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Evaluating the Impact of Pharmacist Intervention in Respiratory Health of Textile Workers

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ABSTRACT

Background: Textile workers face a high risk of respiratory conditions due to exposure to airborne pollutants. Pharmacist-led interventions, such as education on face mask use and breathing exercises, may help improve respiratory health. This study aims to assess the effectiveness of these interventions through a randomized controlled trial. **Methods:** A total of 210 textile workers were randomly assigned to either an intervention group (n = 105) or a control group (n = 105). The intervention group received pharmacist-led counselling on the continuous use of face masks and breathing exercises, while the control group received routine care. Peak Expiratory Flow Rate (PEFR) was measured at baseline and monthly over 5 months. Pre- and post-intervention PEFR values were compared between the groups. **Results:** The intervention group showed a significant improvement in Peak Expiratory Flow Rate (PEFR) compared to the control group. More participants in the intervention group reached the green zone (PEF 80%–100%) by the end of the study, with a reduction in respiratory symptoms. The control group exhibited minimal changes. **Conclusion:** Pharmacist-led interventions, such as face mask use and breathing exercises, effectively improve lung function and reduce respiratory symptoms in textile workers. These findings support integrating such interventions into workplace health programs.

Keywords: Pharmacist intervention, Textile industry workers, Peak Expiratory Flow (PEF), Respiratory health

INTRODUCTION

In emerging nations, the textile and apparel industries play a significant role in social and economic advancement. Numerous studies have revealed that employees in the textile sector are susceptible to respiratory illnesses and have them[1]. Long-term exposure to cotton dust has been linked to many alterations in pulmonary function, including potential changes in peak expiratory flow rate (PEFR), according to epidemiological research on textile workers[2]. Byssinosis, chronic obstructive pulmonary disease, and respiratory irritation are just a few of the respiratory health issues that textile workers exposed to respiratory dust may cause[3]. Respiratory dust exposure typically resulted in dyspnea, wheezing, nasal stuffiness, chest tightness, and a persistent cough with or without phlegm[4]. Worldwide employment in the textile and apparel industries exceeds 60 million people. Occupational asthma is very common in the textile industry, and various substances, including cotton dust and dyes, can aggravate the illness. The prevalence of work-exacerbated asthma is higher, accounting for 25% to 50% of working individuals with documented asthma who experience exacerbations due to occupational asthma symptoms. Wheezing, coughing, tightness in the chest, and/or dyspnea are some of these symptoms[5]. Pneumoconiosis produced by dust from cotton fibers is known as byssinosis, commonly known as brown lung or brown lung illness. On their first day of work, employees first experience tightness in their chest and dyspnea. It is therefore also referred to as "Monday dyspnoea"[6]. The portion of dust that enters the alveolar region of the lungs and can pass through the terminal bronchioles to the gas exchange region of the lungs is known as respirable dust. The dust that is released into the air during the handling or processing of cotton is known as cotton dust, and it can include a variety of materials such as soil, insecticides, bacteria, fungus, and ground-up plant debris[7]. Several processes in the weaving division of the textile mill, including ginning, carding, and spinning, produced a lot of dust[8].

Our findings suggest that pharmacist-led interventions, which are customized to the specific needs and constraints of textile workers, can significantly improve lung health outcomes. By focusing on the pharmacist's role in occupational health, this study seeks to enhance our understanding of how targeted health interventions can improve the respiratory health and overall well-being of textile workers. The findings are expected to contribute valuable insights and practical recommendations for enhancing occupational health standards in the textile industry.

MATERIALS AND METHODS

Study site

Textile industries in erode and Namakkal region.

Ethical Consideration

The study received clearance from the Sudha Institute of Ethical Committee after submitting the proposal with study title, duration, inclusion and exclusion criteria, objectives and a brief methodology about the work to be carried out.

(Approval number: ECR/948/Inst/TN/2018/RR-22)

Inclusion criteria:

Participants must be workers aged between 20 and 80 years, currently employed in the textile industry, with a minimum of one year of employment in this sector. Additionally, workers must be able to attend follow-up visits and participate in the scheduled interventions throughout the study period.

Exclusion criteria:

Workers with severe or terminal respiratory illnesses, those who have undergone major surgery within the past six months, pregnant workers, and individuals unable to wear a face mask continuously during work hours will be excluded from participation.

Study method

Current prospective study is planned to conduct in textile industry after getting approval from hospital ethical committee. A specialized data collection form will be designed for collecting the participants details and intervention specifics. PEFR meters and questionnaires will be used to collect data on respiratory health and pharmacist interventions.

Statistical analysis

Statistical analysis was conducted using SPSS version 21. The Paired t-test was used to compare the mean values of the measurements taken before and after the intervention.

