

## Respiratory Problems among Workers in Sohag Spinning Factory

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### Abstract

**Background:** Cotton dust induced respiratory disorders such as cough, wheezing, shortness of breath, chest tightness, **Aim:** The aims of this study are assessed respiratory problems among Sohag cotton textile workers and evaluate various safety measures used during working day to stop the hazards. **Research design:** descriptive cross-sectional research design was used. **Setting:** This study was carried out in Sohag Spinning Factory. **Sample:** The study sample was 550 workers. Study tools: The self-administered question was including three parts, 1) personal data sheet, 2) to evaluate factory risks and their safety measures. 3) Included the knowledge from the health register of the worker in Health Insurance included replacement checkup and interval medical examination. **Results:** Our research proved. The workers in the blending and picking department, carding and spinning department and combing and twisting department suffer from cough (68.3%, 60.2% and 73.7% respectively), chest pain (68.3%, 57.6%, and 64.9% respectively), and dyspnea (70.7%, 68.1% and 71.9% respectively) The difference from other departments was statically significant. Only 63.8% of workers were performed periodic medical examination. **Conclusion** this research involve that respiratory problems were the most important group of occupational problems in spinning factories as a result of inhalation of cotton fibers **Recommendations.** The study recommends with interval medical checkup should be performed to all workers in the factory. Training and health education programs should be available to all workers.

**Key words:** cotton, cough, protective measures, wheezing

### Introduction

The job is considered an important part of our life. Most persons spend nearly one quarter to one third of their time at job and often work visualization as apportion of their self-identification. Occupational respiratory diseases are a major global public health problem that account for up to 30% of all registered work-related diseases and 10–20% of deaths are caused by respiratory problems (International labor organization,2011) (ILO). Diseases of the respiratory system induced by occupational dusts are influenced by the type of dust and duration of exposure (Vrushali & Ramchandra, 2017).

Cotton dust is defined as dust generated into the atmosphere as a result of processing the cotton fibers combined with any naturally occurring materials such as stems, leaves, bracts and inorganic matter which may have accumulated on the cotton fibers during growing and harvesting period.(9) Most studies in cotton and hemp workers report an increased incidence of chronic and progressive dyspnea, cough and sputum production . ( Ravi .et al, 2018)

Byssinosis has been defined as a respiratory disease associated with inhalation of cotton, flax, and hemp. The disease is found in many cotton processing countries. Some called it cotton dust asthma. Chest tightness, cough, wheezing, and dyspnea in varying degrees are the initial symptoms. The characteristic symptoms of

byssinosis are shortness of breath and tightness of the chest on returning to the work after a period of absence. (Merchant .et al ,2016)

The basic target of occupational safety and health improve the health of people at job through protection and early treatment. Occupational health and safety be affected not only the employee but also on his relatives and significant others` and his community (Merchant .et al ,2016).

The occupational health nurses play an essential part in preservation the health and safety of workers by evaluating the work place for hazards and decrease risk that could lead to problems (Lukes, 2010). More exertion could be directed at health promotion of employee and provide all safety measures to protect workers from risks of environmental work place. so that the work place offers an good place to focus on both health protection and health promotion ( Topcu and Ardahan,2019).

### Significant of study

Cotton spinning industry is the most important industry in Egypt. Respiratory tract diseases represent the most important group of occupational diseases in spinning factories as a result of inhalation of cotton fibers and dust in work place .The problems are highly widespread in factory of developing countries. Chest tightness was the most common respiratory symptom (20.3%). About 14.2% of cotton processing workers were encountering byssinosis. Respiratory system

problems appear the most serious group of occupational problems in cotton textile industry as a result of inhalation of cotton fibers and dust in work environment (Tageldin et al 2017). Cotton workers are commonly at high risk of byssinosis, chronic bronchitis, chronic cough, and other occupational lung diseases .The Symptoms are chest tightness, breaking problem, asthma and irritation in the respiratory track.( padmini.,2012).

