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THE STATUS AND INTERVENTION EFECTIVENESS OF ALLERGIC RHINITIS IN STUFFED ANIMAL WORKERS IN HAI PHONG

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SUMMARY OF THE DISSERTATION OF MEDICINE

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LIST OF WORKS RELATED TO THE DISSERTATION

HAS BEEN PUBLISHED

1. **Nguyen Trong Tuan**, Vu Minh Thuc and Tran Xuan Bach (2020), ***"The clinical, sub-clinical symptoms and related factors of allergic rhinitis caused by cotton dust among stuffed animal workers"***, *Journal of Pratical Medicine*, Vol 5(1133), p40-43, Article in Vietnamese.

2**. Nguyen Trong Tuan**, Tran Xuan Bach and Vu Minh Thuc (2020), ***"The situation and intervention effectiveness of allergic rhinitis caused by cotton dust among stuffed animal workers"***, *Journal of Pratical Medicine*, Vol 5(1133), p28-31, Article in Vietnamese.

INTRODUCTION

Allergic rhinitis (AR) is a popular disease caused by various types of allergens. Among those, allergy with cotton dust is one of the main occupational reasons. The incidence rate of occupational AR in industrial countries was accounted for 2-4% allergic diseases. In Hai Phong carpet company (Vietnam), 32,5% workers suffered from AR caused by cotton dust (Vu Minh Thuc, Vu Van San, 2002).

Hai Phong – the third largest commercial center of Vietnam (after Ha Noi and Ho Chi Minh city) - is the largest industrial center and harbour in Northern coast of Vietnam, concentrating many textile and stuffed animal factories. In recent years, along with the environmental pollution risk, therapid change in manufacture systems and technologies has affected the model of occupational diseases in textile and stuffed animal industry.

Although AR caused by cotton dust (CD) has a relatively high incidence rate and heavy influence on workers' health, there are few researches on this problem. Besides, the risk of occupational exposure leads to AR has not been fully measured as well as the effective and feasible preventionto minimize the influence of this disease has not found. Therefore, we conducted the research: ***"The status and intervention effectiveness of allergic rhinitis in stuffed animal workers in Hai Phong".*** Aimed to the following objectives:

1. Report on the situation of allergic rhinitis caused by cotton dust among stuffed animal workers in Hai Phong 2017-2018
2. Identify fators related to allergic rhinitis caused by cotton dust in stuffed animal workers in Hai Phong
3. Evaluate the results of health education with the nasal irrigation intervention in allergic rhinitis caused by cotton dust

THE NEW CONTRIBUTION OF THE DISSERTATION

The result of this research has contributed to the national data on the overall assessment of the working environment and the status of allergic rhinitis caused by cotton dust to workers in stuffed animal factory as well as identified the relevant factors and the influence of the media intervention. This is a trustworthy reference for related research in specialized fields as well as in medicine.

The study results showed that the percentage of allergic rhinitis caused by cotton dust rate in workers was 20,2%. And workers suffered from allergic rhinitis caused by cotton dust had the rate of itchy nose, rhinorrhea, sneeze and nasal congestion symptoms were 98,3%; 97,7%; 95,9% and 91,3%, in respectively. Workers had the higher senority; Workers having personal and/or family allergic history had higher risks of allergic rhinitis caused cotton dust.

This study illustrated the positive models of media intervention by healthcare education combining with nasal irrigation is effective and feasible, contributed to the health care of workers. which can be applied in other stuffed animal factories with high risk of allergic rhinitis caused by cotton dust.

STRUCTURE OF THE DISSERTATION

- The main part of dissertation: Consists of 119 pages, including of the following section: Introduction 2 pages; Chapter 1: Overview 30 pages; Chapter 2: Materials and Methods 20 pages; Chapter 3: Results 34 pages; Chapter 4: Discussion 30 pages; Conclusions and recommendation 3 pages.

- The other parts: Reference: 119 references (48 Vietnamese and 71 English); 38 tables, 10 figures; 8 appendices.

Chapter 1: OVERVIEW

1.1. The status of AR in textile worker and stuffed animal worker

1.1.1. Allergic rhinitis: Is defined clinically by the symptoms caused by immunologically mediated (most often IgE - dependent) inflammation after the exposure of the nasal mucous membranes to offending allergens. Symptoms of allergic rhinitis include rhinorrhea, nasal obstruction or blockage, nasal itching, sneezing, and postnasal drip that reverse spontaneously or after treatment. Allergic conjunctivitis often accompanies allergic rhinitis - ARIA 2016.

