

**MINISTRY OF EDUCATION
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**THE STATUS AND EFFECTIVENESS OF ASTHMA
INTERVENTIONS AMONG WORKERS EXPOSED
TO COTTON DUST IN NAM DINH TEXTILE
AND GARMENT FACTORIES (2014-2016)**

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INTRODUCTION

Asthma is a serious global health problem that affects all age groups. According to the Global Organization for Asthma (GINA) report in 2014: The incidence of asthma is increasing in many countries. Asthma is a respiratory disease that has many risk factors and complex triggers. One of the most common diseases in asthma is allergies, especially allergies to respiratory allergens. The textile-garment industry is a labor-intensive sector (especially female workers). In the line of garment factories, the main type of dust is cotton. In recent years, there have been many studies examining the working environment and the health status of textile workers, but there is not yet a detailed report on the current state and relationship between the incidence of asthma and cotton dust-induced asthma allergy with the risk factors at the company's workshops producing cotton dust.

Asthma and cotton dust-induced allergy in cotton, wool and textile factories are a growing concern in Vietnam due to the fast development of textile and garment industry. Therefore, we conducted the research on: "**The status and effectiveness of asthma interventions among workers exposed to cotton dust in Nam Dinh Textile and Garment Factories (2014-2016)**". The study includes the following objectives:

1. *To describe the status and some factors related to the asthma and cotton dust-induced asthma allergy among workers in Nam Dinh textile and garment factories in 2016.*
2. *Evaluate the results of the communication on health education on asthma to workers of the two establishments.*

THE CONTRIBUTION OF THE THESIS

The thesis provides rare data available in Vietnam on the incidence of asthma and cotton dust-induced asthma allergy among textile workers. This is a good reference for researchers in the field of occupational health and preventive medicine since the context of the past 15 years, there have been no studies in Vietnam to comprehensively assess the asthma and cotton dust-induced asthma allergy among textile workers, especially in the province of Nam Dinh - which is called "The Textile City".

The result of interventions by means of health education communication contribute to the database serving the workers health care and prevention work of the medical staff of the factories, helping them to find the appropriate, effective, feasible and sustainable intervention measures for the health of workers in this sector.

STRUCTURE OF THE THESIS

The main part of the thesis is 139 pages long, consisting of the following sections: Introduction: 2 pages; Chapter 1- Overview: 37 pages; Chapter 2 - Research Object and Method: 25 pages; Chapter 3 - Research Results: 36 pages; Chapter 4 - Discussion: 36 pages; Conclusions and recommendations: 3 pages

The thesis has 124 references, of which 34 are in Vietnamese and 90 are in English. The thesis has 47 tables and 32 pictures. There are 9 appendices of 18 pages.

Chapter 1. OVERVIEW

1.1. Asthma

1.1.1. Epidemiology of asthma

In recent decades, there are community-based studies in many parts of the world that have shown a rapid increase of incidence asthma in particular and respiratory allergies in general. In addition, although the data are not enough, the incidence of asthma is increasing in developing and industrialized countries. The results of many studies also show that an increased risk of asthma among workers in traditional, forestry and non-industrial industries.

1.1.2. Causes of asthma

The studies of domestic and foreign authors have divided the causes of asthma including: Genetics; Environmental factors: chemicals, dust, smoke ...; Allergens: asthma-causing allergens, such as pollen, especially cotton dust hybrids, in home textile mills and dust mites. Viral infection; Cigarette smoke; Atopy.

1.2. Allergy asthma due to cotton dust allergen in textile workers

1.2.1. Occupational allergens due to cotton dust

The incidence of occupational allergens related to cotton dust is very high, suggesting that the toxicity of this dust is no less than that of chemical dust. According to study result of Antoine Vikkey Hinson et al: Subjects exposed to cotton dust had more respiratory symptoms than non-exposed subjects (36.9% vs. 21.2%).

1.2.2. Asthma allergic to cotton dust

Asthma allergic to cotton dust is a condition of asthma caused by inhalation of dust during long-term exposure. Most of the manufacturing industries produce occupational dust, dust from the working environment that directly penetrates the airways of the workers. Cotton dust is one of the most prominent pathogens and has

been studied in many countries around the world.

1.2.3. Factors related to asthma of workers in textile factories

In addition to the impact of dust production, workers' health is also affected by noise, factory environment, occupational stress. The issue of labor protection and the improvement of the production environment in our country has been proposed for many years, but it has not yet been implemented, cause mainly due to funding.

1.2.4. Diagnosis of asthma

Ask patients directly about the most common symptoms of the disease (cough, difficulty breathing, wheezing, chest tightness); Measurement of respiratory function (obstructive airway disorder); Asthma recovery test positive; Positive allergy test.

