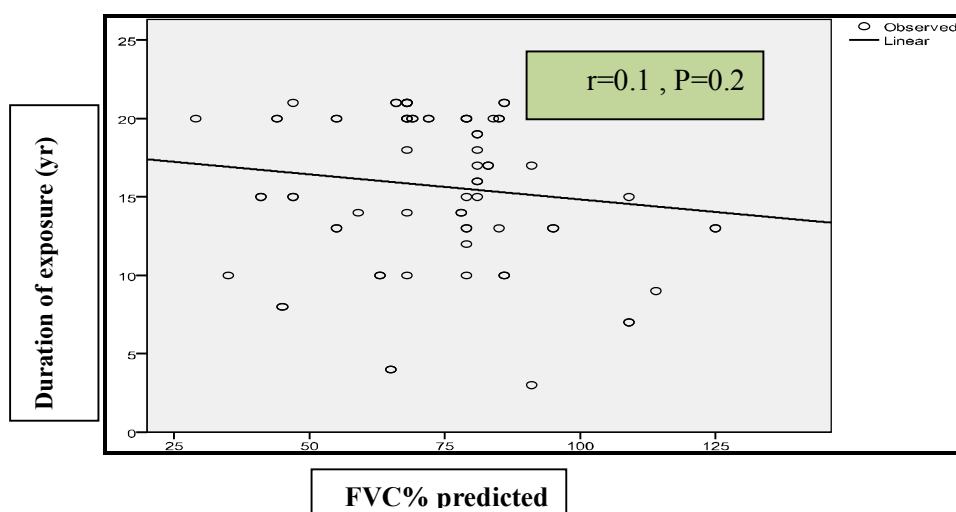


Figure (3): Relation between duration of exposure and level of forced vital capacity [FVC] as percent predicted.

The mean value of FVC% predicted was more in workers who had history of allergy before the work and in those who

had family history of allergy as illustrated in table (6).

Table (6): Mean level of FVC% Predicted in workers with and without history of allergy before the work and in those with and without family history of allergy

	History of allergy before the work		Family history of allergy	
	Yes	No	Yes	No
FVC% Predicted Mean ±SD*	81.50 ±12.1	73.45±20.2	75.43±22.3	73.3±18.2
P value	0.3		0.6	

*SD: standard deviation

Discussion

This study has documented loss of lung function in association with exposure to cotton dust. Those operatives with work

related symptoms had significantly lower FEV1 and FVC than asymptomatic workers.

The relationships between type of occupation and pulmonary contaminants and respiratory symptoms have been studied since the late 1970s [8].

In this study, all workers were not smokers and this might be due to all workers were females and in our society very few females who smoke. Most patients reported accelerated increase in severity of symptoms with increased duration of work. Almost all workers report restrictive lung diseases and this was consistent with many studies like Wang *et al.*, 2005 [9], the predominance of this type of lung diseases is evident due to the progressive precipitation of dust in the lung over time and in this factory they occurs in more rapid way because there was no proper vacuum system, the doors were closed almost during all the time of working.

Most of workers had shortness of breath and this agrees with other studies as in a study performed in Iran by Mehdi *et al.*, 2007 [10].

There was a non-significant increase in severity of respiratory symptoms with increased duration of exposure to cotton dust. Other studies have found that severity of symptoms increases with duration of exposure which was a population-based cohort of adults aged 45–74 years and different from the study design and age categories [11, 12].

Conclusion

This cross-sectional study has documented that cotton dust exposure cause reduced lung function [restrictive lung diseases] which was not related to the duration of working.

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