1.1.2. Pathology: The process of AR consists of three phases

- Sensitization to allergen stage: The allergen has been penetrated into body, causing specific IgE antibodie to be produced. This stage almost has no clinical symptoms

- Early reaction stage: in which sneezing and rhinorrhea develops in 10-15 minutes and disappears. The early reaction is the response of mast cells to offending allergens (type I hypersensitivity). Stimulated mast cells induce nasal symptoms by secreting chemical mediators such as histamine, prostaglandins and leukotrienes. When respiratory epithelium is destroyed and nerve endings are exposed by cytotoxic proteins from eosinophils, sensory nerve fibers are excited by nonspecific stimuli and stimulate both sensory afferent and surrounding efferent fibers, the socalled retrograde axonal reflex. This makes the sensory nerve fibers secrete neuropeptides such as substance P and neurokinin A, which induce contraction of smooth muscles, mucous secretion of goblet cells and plasma exudation from capillaries. This process is called neurogenic inflammation

- Late reactions stage:eosinophil chemotaxis is the main mechanism in the late reaction, which is caused by chemical mediators produced in the early reaction. Several inflammatory cells, eosinophils, mast cells

and T cells migrate to nasal mucosa, break up and remodel normal nasal tissue and these processes result in nasal obstruction which is the main symptom of allergic rhinitis patients.

1.1.3. Diagnosis of AR: According to "The Guidelines for the diagnosis and treatment of allergies - clinical immunity" (Vietnamese Ministry of Health 2014), to diagnosis AR need following informations: Allergic history, clinical symptoms and allergic testing.

1.1.3.1. History: Taking a thorough history is critical in the diagnosis of AR including atopic conditons and genetic predisposition as well as personal and family allergic history.

1.1.3.2 . Clinical diagnosis:

- Functional symptoms: The primary symptoms of allergic rhinitis are itchy nose, rhinorrhea, sneezing and nasal obstruction.
- Inferior turbinates are often enlarged and the mucosa can be described as "pale" or "boggy." Can be diagnosed by Clar head mirror or nasal endoscope.

1.1.3.3. Testing: Allergy testing plays an important role in diagnosing AR as well as evaluating the intervention effectiveness (before and after intervention). One of common test is skin testing (Pricktest)

1.1.4. The role of cotton dust in allergic diseases: Cotton dust is the main causes of AR in textile and stuffed animal workers (one of 28 occupational diseases). Cotton dust is a highly sensitivity allergens.

1.2. The concern factors: Nowadays, in Vietnam, the textile and stuffed animals industry plays a significant role inthe development of socio-economic. This field has received prior investmentin expanding production, updated technology however it still has not yet satisfied the consumption needs and export requirements.According to research results, it can be seen that beside many factors such as gender, age, senority, allergic history, etc the occupational enviroment factors like

noise pollution, working place temperatures, moisture, brightness, dust concentrate, etc also contributes many potential risks in textile and stuffed animal workers' health especially AR caused by cotton dust.

1.3 The interventions of allergic rhinitis caused by cotton dust:

1.3.1. Policy solutions: Like many countries worldwide, Vietnam has many policies and regimes to protect labour health such as: Law on occupational safety and health, regulations on labor working environment standards, regulations on health check (such as recruitment check, yearly general check up, occupational diseases check..) and listing occupational AR into the list of occupational diseases entitled to insurance, hazardous fostering regime.

1.3.2.Technological solutions and occupational environment: The production of textile and stuffed animal industry often generates toxic factors that affect the health of workers. Therefore, in some sections, modern and automated technologies should be used to help limit and control hazardous elements. Some methods of occupational safety and health such as: Shielding; Cooling, ventilation; Dust collector, etc is applied to help reduce harmful elements below hygienic standards.

1.3.3. Health education solution: This solution takes an important part in limitting the harmful effects of the working environment on health. Such as: thematic reports, personal advice, modeling, training, seminars, contests, launching ceremonies, using television, radio, newspapers, write articles, posters, leaflets, phones, messages, etc.

1.3.4. Personal prevention solution: Wearing masks during working timeoffers effective protection to allergic rhinitis. It also a regulation for workers who work directly in polluted, toxic and dusty conditions.

1.3.5 Medical solutions

1.3.5.1. Health management and health care: Yearly general check up, occupational disease examinations for early detection of occupational diseases in specific working conditions.

1.3.5.2. Nasal irrigation: Has been used long and widely in the world. Nasal irrigation is is considered one of the leading measures to prevent and treat allergic rhinitis, especially allergic rhinitis caused by harmful effects of working enviroment. Some types of nasal irrigation: Proetz method, using Netti pot, SRK Saltmax pot,....

1.3.5.3 Pharmaco-therapy: Pharmacologic therapy is the mainstay treatment for the majority of allergic rhinitis patients. There are two types of pharmaco - therapy:

**** Non specific medications:*** Anti histamine are generally effective against sneezing, rhinorrhea, nasal itching, and eye symptoms. Decongestants are most effective with nasal congestion. Leukotriene modifiers are effective for AR and control symptoms comparable to antihistamines. It can be a good choice for patients who suffer from allergic rhinitis and asthma. Cromolyn sodium is a mast cell stabilizer, decreasing the ability for mast cells to release proinflammatory mediators, including histamine. Intranasal, oral and systemic steroid.

**** Immuno - therapy:*** Also known as allergy promotes tolerance byregularly exposing a sensitized patient to the allergen to which they are sensitized. A new model of approach for the treatment of allergic rhinitis, which is a pathogenetic treatment, changing the natural course of the disease. Immunotherapy holds the most promise for patients to permanently decrease or eliminate their symptoms to an allergen. The two most common methods are subcutaneous immuno - therapy (SCIT) and sublingual immuno-therapy (SLIT).