1.2.5. Treatment of asthma

GINA 2015 proposes five components related to the treatment of asthma: 1) patient-physician collaboration (eg asthma action plan); 2) identify and reduce exposure to risk factors; 3) assessment, treatment and monitoring of asthma; 4) management of severe wounds; and 5) personal care during pregnancy and rhinitis and nasal polyps, gastroesophageal reflux, respiratory distress due to aspirin.

1.2.6. Asthma and quality of life

Patients with asthma often feel inferiority, have poorer health, are more worried or depressed, and are more restrictive of their activities than normal people. Thus, the level of improvement in health-related quality of life is one of the aspects that need to be considered when assessing treatment effectiveness, asthma prevention.

1.3. Solutions to reduce the rate of asthma on workers

- ✓ Policy solution
- ✓ Technology solutions and labor conditions
- ✓ Communication solutions, health education

Chapter 2. RESEARCH OBJECT AND METHOD

2.1. Research subjects, locations, time and study periods

2.1.1. Subject

2.1.1.1. Subjects of descriptive research (objective 1):

- 1082 staffs working directly at the workshops/factories with cotton dust. Exclusion the workers being absent at the facility during the investigation (i.e on sick leave, maternity leave, business trips, training); the workers with less than 12 months employment.

- The working environment includes the microclimate (temperature, humidity), dust in selected workshops/factories.

2.1.1.2. Subjects of the intervention study (objective 2): All workers with diagnoses of asthma who meet the inclusion criteria and do not violate the exclusion criteria. Exclusion the workers not voluntarily participating the study after being explained about the purpose and objective of the study.

2.1.2. Location

The research was carried out at two textile and garment facilities in Nam Dinh: Nam Dinh Yarns Factory - Nam Dinh Textile Joint Stock Company and Song Hong Garment Joint Stock Company

2.1.3. Time

The study (including the preparation and implementation) was conducted in three years from January 2014 to December 2016.

2.2. Research method

2.2.1. Study design

The study was carried out under two successive designs: cross-sectional descriptive epidemiological studies at Nam Dinh textile and garment facilities and comparative intervention study.

2.2.2. Sample size and sampling method

2.2.2.1. Sample size and sample selection for the study of asthma status

$$n = Z^2(1-\alpha/2) \times \frac{p(1-p)}{d^2}$$

The calculated sample size is $n = 707$ (workers). Actually surveyed workers number 1082.

2.2.2.2. Sample size for environmental testing study

$$n = Z^2_{(1-\alpha/2)} \frac{s^2}{(\overline{XE})^2}$$

During the study we measured at least 30 samples for each indicator of each facility.

2.2.2.3. Sample size for environmental intervention study

$$n = Z^2(\alpha,\beta) \times \frac{2pq}{(p_1 - p_2)^2}$$

In fact, we have conducted interventions on all 80 patients diagnosed with asthma.

2.3. Technical details and data collection tools

2.3.1. Data collection for Objective 1: Describing current status and some related- factors to asthma and allergy asthma with cotton dustin textile factories.

2.3.1.1. Determining diagnosis asthma and allergy asthma with cotton dustin textile industries.

Conducting the interview, clinical examination, respiratory function test, cotton dusttest and blood sample for IgE quantification.

*) **Criteria for diagnosis of asthma:** Applying asthma diagnostic criteria in the community of GINA 2016 and diagnosis of asthma:

- There were varied symptoms of respiratory that was more than two of symptoms: wheeze, problem of breath, severe chest and cough. And: Mentioned signs and symptoms would be severe at night or after exertion, strong emotions, weather changes and acute respiratory infections exposing to allergens like fur, house dust, pollen, smoke ... /Or: There were a allergic history of them or their family; these problems combine with bronchodilator therapy and corticosteroids responding well to treatment.

- $FEV_1 / FVC < 75\%$ (Gaensler $< 75\%$); Recovery test (+)

***) Criteria for diagnosis of allergic asthma due to fabric powder:**

- Diagnosing bronchial asthma (according to the above criteria), and
 - A history of allergy in their family (point of history of allergy ≥ 8), and IgE quantification > 100 UI/ml, and Skin test with cotton dust(+).

2.3.1.2. The survey of the labor environment to determine the relevant factors.

Measurement of environmental parameters belonging to common technical specifications of the Institute of Occupational and Environmental Health - Ministry of Health. The labor environment is evaluated through the criteria of microclimate, density of cotton dust.

+ **Survey location:** Measuring the factors of labor environment at the beginning, middle and end of the workshop; Measurement time: beginning, middle, and end of labor ship. Measuring the respiratory level. **Measurement time:** In May 2016.

2.3.2. Data collection for the second goal: Evaluating the results of intervention by the communication and education of health

2.3.2.1. Data collection before intervention:

Conducting a Knowledge-Practical Assessment of asthma of 80 asthmatics, assessing the level of asthma control and quality of life of the study subjects in May 2016 (before intervention).