#### **Aim of study**

The aim of this study is to assess respiratory problems among Sohag cotton textile industry for workers and to evaluate the different safety activity used during work environment to prevent these problems.

#### **Research questions**

The study should give overwhelming answer on two main questions.

- 1- What are the most Respiratory Symptoms Prevalence among Sohag Spinning Factory Workers?
- 2- What are the safety measures used during working environment to prevent the respiratory problems?

#### **Subjects and Methods**

##### **I-Technical Design**

##### **Research Design**

A descriptive cross-sectional design was used in the current study

##### **Setting**

The study was conducted in Sohag Spinning Factory

##### **Sample Size**

The studied sample was 550 workers selected randomly from 650 who worked in the productive and repair departments with a proportion of 84.6%. These parts are the highest hazard places because the workers are exposed directly to the cotton dust. The employees were meeting during the morning shift.

##### **Data Collection Tools]**

Structured questionnaire that developed by the researchers after intensive revision of related literature was used in this study. **It included three parts,**

**Part 1: Personal data of the workers:** includes data about, age, sex, Residence, Marital status, Level of education, and Duration of work

**Part 2: Characteristic of work system and protection measures**

Including, type of sector, type of department and safety measures, to evaluate the factory risk and their protection measures including workers data, occupational problems history, and present respiratory symptoms, past history of illness and safety measures.

**Part 3: Health Insurance record and Clinical Respiratory symptoms;** including the

knowledge from the health record of the employee in Health Insurance included pre-placement checkup and periodic medical examination. Respiratory symptoms such as (cough, wheezing, dyspnea, chest tightness)

##### **II -Operational Design**

The operational design included preparatory phase, validity, pilot study and field work.

##### **Preparatory phase**

It involved reviewing the recent, past, national and international related literature and theoretical knowledge of various aspects of the study using books, articles, internet, periodicals and magazines to design the study tools for collection of data.

##### **Ethical Considerations**

The study was approved by the ethical committee of the Faculty of nursing, Sohag University and to carry out this study, The formal letter was transmit to the director of Sohag cotton textile industry and other letter was forward to the Occupational Health and Injuries station in the Health Insurance to facilitate and collect data from records of workers which were implement in 2019 .Verbal consents were obtained from the participating workers before filling in the questionnaire.

##### **Pilot study:**

A pilot study was conducted on 10% of employees to examine the credibility of the questionnaire and accordingly some adjustments were done.

##### **Validity of study tools**

the tools were reviewed to ascertain their validity by three experts in the Community Health Nursing department their comments were considered and the necessary modifications were done.

##### **Reliability**

Reliability of the data collecting tool was tested and it was **0.77**.

##### **Field Work**

The researchers explain the purpose of the study to workers before data collection. The data collection took about 6 months (from July to the end of December 2019). The researcher went to the industry three times per week in the morning shift and two times to the Sohag Health Insurance Center to collect necessary data.

##### **III-Administrative design**

Official letter permission for carrying out the study was obtained from the Dean of Sohag Faculty of Nursing.

##### **Statistical Analysis**

Data were analyzed using the software, Statistical Package for Social Science, (SPSS) version 19. Frequency distribution with its percentage and descriptive statistics with mean and standard deviation were calculated. Chi-square, t-test, correlations were done whenever needed. P values of less than 0.05 were considered significant.

**Result:**

**Table (1):** clears that the majority ( 96.9% ) of the studied workers were males, the mean age was  $41.25 \pm 7.44$ . The workers age group 40-49 years was 44.5%. The majority of them (94.4%) were married, while about one quarter of them (25.6%) had basic education level. In addition, more than two third (65.8%) of workers have experience for 20-30 years.

**Table (2)** reveals that 83.5% were at the productive sector and 15.8% of workers were at the repair sector. 34.7% of workers were at carding and spinning department. As regard type of work 74.2% were technicians compared to 23.1% laborers. 69.5% were work in rotating shifts.