Through researching intervention measures to minimize AR in the community as well as in textiles and stuffed animals production,

with complex pathogenetic mechanisms to prevent, minimize and treat diseases in a feasible and effective way. It is necessary to have comprehensive and coordinated interventions. Assessing the effectiveness of those solutions we have some conclusions:

Having nasal irrigationafter work especially for workers who are regularly exposed to CD is a positive measure thathelp clear the sinuses, eliminate pathogens, reduce the concentration of allergens, especially smoke, CD, ...combined with medical media education would create high efficiency to helpprevent the spread of infection to the other sinuses and reduce postnasal drip, as well as treat AR. Advantages easy to use, does not cause side effects, can be widely applied in the community, suitable for all ages and all professions.

Chapter 2: MATERIALS AND METHODOLOGY

2.1 Research location, timing and objects :

2.1.1. Research location: At 2 factories of Minh Thanh export garments company limited, located in 307 Nguyen Van Linh street, Kenh Duong ward, Le Chan district, Hai Phong city.

2.1.2.Research timing: from 03/2017 to 03/2018

2.1.3. Research objects

2.1.3.1. Cross sectional descriptive objects:

- 850 Workers in stuffed animal factories:

+ Selection criterias: wokers who directly work at factory workshops, working period > 12 months. Agree to participate in the study

+ Exclusion criterias: Absent workers (sick, maternity, etc) during the investigation; working time <12 months, not agree to participate in the study.

- Working enviroment samples: All sections and product chain of factories

2.1.3.2. Intervention study: 172 workers who suffer from AR caused by cotton dust met the selection and exclusion criterias. Divided into 2 groups (86 workers/ group): Intervention group and Control group.

- *Diagnosis of allergic rhinitis*: According to "The Guidelines for the diagnosis and treatment of allergies - clinical immunity" (Vietnamese Ministry of Health 2014):

- Clinical diagnosis: The primary symptoms of allergic rhinitis are itchy nose, rhinorrhea, sneezing and/or nasal obstruction. Turbinates enlarged and/or mucosa can "pale" or "boggy".

- Testing: Skin testing (Prick test) positive.

2.2 Methodology of research

2.2.1. Research design: Cross sectional descriptive and communitivity intervention study

2.2.2. Sample size and sampling method

2.2.2.1. Sample size for cross-sectional descriptive study

Using formula: $n = Z^2_{1-\alpha/2}\frac{p(1-p)}{d^2}$ Meanwhile

N: Sample size

$Z_{1-\alpha/2}$= 1,96; p=0,19 (The rate of AR in Thai Nguyen textile workers)

d=0,05.

The result is 237. However this study was conducted on 2 factories => n= 237x2= 474. Choose Design Effect (DE) = 1,5 => n = 474 x 1,5 = 711. In fact, choose all of workers in this company (850 workers)

2.2.2.2. Sample size for communitivity intervention study: Using formula:

$$n1 = n2 = (Z_{1-\alpha/2} + Z_{1-\beta})^2 \frac{p_1 q_1 + p_2 q_2}{(p_1 - p_2)^2}$$

n_1= intervention group

n_2= control group

$Z_{1-\alpha/2}$= 1,96; $Z_{1-\beta}$ = 0,84 *(β=0,2; Z_β= 0,842)*

P_1= 0,33 (Allergic rhinitis rate before intervention)

P_2= 0,15 (The desired rate after intervention)

The results are n1=n2=85

Choose 172 worker who suffered from AR caused by CD, met up all of selection and exclusion criterias, divided into 2 groups (86 workers/group): Intervention group: Intervent with health education and nasal irrigation; Control group: Only health education.

2.3. Content, variables and index research

- Object 1: The general situations (age, gender, occupational age, type of work...), The situation of allergic rhinitis caused by cotton dust (the disease rate, clinical symptoms, prick test results), The situation of working enviroment (working climate, noise pollution, brightness, CO_2, cotton dust concentrate...)
- Object 2: The related factors of allergic rhinitis caused by cotton dust (age, occupational age, gender, type of work, allergic history)
- Object 3: Intervetion results (Clinical results and Pricktest results)

2.4. Method, tools and data collection techniques: Interview, health examination, testing, intervention... Data collection tools are information collection form, checklist and medical record for AR.

2.5. Data analysis: Data was synthesized and analyed by SPSS software version 16.0. Statistical questionnaire then used to evaluate the differences between rates and statistical significance p= 0.05 was used in inference statistics.

2.6. Ethical issues: The study was conducted underthe approval proposalin Hai Phong University of Medicine and Pharmacy and received the permissionof the dicrector of Minh Thanh Garment Export Company Ltd.

- Workers were clearly explained the purpose and meaning of the research and voluntarily participated in. All personal information was kept confidentially.

- The data is confidentially accurate and serves no other than the purpose of doing research and protecting labour's health.