2.3.2.2. Data collection after the intervention of 3 months (1 time) and 6 months (2 times)

- After the intervention of 3 months (*the August 2016*) and 6 months (*the November 2016*), 80 workers in intervention group was re-interviewed with the questionnaire as before intervention.

2.3. Evaluation methods

- Assessment of knowledge and practice on asthma prevention: The questionnaire consists of 30 questions dividing into two main areas including 20/30 of assessment questions of knowledge and 10/30 questions of prevention and treatment of bronchial asthma. The scores are calculated for each and added for both the knowledge and practice. The rating is based on the 10 point scale: Good level ($8 \leq \text{score} \leq 10$); Excellent level ($6.5 \leq \text{score} < 8$); Average level ($5 \leq < 6.5$); Poor level (< 5 points).

- Evaluating the way to use drug by 100 mcg of Ventolin Inhaler using dosing dosage; Evaluating the knowledge of nasal washing practice after work.

- Assessing of asthma control by ACT questionnair includes 5 questions, from 1 to 5 points each. Total score is 25: good asthma control; Total score (20 - 24): controlled asthma; Total score (15 - 19): uncontrolled asthma; Total score ≤ 14 : lost control completely.

- Assessing quality of life: The quality of life of patients was assessed by the AQLQ (S) questionnaire designed by Juniper in 1992. The questionnaire consists of 32 questions divided into four categories. Each question has a scale of 1-7. GPA is calculated for each field and GPA for all four areas. The higher the average, the better the quality of life.

2.4. Implementing interventions

Those who agree to participate in the study give an explanation of the purpose and method of study. The information are provided for them about current asthma diagnosis and treatment, the theoretical basis of treatment, and strategies for preventing asthma risk factors.

Interventions are being carried out: Using Posters on asthma at the intervention site; organising 2 health talks in 2 establishments; training of health workers in 2 textile and apparel factories, direct counseling, media tapes for asthma prevention and asthma logs and ACT workers checklists. Making a list of asthma workers to managers in the factory, monthly workers are directly advised by health staffs and monitor of compliance of treatment.

2.5. Media content

Media content includes: Acute asthma is in the know: causes, symptom, consequences, prevention, the way to use detoxification medication with the guidance of health staff, benefits and effectiveness of preventive treatment by spot medications, disease diary, periodic health checkups, ACT self-assessments of asthma control at home. Emphasizing how to prevent asthma triggers by proper mask, nasal wash after work, and preventive medicine.

2.6. Management, processing and analysis of data

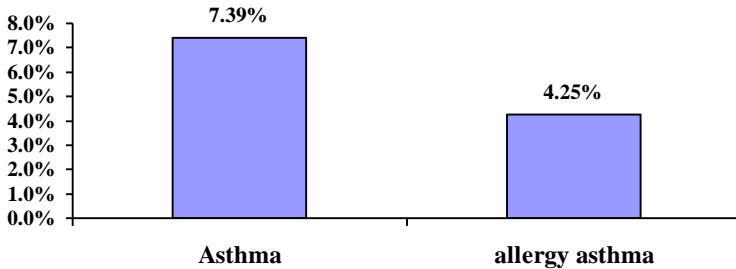
- Data were collected and analyzed by SPSS 19.0.

2.7. Research ethics

The research was approved by the Council through the outline of Haiphong University of Medicine and Pharmacy and the leader of Nam Dinh Spinning Factory/Song Hong Garment Company. Prior to participating in the study, all subjects will be provided clear information regarding their research objectives and research content. Research only serves for health care, no other purposes.

Chapter 3. RESEARCH RESULTS

3.1. Situation and some factors related to asthma and allergy asthma of workers at Nam Dinh Textile and Garment Factory



Hinh 3.4. The rates of asthma and allergy asthma of workers (n=1082)

Comment: The number of asthma workers is 7.39%. The incidence of allergy asthma is 4.25%.

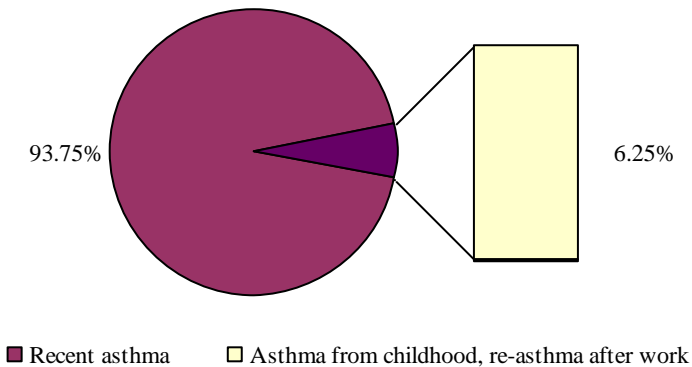


Figure 3.5. Distribution of asthmatic incidence by detection status (n = 80)

Comment: 5 out of 80 workers confirmed with asthma, 6.25%, were detected earlier. All five cases were detected asthma from young, cured and recurrent after work at the factory.

