

Chest Tightness and Chronic Cough; Respiratory Symptoms Among Home-Based Textile Industry Workers



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Abstract

Background: The textile industry, rooted in agriculture, stands as Pakistan's second-largest employer. Within this sector, home-based textile production plays a significant role, albeit largely unregulated and undocumented, resulting in substandard working conditions. Workers in this setting are frequently exposed to cotton dust, posing serious health risks alongside other occupational hazards. This study aimed to assess the prevalence of respiratory symptoms, particularly chest tightness and chronic cough, among home-based textile industry workers in Jhang, Pakistan, underscoring the importance of preventive measures.

Methodology: A cross-sectional study was conducted from September 1, 2017, to February 28, 2018. A sample of 300 participants with over 20 years of work experience was selected from 10 home-based textile units. Data collection utilized a structured questionnaire and analysis was performed using SPSS 25.

Results: The study revealed that 23% of workers reported chest tightness and 18.7% reported chronic cough. These symptoms were notably prevalent among workers aged 45 and above, those with limited formal education, non-users of masks during work, and those directly exposed to cotton dust.

Conclusion: Workers in the home-based textile industry face respiratory symptoms due to exposure to cotton dust. This underscores the necessity of health education and the enforcement of protective measures, such as mask usage and dust control, to safeguard their respiratory health.

Keywords: Cotton dust; chest tightness; chronic cough; home-based textile industry

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Introduction

Cotton dust is a complex blend of ground plant matter, fiber, bacteria, fungi, soil, pesticides, and other contaminants (1). It is generated during various cotton processing operations in textile mills (2). Cotton ginning, spinning, and carding produce an enormous amount of cotton dust (3). Other factors that contribute to cotton dust production include poor maintenance of relative humidity levels, cleaning by using compressed air, improper waste handling, insufficient ventilation, inadequate suction systems, and poor working procedures.

Prolonged and repeated exposure to cotton dust causes a disturbance in the lung macrophage: dendritic cell ratio leading to persistent inflammation in the lungs (4). Hence byssinosis and respiratory symptoms are common among textile workers (5). These respiratory symptoms include chronic cough, chest tightness, wheezing, phlegm, breathlessness, and dyspnea (6, 7). The home-based cotton industry in Pakistan, an indigenous phenomenon, has poor working conditions, where workers are exposed to various occupational

hazards (8). A study conducted in the textile industries in the Faisalabad region of Punjab showed a high prevalence of respiratory symptoms such as shortness of breath, chest tightness, and cough among textile workers, particularly in the weaving section (9). It was also observed that the weaving section had the poorest occupational safety standards and the highest levels of inhalable cotton dust. Other factors associated with these symptoms include long duration of work in ginning, spinning, and carding areas, low educational status, and not using face masks (1, 10).

Pakistan is predominantly an agricultural country. Cotton is one of its major non-food crops. Textile being an agro-based industry depends heavily on cotton. The country is a significant player in the global cotton market, being the fifth-largest producer and the third-largest exporter of raw cotton, and the largest exporter of cotton yarn. Cotton and textiles contribute 8.5% to Gross Domestic Product. (11). Cotton industry in Pakistan has experienced significant growth in recent decades and has become increasingly self-sufficient in meeting local demands. The textile industry, which

heavily relies on cotton, is the second-largest employment-generating sector in Pakistan. Home-based textile industry shares a major contribution to overall textile production (12). Many of these units are unregulated and undocumented, and the workers in these industries are at risk of exposure to cotton dust and related health issues. This study focuses on respiratory symptoms; chest tightness and chronic cough among workers employed in these home-based textile industries by observing the frequency of these respiratory symptoms thereby emphasizing the importance of preventive measures at the workplace.

Methodology

A cross-sectional study was conducted from September 1, 2017, to February 28, 2018, among home-based textile industry workers in Jhang, Pakistan. The study was approved by the institutional review board. A sample size of 300 was calculated by taking a 95% confidence interval, 5% margin of error, and an expected percentage of chest tightness as 22.5% (16). The workers willing to participate were selected from 10 home-based textile units, using a purposive non-probability sampling technique. Data was collected using a structured questionnaire, after receiving informed consent from the workers aged 35 to 55 years, willing to participate in the study with a minimum working experience of 20 years. Smokers and those who had asthma, pulmonary tuberculosis, or hypertension were excluded from the study. A structured questionnaire was used that included sociodemographic variables (age, and education), and work-related factors (usage of mask, working experience, and exposure to cotton dust). The workers in the spinning and weaving sections were grouped as directly exposed whereas the workers in the seizing section and managers were grouped as indirectly exposed. The dependent variables were respiratory symptoms i.e. chest tightness and chronic cough.

Chest tightness: The occurrence of tightness or constriction of the chest at any given time during working hours particularly on the first day of the working week (16).

Chronic cough: Cough, without sputum, for 5 or more days of the week at least for the last 2 years (16).

Data were analyzed using SPSS version 23. Mean and standard deviation were calculated for quantitative variables, and frequency and percentage were calculated for categorical variables. The data were also stratified based on demographic factors such as age, education, usage of the mask, working experience, and exposure to cotton dust, to identify potential effect modifiers. Post-stratification chi-square test was applied.

Results

Regarding the Sociodemographic characteristics of the respondents, it was observed that the mean age was 41.57 ± 6.25 . The majority of the respondents 265 (88.3%) had informal education (not enrolled in any formal school system, attended madrasa for Qura'an literacy) only 35 (11.7%) had formal education. There were 153 (51%) respondents who were directly exposed to cotton dust and 147 (49%) respondents indirectly exposed to cotton dust. Chest tightness was found in 23% of the respondents

whereas chronic cough in 18.7% of the respondents. The relationship between these respiratory symptoms and the socio-demographic factors and work-related factors is shown in the table below.