Chaper 3: RESULTS

3.1. The situation of allergic rhinitis caused by cotton dust in stuffed animal workers

3.1.1. General situations: Total 850 stuffed animal workers.

3.1.1.1. Age distribution: 31-40 years old group 50,5%. ≤ 30 years old group 30,1%, over 50 years old group 1,5%. The median age 34,3± 6,9. The youngest is 20 years old; the oldest is 57 years old

3.1.1.2. Gender distribution: Almost worker was female (91%). Men only contributed to 9%. This is consistent with the characteristics of the textile and stuffed animals industry, which are mainly female workers, while men often work in stages such as operating, repairing and maintaining equipment, machines, etc.

3.1.1.3. Ocupational age distribution: 10 - 20 years group (48,2%), under 10 years group (37,5%), over 20 years group (14,2%). The median was 11,8 ± 6,4. The highest was 34 years, the lowest was 2 years. There were no significant difference about occupational age ($p>0,05$)

3.1.1.4. Type of work: frequently exposed to cotton dust group 91%. Not frequently exposed to cotton dust group 9%. There were significant difference about type of work ($p<0,05$)

3.1.1.5. Nose and throat diseases discontribution: Nose and throat diseases rate 69,0% (allergic rhinitis caused by cotton dust 29,3%).

3.1.1.6. Occupational enviroment discontribution: Although the result of working climates (temperature, moisture, wind speed), brightness, noise, cotton dust concentrate and carbon dioxide in working place have the difference between difference areas. However

they are consistent with the nature and characteristics of the type of work and lower than the limits of Vietnam Permissible hygiene standards.

3.1.2. The situation of allergic rhinitis caused by cotton dust in stuffed animal workers

3.1.2.1. Allergic rhinitis rate: Allergic rhinitis rate in stuffed animal workers was 36,1% (Allergic rhinitis caused by cotton dust rate in workers who suffer Allergic rhinitis was 56%). Allergic rhinitis caused by cotton dust rate in stuffed animal workers was 20,2%

3.1.2.2. Clinical symptoms and Pricktest results of allergic rhinitis caused by cotton dust

Table 3.1. Clinical symptoms of AR caused by cotton dust

Group / Symptom	Intervention group		Control group		p	Total	
	n	%	N	%		CN	%
Itchy nose	**85**	*98,8*	**84**	*97,7*	p>0,05	**169**	*98,3*
Sneeze	**83**	*96,5*	**82**	*95,5*	p>0,05	**165**	*95,9*
Rhinorrhea	**84**	*97,7*	**84**	*97,7*	p>0,05	**168**	*97,7*
Nasal congestion	**79**	*91,9*	**78**	*90,7*	p>0,05	**157**	*91,3*
Changing nasal mucosa	**58**	*67,4*	**57**	*66,3*	p>0,05	**115**	*66,9*
Enlarge turbinate	**60**	*69,8*	**60**	*69,8*	p>0,05	**120**	*69,8*

Interpret: The propotion of itchy nose symptom 98,3%; Rhinorrhea 97,7%; Sneeze 95,9%; Nasal congestion 91,3%; Changing nasal mucosa and Enlarge inferior turbinate 66,9% and 69,8% in respectively. The percentage of all clinical symptoms in both groups are similar. There were no significant difference (p<0,05)

3.1.2.3. The positive result of prick test with cotton dust

Table 3.2.The results of Prick test in AR caused by cotton dust

Group / Results	Intervention group		Control group		p	Total	
	n	*%*	n	*%*		CN	%
Grade 1	**15**	*17,4*	**16**	*18,6*	p>0,05	**31**	*18,0*
Grade 2	**30**	*34,9*	**30**	*34,9*	p>0,05	**60**	*34,9*
Grade 3	**30**	*34,9*	**30**	*34,9*	p>0,05	**60**	*34,9*
Grade 4	**11**	*12,8*	**10**	*11,6*	p>0,05	**21**	*12,2*
Total	**86**		**86**			172	*100%*

Interpret: Both Grade 2 and Grade 3had the highest rates (34,9%). Grade 1 and Grade 4 were 18,0% and 12,2%, in respectively. The results of prick test in both groups were equivalent. There were no significant difference (p<0,05)

3.2. The related factors of AR caused by cotton dust

3.2.1. Age: The rate of AR caused by CD in group ≤ 30 years old 20,7%; in group 31-40 years old 19,1%; 41-50 years old 24,3%. There were no significant difference (p>0,05)

3.2.2. Gender: The percentage of AR caused by CD in female workers was 20,6%. However this number in men was 16,4%. The incidence of AR caused by CD in female worker was 1,32 times higher than male workers (OR= 1,32; $CI_{95\%}$ = 0,69 - 2,51)

3.2.3. Occupational age: The percentage of AR caused by CD in < 10 years senority group was 18,8%. However this number in 10 - 20 years group and >20 years group was 19,8% and 25,6%, in respectively. There were no significant difference between three groups (p>0,05).

3.2.4. Type of work: Workers often exposed with cotton dust had the incidence rate of 20,5%. Meanwhile in non-exposed group, this number was 17,1%. There were no significant difference between those groups (p>0,05).