**Table (3):** The current results show availability of preventive measures, It was observed that more than two third of the studied workers (67.3%) stated that the mask is available it was found that two fifth (41.6%) of them using it during work. Also the present results show 99.5% of workers mentioned about the availability of the emergency equipment's (Fire protection, Apparatus of early warning, Rapid means of communication).

**Table (4):** As regards the outcomes of periodic medical examination among the workers, **table (4)** shows that 63.8% of workers were performed periodic medical examination, 99.4% from them were performed chest x-ray and 97.2% , 42.5% were performed pulmonary function tests and clinical examination respectively. As regard the respiratory diseases, it was found that 13.4%, 11.1% and 2.3% were suffering from chronic bronchitis, chronic bronchitis with emphysema and bronchial asthma respectively.

**Table (5):** declare the relationship between clinical symptoms and age of workers, it was found that there is no statistical significant differences among age of workers and their clinical symptoms complains

**Table (6):** represents the relationship between clinical symptoms that appear on workers & the type of work department in Sohag Spinning Factory, it was found that people worked in **Combing & twisting department** were more exposed to symptoms of respiratory disease (73.7% **71.9%** ) cough, dyspnea& Chest pain respectively. While workers worked in **Electric repair department** were less exposed to the same symptoms of respiratory diseases (28.6%, 33.3%, & 28.6%) cough, dyspnea& Chest pain respectively

**Table (7):** shows that, cases with respiratory diseases increase as the duration of work increased. It was found that 2.1% of chronic bronchitis has duration of work 5-9 years compared to 42.6% having duration of work 20-24 years. Similarly cases of chronic bronchitis with emphysema 5.1%

compared to 38.5% of cases and bronchial asthma, 0.0% compared to 37.5% of cases having duration of work 20-24 years.

**Table (8):** Reveals that 64.3% of workers who exposed to cotton dust and 57.1% of no exposed workers complain of dyspnea. there is statistically not significant difference found between exposed to cotton dust and dyspnea.

## Results

Table (1): personal data of the workers in the Sohag Spinning Factory (no=550)

Variables	Total No.(550)	%
<b>Sex:</b>		
Male	533	96.9
Female	17	3.1
<b>Age (years):</b>		
20 -	43	7.8
30 -	186	33.8
40 -	245	44.5
50-60	76	13.8
Mean	<b>41.25 ± 7.44</b>	
<b>Residence:</b>		
Rural	272	49.5
Urban	278	50.5
<b>Marital status:</b>		
Single	30	5.4
Married	519	94.4
Widow	1	0.2
<b>Level of education:</b>		
Illiterate	101	18.4
Read & Write	280	50.9
Basic education	141	25.6
Technical	25	4.5
University	3	0.5
<b>Duration of work: (year)</b>		
5-	18	3.3
10-	67	12.2
15-	103	18.7
20-	210	38.2
25-30	152	27.6
Mean	<b>20.54 ±5.32</b>	

Table (2): Distribution of workers according to the work system in the Sohag spinning Factory, (no=550)

Variable	Total No. = 550	%
<b>Type of sector:</b>		
Productive sector	459	83.5
Repair sector	87	15.8
Other	4	0.7
<b>Type of department:</b>		
Blending & picking	41	7.5
Carding & spinning	191	34.7
Drawing & roving	59	10.7
Winding & doubling	95	17.3
Combing & twisting	57	10.4
Finishing process	86	15.6
Electric repair	21	3.8
<b>Type of work:</b>		
Technician	408	74.2
Laborer	127	23.1
Others	15	2.7
<b>Work system:</b>		
Morning shifts	168	30.5
Rotating shifts	382	69.5
<b>Overtime work/ day:</b>		
One hour	543	98.7

**Table (3): Distribution of workers according to availability of preventive measures in Sohag spinning factory (no=550)**

Preventive measures	Total No. =550	%
Safety equipment: (mask)	370	67.3
Using mask	154	41.6*
Emergency equipment's	547	99.5
No health education program.	546	99.3

\* The percent calculated from the total number of safety equipment's (370).