Table 1: Frequency of variables.

Factors			Freq	%
Socio demographic	Age	< 45 years	38	12.7
		≥ 45 years	262	87.3
	Education	Informal	281	93.7
		Formal	19	6.3
Work-related	Use of a mask	Do not use a mask	291	97
		Use a mask	9	3
	Working experience	< 30 years	152	50.7
		≥ 30 years	148	49.3
	Exposure to cotton dust	Directly exposed	153	51
		Indirectly exposed	147	49

Table 2: Relation of chest tightness and chronic cough with sociodemographic and work-related factors.

Factors			Respiratory symptoms			
			Chest tightness		Chronic cough	
			Freq (%)	P value	Freq. (%)	P value
Sociodemographic	Age	< 45 years	2 (0.67)	0.005*	0 (0)	0.005*
		≥ 45 years	67 (22.33)		41 (13.67)	
	Education	Informal	54 (18)	0.003*	30 (10)	0.001*
		Formal	15 (5)		11 (3.63)	
Work-related	Use of a mask	Do not use a mask	63 (21)	0.002*	36 (12)	0.001*
		Use a mask	6 (2)		5 (1.67)	
	Working experience	< 30 years	1 (0.33)	0.001*	3 (1)	0.001*
		≥ 30 years	68 (22.67)		38 (12.67)	
	Exposed to cotton dust	Directly	69 (23)	0.001*	38 (12.67)	0.001*
		Indirectly	0 (0)		3 (1)	

* Significant p-value

Discussion

Cotton, a cash crop, plays a significant role in the economy of many countries, including Pakistan (11). A large portion of the population is involved in cotton handling from cultivation to textile and garment manufacturing and consequently exposed to cotton dust leading to various respiratory symptoms (13, 14).

Turkey is one of the top ten cotton-producing countries and has a large textile industry (15). A study conducted on cotton mill workers in Turkey found that the most common respiratory symptom was chest tightness, at 20.3%, comparable to the results of the current study i.e. 23% (3). A similar study conducted in Nigeria found that the prevalence of respiratory symptoms was highest among workers in the spinning section. Chest tightness was found to be 22.5% whereas chronic cough was found to be 43% in the same study, quite comparable to the results of the current study (16). Studies conducted in Tanzania (chronic cough $P < 0.001$) and Ethiopia (chest tightness and chronic

cough 33% and 23%) (5, 7). These results are comparable to the current study, where chest tightness is reported at 23.8% and chronic cough at 18.7%. Minor differences in the results are attributable to the sample size and study methodology. The above-mentioned studies were conducted in large textile industries that generally had better working conditions as compared to the current study.

In a recent study, conducted in Karachi, Pakistan, respiratory symptoms were found in 56% of the participants, the majority of whom were working in the spinning section and had been working for a longer duration (10). This can be related to the current study where the workers of the spinning and weaving section, grouped as being directly exposed to cotton dust, had higher rates of respiratory symptoms i.e. 51%. The workers having longer working duration also had a higher prevalence of respiratory symptoms. A cross-sectional study conducted in textile industries in Faisalabad, Punjab found that the prevalence of respiratory symptoms (shortness of breath, chest tightness, and cough) were generally high, with the majority in the weaving section of the cotton industry i.e. 20-40% (8). Out of 800 workers, 600 reported never using a mask during work hours. It was also found that a lack of adequate knowledge and inappropriate practices render these workers exposed to cotton dust-related respiratory symptoms i.e. only 21% practicing preventive measures (17). While in the current study, 97% of workers were not using masks.

Conclusion

The study concluded that chest tightness and chronic cough were the primary respiratory symptoms among home-based textile workers, more common in older workers with limited education, especially those who didn't use masks during work. Furthermore, respiratory issues were more prevalent in workers with longer experience and direct exposure to cotton dust. Addressing these concerns is crucial. The affected workers were referred to the local hospital for comprehensive care and investigation. Sustainable solutions are vital (18).

In the present study, 300 workers from 10 home-based textile industries were surveyed about their respiratory symptoms in relation to sociodemographic and work-related factors. It mainly relied on the subjective responses of the workers. Cotton dust levels at the workplace, lung function tests, and X-ray chest were not applied due to budgetary constraints.

World Health Organization and Occupational Safety and Health Administration (19) suggest some of the following practices for improving the working conditions and health of workers involved in cotton dust-generating processes:

A baseline health examination should be done including thorough medical, environmental, and occupational history, physical examination, and physiologic and lab tests, of the workers to assess and detect preexisting or concurrent health status which may be aggravated by exposure to cotton dust.

Screening, carried out by interviews and physical examination, at regular intervals, aims at identifying the

trend in the physiological function of the respiratory tract as compared to their baseline status or to the expected values of the reference population.

A systematic and effective surveillance program, intended to prevent or control occupational disease, should be implemented (20). This should include pre-placement of the workers and a proactive approach to detect the adverse effects on health, therefore, referring the works for diagnosis, confirmation, and treatment as necessary.

In addition to the recommendations mentioned earlier, proper sanitation, and good housekeeping should be emphasized at the workplace mainly through vacuum cleaning. There is a need to generate affordable dust counters for these home-based textile industries to monitor and hence control cotton dust (21). Other sustainable measures should also be sought out through a proactive approach to protect the health of these workers.

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Ethical Approval:

This study was approved by Ethical Review Committee of Institute of Public Health, Lahore.
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Authors' Contribution:

SA: Inception of the idea, proposal writing, data collection and analysis, manuscript writing

MJK: Data collection and manuscript writing

KRK: Data collection and manuscript writing

AS: Data collection and manuscript writing

MAS: Ethical considerations and manuscript writing

MSI: Inception of the idea and proposal writing

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