3.2.5. Personal allergic history: Personal allergic history group had the incidence rate of 11,5% compare with 17,1% of non-personal allergic history group. There were significant difference between those groups (p<0,001).

3.2.6. Farmily allergic history: Group with family allergic history had the incidence rate of 12,0% compare with 8,2% of non-family allergic history group. There were significant difference between those groups (p<0,001).

Table 3.3.Relevant factors of AR caused by cotton dust related to stuffed animal workers in multivariate regression analysis

Relevant factors	**Hệ số**	**SE**	**p**	**OR**	**$CI_{95\%}$**
Gender	0,24	0,35	0,50	1,27	0,64 - 2,51
Type of work	0,19	0,34	0,57	1,21	0,62– 2,38
Personal allergic history	**0,1**	**0,23**	**<0,001**	**2,72**	**1,75– 4,22**
Family allergic history	**0,91**	**0,21**	**<0,001**	**2,48**	**1,65– 3,75**
Age (years)	-0,05	0,20	0,81	0,95	0,65– 1,40
Senority (years)	**0,48**	**0,20**	**0,02**	**1,62**	**1,10– 3,40**

Interpret: In multivariate regression analysis, there was an significant association between personal & family allergic history, senority and allergic rhinitis caused by cotton dust in stuffed animal workers with (OR = 2,72; $CI_{95\%}$ = 1,75 – 4,22; p<0,001); (OR = 2,48; $CI_{95\%}$ = 1,65 – 3,75; P<0,001); (OR = 1,62; $CI_{95\%}$ = 1,10 – 3,40; P = 0,02), in respectively.

3.3. Result of preventive intervention

3.3.1. Result of health education intervention: Before intervention, the KAP of stuffed animal worker was low, with the good knowledge result, the good attitude result and the good practice attitude was 20,3%, 23,8% and 15,1%, in respectively. However, after intervention,

the KAP of worker had improved dramatically with 94,8% of good knowledge, 92,4% of good attitude and 97,1% good practice.

3.2.2 Clinical result of intervention

3.2.2.1 Result of itchy nose symptom

Table 3.4. The intervention result of itchy nose symptom

Group / Grade	Intervention group		Control group		p
	n	%	n	%	
Very good	**11**	*12,8*	**0**	*0*	
Good	**7**	*8,1*	**1**	*1,2*	*p<0,001*
Fair	**23**	*26,7*	**1**	*1,2*	*p<0,001*
Bad	**45**	*52,3*	**84**	*97,6*	*p<0,001*
Total	**86**	*100%*	**86**	*100%*	

Interpret: Intervention group: After 6 months intervention, Very good result 12,8%; Good result 8,1%; Fair (26,7%) and Bad result 52,3%.

- Control group: The itchy nose symptom was almost remained as before intervention. The bad result was 97,6%. After intervention, the effective intervention of itchy nose symptom in intervention group was higher than control group (p<0,001).

Table 3.5. The intervention result of sneeze symptom

Group / Grade	Intervention group		Control group		p
	n	%	n	%	
Very good	**12**	*13,9*	**0**		
Good	**5**	*5,8*	**1**	*1,2*	*p<0,001*
Fair	**17**	*19,8*	**2**	*2,3*	*p<0,001*
Bad	**52**	*60,5*	**83**	*96,5*	*p<0,001*
Total	**n1=86**	*100%*	**n2=86**	*100%*	

Interpret: Intervention group: After 6 months, Very good result 13,9%; Good 5,8%; Fair 19,8% and Bad 60,5%. Control group: The sneeze symptom was almost remained as before intervention. The bad result was 96,5%. After intervention, the effective intervention of sneeze symptom in intervention group is higher than control group (p<0,001).

Table 3.6. The intervention result of rhinorrhea symptom

Group / Grade	Intervention group		Control group		p
	n	%	n	%	
Very good	**10**	*11,6*	**0**		
Good	**7**	*8,1*	**2**	*2,3*	p<0,001
Fair	**24**	*27,9*	**1**	*1,2*	p<0,001
Bad	**45**	*52,3*	**83**	*96,5*	p<0,001
Total	**n1=86**	***100%***	**n2=86**	*100%*	

Interpret: Intervention group: After 6 months, Very good result 11,6%; Good result 8,1%; Fair 27,9% and Bad result 52,3%. Control group: The rhinorrhea symptom was almost remained as before intervention. The good, fair and bad results are 2,3%, 1,2% and 96,5%, in respectively.After intervention, the effective intervention of rhinorrhea symptom in intervention group is higher than control group (p<0,001).

Table 3.6. The intervention result of nasal congestion symptom

Group / Grade	Intervention group		Control group		p
	n	%	n	%	
Very good	**7**	*8,1*	**0**		
Good	**4**	*4,7*	**2**	*2,3*	P<0,001
Fair	**24**	*27,9*	**2**	*2,3*	P<0,001
Bad	**51**	*59,3*	**82**	*95,3*	P<0,001
Total	**n1=86**	*100%*	**n2=86**	*100%*	

Interpret: Intervention group: After 6 months, Very good result 8,1%; Good result 4,7%; Fair 27,9% and Bad result 59,3%. Control group: The nasal congestion symptom was almost remained as before intervention. The good, fair and bad results are 2,3%, 2,3% and 95,3%, in respectively. The effective intervention of nasal congestion symptom in intervention group is higher than control group (p<0,001).