Figure 3.13. Incidence of asthma following to the factories (n=1082)

The factories	Asthma			Allergy asthma		
	yes (n,%)	no (n,%)	P	yes (n,%)	no (n,%)	P
Yarn Factory (n=368)	32 (8,7)	336 (91,3)	0,240	22 (5,98)	346 (94,0)	0,043
Sewing company (n=714)	48 (6,7)	666 (93,3)		24 (3,36)	690 (96,6)	
Total (n=1082)	80 (7,39)	1002 (92,6)		46 (4,25)	1036 (95,7)	

Comment: The rate of bronchial asthma in the Nam Dinh factory is 8.7%; The incidence in the garment company is 6.7% ($p > 0.05$). The incidence of asthma in cotton yarn mills was 5.98% higher in Song Hong garment company (3.36%) with statistically significant difference ($p < 0.05$).

Figure 3.14. Incidence of asthma following to gender (n=1082)

The factories	Asthma					Allergic asthma				
	femal ¹		male ²		P _{1,2}	female ¹		male ²		P _{1,2}
	n	%	n	%		n	%	n	%	
Yarn Factory ³	25	11,6	7	4,6	0,018	17	7,91	5	3,27	0,064
Sewing company ⁴	35	6,6	13	7,1	0,811	17	3,20	7	3,83	0,686
Total	60	8,0	20	6,0	0,224	34	4,56	12	3,57	0,457
p_{3,4}	0,022		0,329			0,005		0,784		

Comment: At the Yarn Factory, the incidence of asthma in women was higher than men ($p < 0.05$). The incidence of asthma of male workers in two factories was not significantly different ($p > 0.05$). The prevalence of asthma in women in the Yarn Factory was higher in Sewing company ($p < 0.05$).

Figure 3.15-3.16. Incidence of asthma by age and working time
(n=1082)

Age	Asthma				Allergic asthma			
	Yarn Factory (n,%)	Sewing company 2 (n,%)	Total (n,%)	p _{1,2}	Yarn Factory 1 (n,%)	Sewing company 2 (n,%)	Total (n,%)	p _{1,2}
20-29	2 (2,6)	6 (2,8)	8 (2,7)	0,942*	2 (2,63)	4 (1,86)	6 (2,06)	0,684*
30-39	14 (10,4)	25 (7,0)	39 (7,9)	0,211	13 (9,63)	12 (3,34)	25 (5,06)	0,004
40-49	9 (10,6)	15 (12,9)	24 (11,9)	0,613	4 (4,70)	6 (5,17)	10 (4,98)	0,881*
≥ 50	7 (9,9)	2 (11,8)	9 (10,2)	0,816*	3 (4,23)	2 (11,76)	5 (5,68)	0,228*
total	32 (8,7)	48 (6,7)	80 (7,39)	0,240	22 (5,98)	24 (3,36)	46 (4,25)	0,043
<i>p</i> _{age group}	0,331*	0,008*	0,002		0,247*	0,158*	0,260	
Working time								
<10 years	11 (6,7)	12 (3,2)	23 (4,2)	0,057	9 (5,52)	6 (1,58)	15 (2,76)	0,010
10 - ≤ 20	8 (11,3)	22 (8,3)	30 (9,0)	0,442	7 (9,86)	11 (4,16)	18 (5,37)	0,059
>20 years	13 (9,7)	14 (20,0)	27 (13,2)	0,039	6 (4,48)	7 (10,0)	13 (6,37)	0,125
Total	32	48	80		22	24	46	
<i>P</i> _{working time}	0,463	<0,001	<0,001		0,287	0,001	0,044	

*) Fisher's Exact Test

Comment: The highest incidence of asthma in 40-49 group, the lowest one in 20-29 group. The older age is higher the incidence is. There is statistically meaning in the age group less than 50 years (p

<0.05). Prevalence of allergic asthma in 30-39 age group in the yarn factory was higher in the garment company ($p < 0.05$). The incidence of asthma differs according to the seniority of the garment company (the higher seniority is the higher incidence is), at the spinning factory, there is no difference ($p > 0.05$).