**Table (4): Distribution of the outcomes of periodic medical examination among the workers working in Sohag Spinning Factory from Health Insurance records, (no=550)**

Variable	Total No.=550	%
<b>Periodic examination:</b>	351	63.8
Clinical Exam	149	42.5*
Chest X-ray	349	99.4*
Pulmonary function test	341	97.2*
Blood analysis	-	-
<b>Respiratory diseases:</b>		
Chronic bronchitis	47	13.4*
Chronic bronchitis with emphysema	39	11.1*
Bronchial asthma	8	2.3*
Normal	232	66.1*
No diagnosis	25	7.1*

\* The percent calculated from those who perform periodic examination (351).

**Table (5): Relationship between clinical symptoms and age of workers in Sohag Spinning Factory (no=550)**

Clinical symptoms	20-		30-		40-		50-60		Total		X <sup>2</sup>	P-value
	No.	%	No.	%	No.	%	No.	%	No.	%		
Cough	22	51.2	111	59.7	131	53.5	44	57.9	308	56.0	2.18	P>0.05
Chest pain	18	41.9	96	51.6	124	50.6	41	53.9	279	50.7	1.73	P>0.05
Sneezing	3	7.0	8	4.3	7	2.9	5	6.6	23	4.2	3.01	P>0.05
Dyspnea	29	67.4	114	61.3	159	64.9	51	67.1	353	64.2	1.21	P>0.05

- All percentages calculated from the total of age group.

**Table (6): Relationship between clinical symptoms and the department of work in Sohag Spinning Factory (no=550)**

Clinical symptom	Blending & picking		Carding & spinning		Drawing & roving		Winding & doubling		Combining & twisting		Finishing process		Electric repair		Total		X <sup>2</sup>	P value
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	No.	%		
Cough	28	68.3	115	60.2	28	47.5	42	44.2	42	73.7	47	54.7	6	28.6	308	56.	24.7	< 0.001
Chest pain	28	68.3	110	57.6	25	42.4	33	34.7	37	64.9	40	46.5	6	28.6	279	50.7	29.4	< 0.001
Sneezing	6	14.6	8	4.2	1	1.7	1	1.1	2	3.5	5	5.8	-	-	23	4.2	15.9	< 0.05
Dyspnea	29	70.7	130	68.1	36	61.0	55	57.9	41	71.9	55	64.0	7	33.3	353	64.2	14.1	< 0.05

All percentages calculated from the total of workers in the department.

**Table (7): Relationship between recorded respiratory diseases and duration of work in Sohag Spinning Factory (no=550)**

Chest diagnosis	5-		10-		15-		20-		25-30		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Chronic bronchitis	1	2.1	4	8.5	6	12.8	20	42.6	16	34.0	47	100
Chronic bronchitis with emphysema	2	5.1	4	10.3	5	12.8	15	38.5	13	33.3	39	100
Bronchial asthma	0	0.0	1	12.5	1	12.5	3	37.5	3	37.5	8	100
Normal	11	4.7	35	15.1	47	20.3	90	38.8	49	21.1	232	100
Not diagnosed	1	4.0	1	4.0	3	12.0	12	48.0	8	32.0	25	100
Total	15	4.3	45	12.8	62	17.7	140	39.9	89	25.4	351	100

 $X^2 = 12.50$  $P > 0.05$ **Table (8): Relation between exposure to cotton dust and complaining from dyspnea in Sohag Spinning Factory (No=550)**

Dyspnea	Cotton dust					
	Yes		No		Total	
	No.	%	No.	%	No.	%
Yes	349	64.3	4	57.1	353	64.2
No	194	35.7	3	42.9	197	35.8
Total	543	100	7	100	550	100

 $X^2 = 0.15$  $P > 0.05$ 

## Discussion

Cotton spinning industry is considered one of the most important industries in Egypt. In worldwide, more than 60 million people are employed in the textile industry (Salvi, 2009 & Peggy et al., 2013). So, with rapid industrialization and mechanization in textile industries occupational health hazards are becoming more prominent especially respiratory diseases as chronic obstructive pulmonary disease (COPD), which represents the most important group of occupational diseases in spinning factories due to inhalation of cotton fibers and dust in work place.