Table 3.7. The intervention result of changing nasal mucosa

Group / Grade	Intervention group		Control group		p
	n	%	n	%	
Very good	**5**	*5,8*	**0**	*0*	
Good	**7**	*8,1*	**3**	*3,5*	p<0,01
Fair	**12**	*13,9*	**4**	*4,7*	p<0,01
Bad	**62**	*72,1*	**79**	*91,9*	p<0,01
Total	**n1=86**	*100%*	**n2=86**	*100%*	

Interpret: Intervention group, after intervention: Very good result 5,8%; Good result 8,1%; Fair 12,9% and Bad result 72,1%. Control group: This symptom was almost remained as before intervention. The good, fair and bad results are 3,5%, 4,7% and 91,9%, in respectively. The effective intervention in intervention group is higher than control group (p<0,001).

Table 3.7. The intervention result of enlarged turbinate symptom

Group / Grade	Intervention group		Control group		p
	n	%	n	%	
Very good	**2**	*2,3*	**0**	*0*	
Good	**5**	*5,8*	**1**	*1,2*	p<0,05
Fair	**9**	*10,5*	**0**	*0*	
Bad	**70**	*81,4*	**85**	*98,8*	p<0,05
Total	**n1=86**	*100%*	**n2=86**	*100%*	

Interpret: Intervention group: After intervention, Very good result 2,3%; Good result 5,8%; Fair 10,5% and Bad result 81,4%. Control group: This symptom was almost remained as before intervention. The bad results are 98,8%. After intervention, the effective intervention of enlarged turbinate symptom in intervention group is higher than control group (p<0,001).

3.3.3 Prick test result after intervention

Table 3.8. The prick test result after intervention

Group Grade	Intervention group		Control group		p
	n	%	n	%	
Very good	**0**		**0**		
Good	**5**	*5,8*	**0**		
Fair	**28**	*32,6*	**1**	*1,2*	p<0,01
Bad	**53**	*61,6*	**85**	*98,8*	p<0,01
Total	**n1=86**	*100%*	**n2=86**	*100%*	

Interpret: Intervention group: After intervention, Good result 5,8%; Fair 32,6% and Bad 61,6%. Control group: The pricktest results was almost remained as before intervention. The bad results are 98,8%. After intervention, the effective intervention of enlarged turbinate symptom in intervention group is higher than control group (p<0,01).

Chapter 4: DISCUSSION

4.1. The situation of AR caused by CD in stuffed animal workers

4.1.1. General features: In our study, the average age of animal stuffed workers was 34,3 $\pm$ 6,9; the youngest was 20 years old, the oldest was 57 years old. The result of our study was higher than result of De Silva et al (2011) in Sri Lanka textile workers (27,8 ± 5,9). This can be explained that in Minh Thanh export garments Co Ltd, workers have the stable in number and the continuos between generations.

- Almost workers were female (91%). This is consistent with the characteristics of the textile and stuffed animals industry, which are required some particular traits of women such as meticulosity, perseverance, ingenuity etc. This result is similar to previous research of Trinh Hong Lan (2010) (The women rate was 89%)

- The average senority was 11,8 ± 6,4 years, the highest senority was 34 years. The main peak was 10-20 years group (48,2%), follow up was under 10 years group (37,5%). Our result was similar to previous researchs: Hoang Thi Thuy Ha (2015) at Thai Nguyen textile company and Trinh Hong Lan (2010) at Southern Vietnam shown that the highest aged group was from 31 -40 year old however the senority was higher than our study. This can be explained that Minh Thanh export garments Co.Ltd was established only 23 years, meanwhile other authors' research facilities was established for a long time.

4.1.2. The situation of working enviroment factors:

Minh Thanh Garment Export Co., Ltd was established in 1997- with the business of producing stuffed animals, mainly exported to the US, Japan and EU- used modern, synchronized facilities and technologies. In fact, in our study, the working enviroment measurement results was met the Vietnam safety and hygiene standard. However, we found that the incidence rate was distributed quite evenly among factory sectors, although in some areas had higher cotton dust concentration than other sections such as sewing sections, cutting and stamping sections etc, the incidence rate was tend to be higher than other sections. However there was no significant difference between those groups ($p<0,05$). It could be explaind that whether the cotton dust concentration is the only partial influence to the AR incidence rate or there is a new model of stuffed animal industry working environment is still ambiguos. Thus, to clear up this suspicion, there would need further studies.