Figure 3.17. Incidence of asthma according to type of work (n=1082)

Working	Asthma			Allergic asthma		
	Yarn Factory ¹ (n,%)	Sewing Company ² (n,%)	P _{1,2}	Yarn Factory ¹ (n,%)	Sewing Company ² (n,%)	P _{1,2}
Frequent exposure to dust ³	30 (9,70)	42 (6,3)	0,062	22 (7,10)	20 (3,01)	0,003
Casual dust exposure ⁴	2 (3,4)	6 (12,2)	0,139*	0	4 (8,16)	0,043*
Total	32	48		22	24	
p_{3,4}	0,200	0,110		0,033*	0,059	

*) Fisher's Exact Test

Comment: There is a difference in the incidence of allergic asthma to cotton dust in two groups of workers exposing to dust and irregular contact at two factories/companies ($p < 0.05$). Specifically, the prevalence of allergy asthma to cotton dust in workers exposing to cotton dust was higher in the garment factory, 7.10% compared to 3.01%, while the incidence of asthma in the garment industry was higher than in the yarn factory ($p < 0.05$). The prevalence of asthma among the workers contacting usually to cotton dust has a significantly ($p < 0.05$) different at the garment factory ($p > 0,05$).

Figure 3.29. The multivariate analysis of several factors associated with asthma

Factors		Allergic asthma		Asthma	
		OR _{correction} 95%CI	P _{value}	OR _{correction} 95%CI	P _{value}
Age	< 29	-		-	
	30 - 39	0,549 (0,19-1,57)	0,263	0,431 (0,18-1,04)	0,061
	40 - 49	1,27 (0,26-6,09)	0,764	0,518 (0,16-1,67)	0,273
	> 50	1,30 (0,22-7,65)	0,771	0,622 (0,16-2,44)	0,496
Working time	<10 years	-		-	
	10 -20	0,53 (0,23-1,21)	0,177	0,572 (0,29-1,12)	0,102
	>20	0,377 (0,09-1,55)	0,377	0,415 (0,15-1,14)	0,087
Temperature	right	-		-	
	wrong	1,50 (0,55-4,04)	0,420	1,02 (0,50-2,07)	0,961
Humidity	right	-		-	
	wrong	0,784 (0,29-2,09)	0,637	1,11 (0,54-2,30)	0,770
Cotton dust	right	-		-	
	wrong	1,05 (0,41-2,68)	0,913	-	-
Allergic rhinitis	no	-		-	
	yes	51,075 (6,95-375,09)	<0,001	25,169 (9,06-69,89)	<0,001
Allergic Sinusitis	no	-		-	
	yes	0,99 (0,33-2,97)	0,995	-	-
Deviated nasal septum	no	-		-	
	yes	-	-	1,270 (0,41-3,97)	0,681

Comment: The analysis of factors in the multivariate model of related factors has $p < 2$ on multivariate analysis by enter-forward method.

The results show that there is only one factor that influences bronchial asthma and allergy bronchial asthma are allergic rhinitis.

3.2. The result of the intervention

3.2.1. Results on the improvement of knowledge

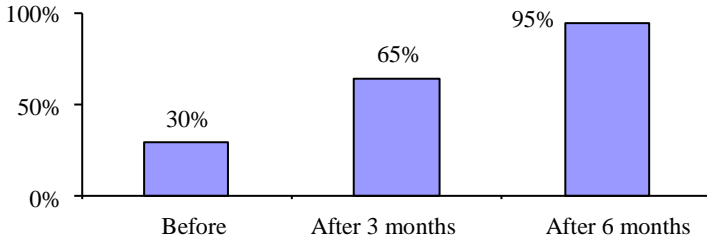


Figure 3. 8. Correct practice rate before and after of intervention

- *Eff.index* before and after of 6-month intervention: 216,7%

Comment: After 6 months, the correct knowledge rate was 95%, 65% higher than before. *Eff.index* reached 216.7%.

3.2.2. Results for improvement of practice

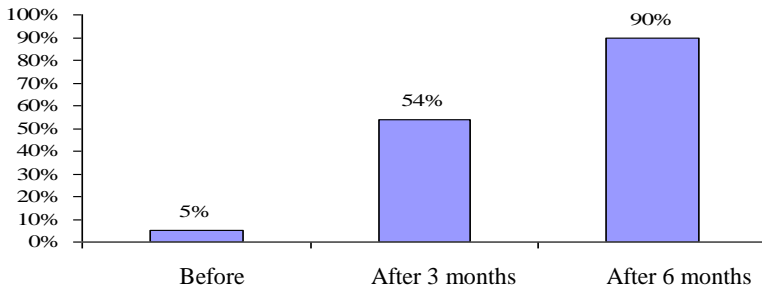


Figure 3.10. Correct practice rate before and after of intervention

(n=80)

- *Eff.index* before and after of 6-month intervention: 1700%

Comment: Before the intervention, the good rate of practice was only 5%. After the intervention, the rate of good practice has increased significantly. Specifically, after 3 months this rate is 53.75% and

reaches 90% after 6 months. The rate of correct practice after 6 months increased of 85% compared to before intervention.