According to the current study, most of participants worked in Sohag Spinning Factory, were males as they accepted three shifts work. This finding is supported by study of (Lai, et al, 2014) done in Shanghai and Lancashire cotton industries, which indicated that male workers have longer service year in this study and have higher cumulative dust exposure.

It is noted in the current study, working department was significantly associated factor with respiratory symptoms. The prevalence of self-reported respiratory symptoms was higher among participants have longer duration work in Blending & picking, Carding & spinning and Combing & twisting departments were suffering from dyspnea, cough and chest pain as occupational exposure to cotton dust has been linked with respiratory diseases due to nature of work & poor environmental conditions. This finding is in line

with studies done in Pakistan (Tanzil & Khan, 2015), which reported that workers in higher cotton dust exposure work environment are at the greatest risk for developing respiratory symptoms than those who with in administrative department.

Moreover, nearly two thirds of the participants were performed medical examination. A few percentages of workers had chronic respiratory diseases such as chronic bronchitis was chronic bronchitis with emphysema and were bronchial asthma. These results were agree with many studies done by Hinson research (2016), who reported that 6.3% of the studied sample had chronic bronchitis & 4.8% had bronchial asthma.. Also, it was agree with the study by Tageldin, et al., (2017) who reported that the prevalence of chest disease attributed to the exposure to cotton dust.

As regards duration of work, this study illustrated that respiratory symptoms increase as the duration of work increase. This was attributed to long time of cotton dust exposure. These results are agree with The study by Mansouri et al, (2016) found that long-term exposure to cotton dust is associated with respiratory disease that increases with the duration of exposure (Mohammadien et al., 2013), also found that respiratory symptoms chronic bronchitis, cough, and dyspnea were more common and persistent in the cotton group than in the silk Byssinosis is a chronic respiratory disease seen among workers exposed to cotton dust. In the last few years the disease has shown a declining trend

due to the introduction of dust control in the textile mills of developed countries.

In our study the report of periodic medical examination reported that there are no cases of Byssinosis in Sohag Spinning Factory. This result agree with the study of (Vrushali & Ramchandra, 2017), which reported that the prevalence of respiratory problems decreased among workers were working at Byssinosis exposed to cotton dust with proper precautions taken in mill machineries and workers. This supports association between reduced chances of respiratory diseases and proper precautions taken in mill and by workers to reduce the health hazards of exposure to cotton dust, workers should wear oro-nasal mask for protection against cotton fibers. General ventilation of the work room and wetting of dusts by water sprays for prevention of air contamination with dust, the medical examination of workers frequently.

### Conclusion

Our study concluded that respiratory disorders were the most important group of occupational disease in spinning factories as a result of inhalation of cotton fibers and dust in the work place. Moreover Periodic medical examination among workers was not available to all workers in the spinning factory. There was shortage of health services to workers and nursing services in the factory were not present. There was shortage of safety equipment. Mask only was provided for the exposed workers. Training programs and health education about occupational health hazards and prevention are not available.

### Recommendation

Based on the findings, the study will be recommended that improving worker's health through:

- 1- Continuous Periodic medical examination should be done to all workers in the Spinning factory
- 2- General practitioner and qualified nurse should be present daily in outpatient clinic factory to provide medical services, health promotion and improve health services to workers at any time.
- 3- Training and health education programs should be provided to all workers from the start of work and regularly carried out to assist the worker adjustment to the working environment through emphasizing the correct use of personal protective measures.
- 4- Further research about occupational hazard and safety environment

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