4.1.3.The situation of AR caused by CD in stuffed animal workers:

In our study, 850 stuffed animal worker were selected to participated in this research. We found that 307 workers suffered from AR (36%) and using the Pricktest to found the cause of allergies, resulting in 172 people had positive result for CD (20,2%). Our result was lower than

Vu Van San study (2002) when researched on 780 workers of Hang Kenh carpet factory (the AR caused by CD rate 32,5%). This could be explained that Vu Van San studied in 2002 when the hygiene and safety of factories were still inadequate, however in our research, our facility has been invested in a modern, advanced production line system and workshop so the indicators of the working environment basically reach Vietnam permission hygiene standards.

4.1.3.1.The clinical symptoms:Workers who suffered from AR caused by CD had symptoms of perennial allergic rhinitis in which the itchy nose rate was 93,8%; rhinorrhea symptom 97,7%; sneeze symptom 95,9%; pale mucosa symptom 66,9% and enlarger turbinate 69,8%. Our result was similar the result of Dinh Viet Tuyen which was study in Halotexco company (2018): Sneeze, itchy nose, nasal congestion, rhinorrhea symptoms rate were 89,9%; 89,6%; 67,2% and 60,8%.

4.1.3.2. Prick test results: The positive result with cotton dust among allergic rhinitis group was 56,0%. In particular, grade II and grade III rate was highest and both equal 34,9%. Grade I and grade IV rate was 18,0% and 12,2%, in respectively. Our results was similar with the research of Dinh Viet Tuyen (2018) found that the positive result with cotton dust among allergic rhinitis workers in Halotexco - Nghe An was 50,8%. Meanwhile Nguyen Hoang Phuong (2018) claimed that 100% patients had positive results with prick test and grade I was 60% and grade IV was 10%.

4.2. Several factors related to AR caused by cotton dust

- Workers in the 41-50 years old group was 1,23 times more likely to be infected with AR caused by cotton dust than under 30 years old group (95% CI = 0,76 - 1,99). Similarly, the 31-40 years old group was only 0,91 times more likely to get disease than under 30 years old group (95% CI = 0,62-1,33). Although there was a differrence in the

incidence rate among groups, there was no relationship between age and disease status (p> 0.05). Our results was similar with Ungkhara et al (2018) in Thailand which claimed that the incidence rate of occupational allergic rhinitis was unrelated to the age of workers.

- The allergic rhinitis caused by cotton dust in stuffed animal workers was not related to gender (OR = 1,32; $CI_{95\%}$ = 0,69 -2,51; p>0,05). Our results was similar with Perečinský et al (2014) in Czech Republic when researched about occupational rhinitis.

- Senority factor: In this study, we found that the longer senority was, the higher occupational AR rate was. It was similar with some researches which were conducted by Phan Quang Doan (1999), Vu Van San (2002), Nguyen Dinh Dung (2001), Bui Hoai Nam (2017) claimed that there was a relationship between the senoritywith AR rate

- Type of work factors: Considering the relationship between the incidence rate and the type of work, we found that the group were often exposed with cotton dust had suffer AR caused by CD 1,25 times higher than group non-exposed with cotton dust (OR = 1,25; $C_{I95\%}$ = 0,69 - 2,51; p>0,05). This was similar the results of Vu Van San, Nguyen Giang Long and Hoang Thi Thuy Ha's researches.

- Our study was showed that there was a relationship between personal allergic history and disease. Workers who had personal allergic history had higher risk of AR caused by CD than other group (OR = 3,58; $CI_{95\%}$ = 2,53 – 5,06; p<0,001). Research of Chen YX et al (2017) was conducted in Beijing textile workers was claimed that there was a connection between contact dermatitis history and allergic rhinitis.

- Group with family allergic history had the higher disease risk than non family allergic history group (OR = 3,77; $CI_{95\%}$ = 2,66 – 5,34; p<0,001). Research of Dold et al (1992) was found that 46% allergic rhinitis patients had family allergic history

- Considering the multivariable models by factor associated, the results of multivariate analysis (Tab.3.3) showed the personal, family allergy history and senority were factors associated with allergic rhinitis caused by CD ($p<0.05$). In which, workers with personal allergic history were 2,72 times higher to get disease than other group (OR = 2,72; $CI_{95\%}$ = 1,75 - 4,22). Workers with family allergic history were 1,65 – 3,75 times more likely to develop AR caused by CD than other group (OR= 2,48; $CI_{95\%}$ = 1,65 - 3,75). Workers had the higher senority suffered more from disease (OR = 1,62; $CI_{95\%}$ = 1,10 - 3,40)

4.3 The effec of intervention solutions

4.3.1. Health education solution: We had conducted health education for 172 worker suffered from AR caused by CD, including: disease advice (symptoms, causes, how to prevent), intrustions for wearing mask. Before intervention, the KAP of SAW was low, with the good knowledge, good attitude and good practice results were 20,3%, 23,8% and 15,1%, in respectively. However, after intervention, the KAP of worker has improved dramatically with 94,8% of good knowledge, 92,4% of good attitude and 97,1% of good practice.

4.3.2. Clinical efficacy: In our research, before intervention, almost workers in both intervention and control group had the symptoms of AR. After 6 months intervention, we found that the intervention effect of intervention group was higher than control group. Although health education had a dramatically effect on changing KAP of workers.