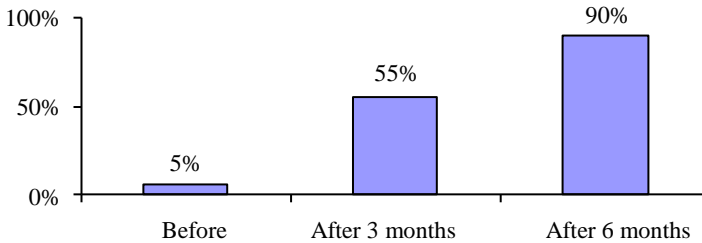


Figure 3.11. Prevalence of correct Knowledge-Practice to prevent bronchial asthma before and after intervention (n=80)

- *Eff.index* before and after 3-month intervention is 1700%

Comment: Prior to intervention, the correct rate of Knowledge-Practice only 5%. After 3 months, this rate is 55% and reaches 90% after 6 months. The right rate of knowledge-practice after 6 months increased 85% compared with before intervention.

Table 3.39. Spray practical skills before and after the intervention (n=80)

The steps	Before ¹		After 3-month intervention		After 6-month intervention ²		p _{1&2}
	n	%	n	%	n	%	
Full steps	0	0	2	2,5	52	65,0	<0,001*

*) Fisher's Exact Test

Comment: Before the intervention, all 80 subjects did not correctly complete in all 4 skills, spray prevention and treatment of asthma. After intervention, the proportion of correct sprays increased both at 3 months and 6 months after intervention. Specifically, after 6 months, the correct ratio of practise is 65%. The this rate, after the 6 month, increased 65% compared to before intervention.

Table 3.40. Knowledge of nasal wash before and after intervention
(n=80)

The steps	Before ¹		After 3-month intervention		After 6-month intervention ²		P _{1&2}
	n	%	n	%	n	%	
Complete 4 steps	1	1,25	4	5,0	49	61,2	<0,001*
After work having nasal wash	30	37,5	61	76,3	78	97,5	<0,001

*) Fisher's Exact Test

Comment: Before intervention, 1.25% of subjects have proper knowledge of nasal wash, after 6 months, this rate is 61.2%. The rate of rhinitis practice after 6 months also increased 60% compared to before intervention ($p < 0.001$). Nasal wash practices increased from 37.5% to 97.5% at the same time ($p < 0.001$).

3.2.3. The improved results of asthma control

Table 3.41. Changes in asthma control before and after intervention

Time The level	Before ¹		After 3-month intervention		After 6-month intervention ²		P _{1&2}
	n	%	n	%	n	%	
Thorough control (25 points)	1	1,25	52	65,0	79	98,75	<0,001*
Controlled (≥ 20 points <25)	79	98,75	28	35,0	1	1,25	

*) Fisher's Exact Test

Comments: Prior to intervention, there is only 1 case (1.25%) completely controlled asthma. After 3 months, the this rate was 65%. After 6 months, 98.75% controlled completely asthma. 1.25 reached the controlled level. The difference in the level of asthma control before and after intervention was statistically significant ($p < 0.001$).

Table 3.45. General quality of life indicators before and after the intervention (n=80)

The indicators	Before ¹	After 3-mth intervention	After 6-mth intervention ²	Change points	p _{1&2} (t-test)
Medium points of quality of life (SD)	6,04 (0,41)	6,53 (0,19)	6,80 (0,11)	0,76	<0,001
Avr score (SD) of symptom aspect	6,14 (0,47)	6,64 (0,21)	6,87 (0,10)	0,73	<0,001
Avr score (SD) action aspect	5,56 (0,45)	6,18 (0,27)	6,62 (0,22)	1,06	<0,001
Avr score (SD) feelings aspect	6,81 (0,26)	6,89 (0,17)	6,98 (0,06)	0,17	<0,001
Avr score (SD) envir. aspect	6,10 (0,82)	6,66 (0,44)	6,92 (0,19)	0,82	<0,001

Comment: Overall, quality of life improved after intervention, significant differences statistically significant (p < 0.05).

Table 3.46. Results for asthma symptoms improvement (n=80)

The indexes		Before ¹	after 3-month	after 6-month ²	Eff.index _{1&2} (p)
asthma symptoms after waking up in the morning in the past 2 weeks	No	68 (85%)	74 (92,5%)	80 (100%)	17,6% (0,002)
	Yes	12 (15%)	6 (7,5%)	0	
Troubled breathe in the last 2 weeks	No	48 (60%)	72 (90,0%)	77 (96,25%)	60,4% ($<0,001$)
	Yes	32 (40%)	8 (10%)	3 (3,75%)	
Wake up at night due to asthma in the past 2 weeks	No	51 (63,75%)	70 (87,5%)	78 (97,5%)	52,9% ($<0,001$)
	Yes	29 (36,25%)	10 (12,5%)	2 (2,5%)	
asthma prevented sleep in the last 2 weeks	No	52 (65%)	71 (88,75%)	78 (97,5%)	50% ($<0,001$)
	Yes	28 (35%)	9 (11,25%)	2 (2,5%)	

Comment: The symptoms of asthma in the past two weeks at different times of investigation have significantly improved.