RESULT AND DISCUSSION

Table 1: Baseline characteristics of 105 participants in the intervention group and 105 participants in the control group

Characteristic	Intervention group		Control group	
	n	%	n	%
GENDER				
Male	68	69.76	63	60
Female	37	35.23	42	40
Age (years)				
21-30	8	7.61	14	13.3
31-40	26	24.76	38	36.19
41-50	24	22.85	26	24.76
51-60	27	25.71	21	20

61-70	20	19.04	5	4.76
71 - 80	0	0	1	0.95
Smoking habit				
Smoker	46	43.80	25	23.80
Non smoker	59	56.19	80	76.19
Occupational status				
Allied workers	9	8.57	12	11.42
Supervisors	6	5.71	5	4.76
Actual workers	90	85.71	88	83.80
Experience (years)				
1 - 10	12	11.42	52	49.52
11 - 20	27	25.71	26	24.76
21 - 30	31	29.5	17	16.19
31 - 40	24	22.85	8	7.61
41 - 50	11	10.47	2	1.90
Existing illness				
Diabetes mellitus	6	5.71	6	5.71
Hypertension	17	16.19	8	7.61
Peptic ulcer	2	1.90	1	0.95
Asthma	0	0	1	0.95
No existing illness	80	76.19	89	84.76
Symptoms				
Cough	5	4.76	14	13.33
Phlegm production	4	3.80	6	5.71
Shortness of breath	23	21.90	7	6.66
Wheeze	16	15.23	2	1.90
Chest tightness	9	8.57	7	6.66
No symptoms	48	45.71	69	65.71

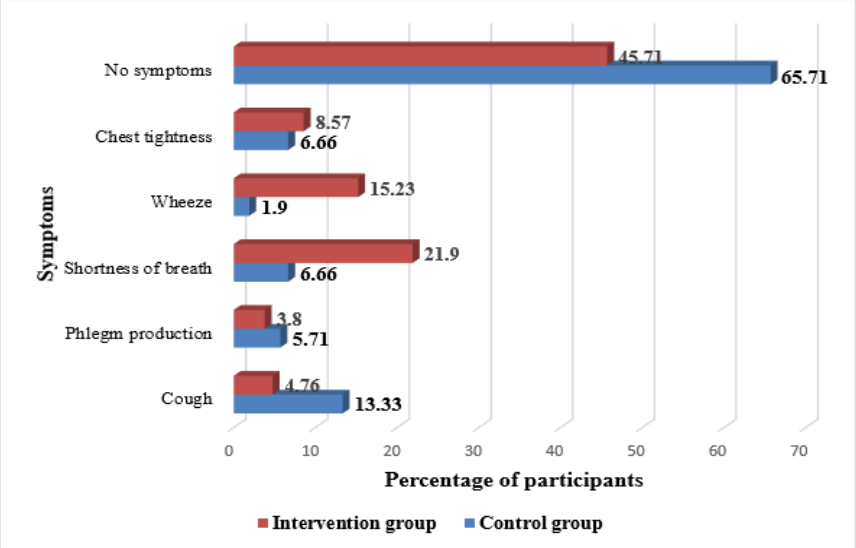

Figure 1: DISTRIBUTION OF PARTICIPANTS BASED ON EXISTING ILLNESS

Table 1 and figure 1 shows the demographic characteristics of the intervention and control groups were relatively well-balanced. Males made up 69.76% of the intervention group and 60% of the control group, while females accounted for 35.23% and 40%, respectively. The majority of participants fell within the 31-60 age range, with 73.32% in the intervention group and 81.95% in the control group. However, the intervention group had a higher proportion of participants aged 51-70 years (44.75%) compared to the control group (24.76%), potentially affecting lung health outcomes due to age-related factors. Another study conducted by Rojas M et al. 2015 suggested that the prevalence of lung diseases such as idiopathic pulmonary fibrosis (IPF), chronic obstructive pulmonary disease (COPD), and acute lung injury have been found to increase considerably with age[9].

A significant difference was observed in smoking habits, with 43.80% of the intervention group identified as smokers, compared to only 23.80% in the control group. This discrepancy in smoking prevalence could have contributed to a lower baseline lung function in the intervention group, making them more likely to benefit from pharmacist interventions. Another study conducted by St Claire S et al. 2020 suggested smoking is a risk factor for many lung diseases, including Asthma, Emphysema, Chronic obstructive pulmonary disease (COPD)[10].