4.3.2.1. Intervention result with itchy nose symptom: The our results showed that nasal irrigation treatment had good effect to itchy nose symptom. This was similar toresult of Vu Trung Kien (2013) when using some antihistamine to treat AR. He claimed that before intervention, the number of patients had itchy nose symptoms was

relatively high (93,6%), however after intervention, number reduced to 46,8 % (itchy nose group) and 21,3% (non - itchy nose group)

4.3.2.2. Intervention result with sneeze symptom: The results of our research showed that nasal irrigation treatment had good effect to sneeze symptom. This was similar toresult of Vu Trung Kien (2013) in Thai Binh province which showed that before intervention, almost patients had the sneeze symptom (severity level was accounted for 66%). After intervention, sneeze symptoms rate were reduced to 85,1% (severity level 17,2%).

4.3.2.3 Intervention result with rhinorrhea symptom: The results of our research showed that nasal irrigation treatment had good effect to rhinorrhea symptom, This was similar toresult of Nguyen Giang Long (2018) in Nam Dinh & Song Hong garment factories. He claimed that when using Montelukast to treat allergic rhinitis caused by cotton dust, after treatment the severe level of runny nose symptom was gone, moderate level rate was reduced from 35,2% to 1,9%; mild level rate was decreased from 38,9% to 33,3% and non rhinorrhea symptom rate was increased from 16,7% to 64,8%. However in control group, the level of rhinorrhea symptom was decreased but not significant.

4.3.2.4.Intervention result with nasal congestion symptom: Using nasal irrigation combine with health education was brought good result with nasal congestion symptom. This is similar with Tomooka study (2000) when studied on the effectiveness of nasal irrigation. He found that the nasal congestion symptom was improved 23,6%. According to Vu Trung Kien (2013) in Thai Binh province when studied on 47 patient was intervented by Montelukast showed that after treatment, the rate of nasal congestion was reduced to 72,34%.

4.3.2.5. Intervention result with pale mucosa symptom: Using nasal irrigation combine with health education was brought good result, this

is similar Vu Trung Kien study (2013) was showed that before treatment, 68,1% patients had the pale mucosa symptom. After using antihistamine drug intervention, 52,3% patients had the normal mucosa and moderate level rate was reduced from 31,91% to 17,02%.

4.3.2.6. Intervention result with enlarger turbinate: In our research, intervention group had good result with enlarger turbinate symptom after intervention. This is similar toVu Trung Kien (2013) which showed that before treatment, 46,8% workers had hypertrophy turbinate symptom. After using antihistamine drug intervention, the hypertrophy turbinate rate was reduced to 19,2%.

4.3.3 Prick test result: Intervention group had the good result was accounted for 5,8%, fair result was 32,6%. In control group, the prick test results was remained as before intervention, the bad result was 98,8%. So that the intervention effect of intervention group was higher than control group ($p<0,01$). This is similar to Nguyen Giang Long (2018) which conducted on 54 workers of Nam Dinh textile factory.

CONCLUSION

1.The situation of AR caused by cotton dust in SAW

- The rate of AR was 36%. AR caused by cotton dust was 20,2%.
- Clinical and sub-clinical symptoms: Workers suffered from AR caused by cotton dust had symptoms of perennial AR: Itchy nose 93,8%; Rhinorrhea 97,7%; Sneeze 95,9%;Nasal congestion 91,3; Pale mucosa 66,9% and Enlarger inferior turbinate 69,8%. Pricktest results: Both grade II & III rate were 34,9%; Grade I 18%; Grade IV 12,2%.

2.The factors related to allergic rhinitis caused by cotton dust: The higher of senority was, the higher of incidence rate was. Workers had the personal and family allergic history had 2,72 and 2,48 time incidence rate higher than the others, in respectively.

3.The results of preventive intervention: Intervention by health education combine with nasal irrigation was bring good results in botth clinical and sub-clinical symptoms.

- Itchy nose symptom: Good result 12,8%; Non itchy nose group was increased to 19,7%. Sneeze symptom: Good result 13,9%; Non sneeze group was increased to 15,1%. Rhinorrhea symptom: Good result 11,6%; Non rhinorrhea group was increased to 15,1%. Nasal congestion symptom: Good result 8,1%; Non nasal congestion group was increased to 9,3%. Pale mucosa symptom: Good result 5,8%; Non-pale mucosa group was increased to 10,4%. Enlarger inferior turbinate symptom: Good result 2,3%; Non-enlarger inferior turbinate group was increased to 7,0%.

RECOMMENDATION

From the research results, we have the following recommendations:

1. For workers: Implementation and maintenance of nasal irrigation after work can prevent, minimize AR especially AR caused by CD.

2. For medical clinic: Improve the quality of periodic health check which can early detect AR, especially workers with allergic history and high senority. Maintain the health education and advice on doing nasal irrigation after work to prevent, minimize and treat allergic rhinitis, especially AR caused by cotton dust. Strengthen the management of AR workers and workers with allergic history.

3. For the employers: Provide adequate nasal irrigation tools to workers, especially those with AR or have nasal allergic history; relocate working position for workers with AR caused by cotton dust.