Chapter 4. DISCUSSION

4.1. Current situation and some factors related to asthma and allergy asthma with cotton for the workers in Nam Dinh Textile and Garment.

Conducting research on 1082 workers in two textile and garment factories in Nam Dinh, we obtained results: the rate of workers diagnosed asthma is 7.39%; The incidence of allergy bronchial asthma is 4.25% (Figure. 3.4). There are about 3 million workers in the garment and textile industry in Vietnam, of which 70% -80% are female workers, the rate of workers at the garment factory is 7.39%, equivalent to about 200,000 workers. Over 150,000 female workers get asthma or potential risk of asthma. In particular, there are about 80,000 female workers among 100 thousand potential employees who suffer from asthma allergy to dust. A survey of the state of asthma was detected and treated before, and we obtained the results (Figure 3.5): Of the 80 workers identified asthma, only 5 cases accounted for 6.25%. Previously discovered and treated, the remain (93.75%) was detected and confirmed in this examination. This result suggests that garment facilities should have criteria for measuring respiratory function, which will help detect early cases of congenital asthma and some cancers. Cardiology (counseling, preventive treatment) to improve the health of workers and improve labor productivity.

From the results of Table 3.13, we found that the incidence of asthma in the yarn factory was 8.7%, this incidence in the garment company was 6.7%, but this difference was not statistically significant ($p>0.05$). The prevalence of allergic asthma caused by cotton dust in Nam Dinh Yarns factory was 5.98%, higher in Song Hong garment company (3.46%) with significant difference ($p<0.05$).

Research shows that asthma and allergic asthma due to cotton dust is a health concern needing to be addressed at textile facilities. The results of Table 3.14 show that there is a difference in the incidence of allergic asthma due to cotton dust in Nam Dinh Yarns factory and Song Hong garment company. In fact, the results of measuring the labor environment at these two establishments also showed that the working environment at Song Hong garment company was better than the Nam Dinh Yarns factory because Nam Dinh Textile Corporation has been established for a long time and moving out of the city, it only currently retained the factory at the old location, the factory has degraded, work maintenance is very limited. In terms of the incidence of asthma by age group (Table 3.15), there was an increase in the incidence of asthma among age groups ($p < 0.05$), increasing from age group (20-29 years) to (40-49 years) and decreased in the over 50 age group. The results of our study are consistent with Kim BK's published 2016 results. Chaari et al show that allergic symptoms gradually develop by the time of apprenticeship, the intensity of exposure to dust. Analysing the incidence of asthma in the workplace (Table 3.17), we found that: There is a difference in the incidence of asthma in the two groups of direct labor (*exposure regular cotton dust*) and indirect (*contact with irregular cotton dust*) in two factories /companies ($p < 0.05$).

Considering the involved factors in the multivariable model, $p < 0.2$ (table 3.29) by enter-forward method, the results showed that there was only one factor affecting the incidence of bronchial asthma and allergy bronchial asthma, allergic rhinitis. According to Khan DA: Allergic rhinitis and asthma are common diseases occurring together. Epidemiological studies have shown that the majority of bronchial asthma patients adding rhinitis and the occurrence of

rhinitis led to an increase in asthma risk factors. Studies by other authors have concluded that allergic rhinitis is associated with more severe asthma, less control of asthma, and a decline in quality of life.

4.2. The results of the communication and health education for workers getting the asthma.

In the intervention study, we conducted the intervention on bronchial asthma for all 80 workers diagnosed with asthma. After 6 months, 100% of subjects have proper knowledge about dust reserve. Comprehensive knowledge of the disease, treatment and prevention of bronchial asthma has increased by 60% over the period of 6 months compared to before intervention (figure 3.8) and effective index was 216%. The rate of correct practice increased by 85% compared to before intervention (Figure 3.10). This is a very encouraging result in the direct and regular counseling model with the key people of the factory and the support of communication materials. Total, evaluating the knowledge and the practise (table 3.11): after 3 and 6 months, the correct rates are 55% and 90% in turn. The implementation of health education communication activities to change knowledge-attitude-practice, after the knowledge and attitude change, the final purpose is to change the practice. Only practice changes the performance indicators, improve the effectiveness of the intervention. Education about optimal drug use is an important strategy for improving asthma control. The implementation of health education communication activities aimed at changing knowledge-attitude-practice, after the impact of knowledge change, the ultimate goal is practice. Only practice changes the performance indicators, improve the effectiveness of the intervention. Education about optimal drug use is an important strategy for improving asthma control. Evaluation of practice skills (table 3.39): After 3 and 6 months intervention, the correct rate of

sprays increase, the difference in skill, before and after intervention, was statistically significant ($p < 0.001$). One of the ways to prevent dust in the workplace is to wash the nose. Table 3.40 shows that the rate of knowledge of proper rhinitis practice increased ($p < 0.001$) after intervention. Saline nasal washings have been known for more than a century, and so far there were many scientifically validated studies demonstrating the effectiveness of nasal irrigation with physiological saline.