Occupational status was similar between the groups, with the majority being actual workers (85.71% in the intervention group and 83.80% in the control group). However, the years of experience showed variation: 29.5% of the intervention group had 21-30 years of experience, while 49.52% of the control group had only 1-10 years of experience. This suggests that the intervention group had longer exposure to textile dust, which might have worsened their respiratory conditions. Another study conducted by Ali NA et al. 2018 suggested the dose-response relationship between cotton dust exposure and lung function among textile mill workers[11].

In terms of existing illnesses, 76.19% of the intervention group and 84.76% of the control group reported no health conditions. Hypertension was more prevalent in the intervention group (16.19%) compared to the control group (7.61%). Another study conducted by Ramalho SHR et al. 2020 suggested lung dysfunction is also associated with hypertension, which are risk factors for CVD[12] . Regarding symptoms, the intervention group had higher reports of shortness of breath (21.90%) and wheezing (15.23%), compared to 6.66% and 1.90% in the control group, respectively. These differences indicate a higher baseline burden of respiratory symptoms in the intervention group, possibly linked to factors like smoking and longer dust exposure. Another study conducted by Mansouri F et al. 2016 suggested the textile workers can experience a variety of respiratory symptoms, including cough, chest tightness, wheeze, phlegm production, shortness of breath[13].

Table 2: Peak Expiratory Flow Before and After Intervention

Characteristic	**Intervention group (n)**				**Control group(n)**			
PEF %	Month 1	Month 5	Mean ± Std.Dev	P- value	Month 1	Month 5	Mean±Std.Dev	P-value
Green zone 80%– 100%	17	71	-84.85± 18.82	<0.05	8	5	5.152± 29.11	0.073
Yellow zone 50% - 80%	83	34			77	90		
Red zone < 50%	5	0			20	10		
P - value	< 0.05							

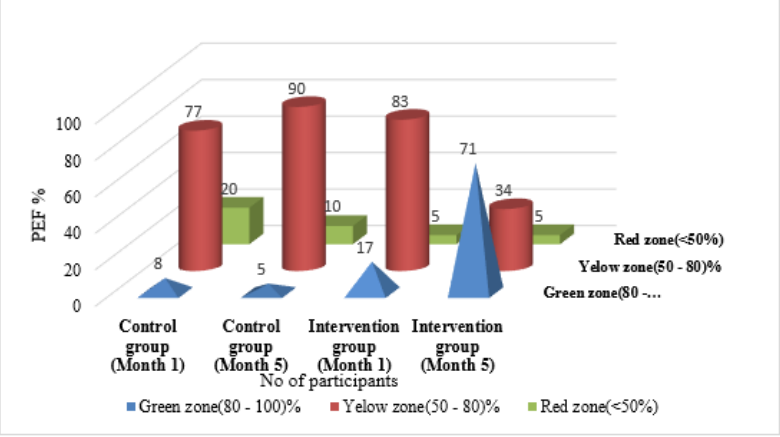

Figure 2: Peak Expiratory Flow Before And After Intervention

Table 2 and figure 2 shows the intervention group demonstrated substantial improvement in Peak Expiratory Flow (PEF). For the green zone (PEF 80%–100%), the number of participants increased significantly from 17 at Month 1 to 71 at Month 5 indicating effective intervention. The control group, however, showed a minor and non-significant change in the green zone.

The intervention group also saw a marked decrease in the yellow zone (PEF 50%–80%), from 83 to 34 participants, while the control group's numbers increased from 77 to 90. The intervention's effectiveness in reducing the yellow zone count supports its positive impact.

In the red zone (PEF <50%), the intervention group saw all participants improve, moving from 5 at Month 1 to 0 at Month 5. The control group showed a partial improvement, with the number of participants decreasing from 20 to 10. Mean and standard deviation 5.152 ± 29.11, P – value 0.073, when comparing month 1 and month 5 for the control group indicates that the change in PEF is statistically not significant, suggesting no difference in respiratory function over time. Mean and standard deviation -84.85 ± 18.82, P – value <0.05, when comparing month 1 and month 5 for the Intervention group indicates that the change in PEF is statistically significant, suggesting improvement in respiratory function over time. The comparison of PEF between the intervention and control groups at Month 5 yielded a p-value <0.05, highlighting a highly significant improvement in the intervention group's respiratory function relative to the control group.

CONCLUSION

In our study demonstrates the effectiveness of pharmacist-led interventions in promoting lung health among textile industry workers. By incorporating continuous mask usage and breathing exercises, the intervention has shown promise in improving respiratory outcomes. These findings support the role of pharmacists in occupational health settings, highlighting their potential to contribute significantly to the well-being of workers in environments with high exposure to airborne particles. Future research should aim to build on these findings, expanding the scope and duration of the intervention to further validate its long-term impact.

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