The results of the health education communication, in Table 3.41, changed in the level of asthma control. The level of asthma control was markedly improved, before intervention compared to the after. The difference in the prevalence of pre-intervention and post-intervention was statistically significant ($p < 0.001$). Evaluation of the quality of life of asthmatics after intervention (Table 3.45): Indicators of quality of life in four dimensions: symptom, activity, emotion, environment and quality Mean life expectancy increased after intervention, this difference was statistically significant ($p < 0.05$). From the confirmation of the effectiveness of the knowledge and practice improvement on asthma worker, we conducted an assessment of the improvement of asthma symptoms. Results of Table 3.46 show that: the last 2 weeks, asthma symptoms at the time of the survey have significantly improved, before and after the intervention of 6 months, 17.6% and 60.4% ($p < 0,05$) in turn.

4.3. Limitations of the research

The representative character of the sample is not high because it is only selected in a northern province. No change in FEV_1 was observed at different times of the day. Disease-causing factors that were not been evaluated have been standardized according to international standards. The intervention design was not fully assessed to the management of the health department at the factory

CONCLUSION

1. Current situation and some factors related to the asthma and cotton dust-induced asthma allergy among workers of the Textile and Garment Factories of Nam Dinh Province in 2016

The rate of asthma in workers in 2 textile and garment factories in Nam Dinh in 2016 is 7,39%.

The incidence of asthma in cotton in Nam Dinh is 4.25%. This incidence in textile mills is higher in garment companies (5.98% and 3.36%) with $p < 0.05$.

The incidence of asthma was 6.25%.

The prevalence of bronchial asthma among cotton was 7.1%, higher than in the garment industry (3.0%) ($p < 0.05$).

Multivariate analysis: The only factor that affects bronchial asthma and allergic bronchial asthma is allergic rhinitis.

2. Results of the communication on health education for asthma workers.

- The rate of knowledge is 60% after intervention compared with before intervention. The efficiency index of knowledge was 216.7%; The rate of practice gained 85% after intervention compared to before intervention; Overall, the correct rate of knowledge-practice increased 85% after intervention compared to before intervention.

- Skills of spraying medicine, correct knowledge of rhinitis practice increased significantly ($p < 0.05$).

The level of asthma control was significantly improved before intervention compared to after one ($p < 0.001$).

Indicators of quality of life in four dimensions: symptom, activity, emotion and environment, overall mean quality of life increased after intervention with statistically significant differences ($p < 0.05$).

- The asthma symptoms in the last 2 weeks at the time of the survey showed marked improvement, before and after 6 months of intervention were 17.6% to 60.4% in turn.

RECOMMENDATION

From the research results, we make the following recommendations:

1. For the employer

- To maintain a regular health check-up for workers;
- Nam Dinh Yarns Factory to step by step improve microclimate environment and reduce dust pollution at the work place.

2. For the medical staff of the factories

- To manage the asthma cases, maintain monthly counseling and inspection of asthma based on Asthma Control Test (ACT) to maintain the good results of communication solutions for health education, to improve life quality and the workers' health in order for their better contribution.

- To detect, manage and guide for early treatment of allergic rhinitis to avoid further transforming to asthma.

3. For the workers

- To maintain a regular health check-up.
- The workers diagnosed with asthma should maintain a monthly meeting with the medical staff of the factories, updating the asthma tracking log and calculate the asthma control point.

LIST OF RELATED RESEARCH PROJECTS
PUBLISHED BY AUTHOR

1. Tran Thi Thuy Ha, Nguyen Van Son, Pham Minh Khue, Vu Minh Thuc (2016). “Situation Of Allergic Asthma Caused By Cotton Dust Among Workers At The Textile Companies In Nam Dinh Province In 2016”. *Vietnam journal of preventive medicine*. Vol 14(187), 2016.
2. Tran Thi Thuy Ha, Nguyen Van Son, Pham Minh Khue, Doan Ngoc Hai, Bui My Hanh (2017). “The associated factors to allergic asthma caused by cotton dust among textile workers in Nam Dinh province, 2016”. *Vietnam journal of preventive medicine*. Vol 7(27), 2017.
3. Tran Thi Thuy Ha, Pham Minh Khue, Doan Ngoc Hai, Bui My Hanh (2017). “Effective assesement of communication intervention in changing knowledge and practive about allergic asthma caused by cotton dust of textile workers in Nam Dinh province, 2016”. *Vietnam journal of preventive medicine*. Vol 7(27), 2017.