The Effect of Cotton Wool Dust on Peak Flow Meter (PEF)of Textile Factory Workers in Mosul

Kassim .M. Sultan*,Muhammed .W.AL.Obaidy *, Aziz Mohammed **

ABSTRACT :

BACKGROUND:

Byssinosis is a disease caused by long exposure to cotton, hamp, and flax dust, it differs from occupational asthma, it needs along period of exposure to develop and the worker gets adaptation on subsequent days after Monday chest tightness. The over all prevalence of byssinosis was 22.4%.Byssinosis needs at least 10 years to develop, the prevalence and severity increased with increasing duration of exposure to cotton dust. processing of cotton is more harmful to lungs, and this is due probably to high dust concentration, or the dust contains toxins and other organic substances which decrease in later manipulations.

OBJECTIVE:

To find out the prevalence of byssinosis among textile factory workers in mousel.

To through alight on the relationship between smoking and byssinosis among workers exposed to cotton wool dust. the relationship between duration of working in a textile factory and occurrence of byssinosis

PATIENT AND METHOD:

Two hundred and fifty Mosul Textile factory male workers , occupationally exposed to cotton dust, aged (22-65) years were randomly selected and were interviewed to get information about age, work duration, smoking habit, and about chronic cough, phlegm, wheeze and chest tightness, and workers were examined clinically, and special considerations attended to the chest. The workers involved in this study were in good health at the time of engagement to this work, and any worker with bronchial asthma, or other chest diseases were excluded. by history .Peaked expiratory flow (PEF) was carried out for all 250 workers by Right's Peak flow meter (W18416.Harlow, England).

RESULT AND DISCUSSION:

All of the workers were male their age ranged 22-65 years with mean age of 45.3 years, in those between 31-40 years the incidence was 10.8%, this increased to 49.3% in those whose age was over 51 years. The mean work duration was 18.2 years, ranged (2-44) years. The prevalence was 12.6% in age groups 10-19 year work duration, 47.2% in 20-29 years, and 49.2% in those over 30 year work duration. In age group 10-19 years work duration moderate cases of byssinosis was 4.7% and no any sever case and mean PEF 106%, while in age group over 30 year work duration there was 33.3% moderate and 7.9% sever cases of byssinosis and mean PEF 94.9%.increased prevalence and severity of byssinosis in sections where the dust concentration was high. In the weaving room 12%, were byssinotic, where the dust concentration was lowest, 25%, in spinning room where the dust concentration was higher, while in ginning room where the dust concentration is highest the prevalence was 41.8%. .

CONCLUSION:

We have shown that the prevalence of byssinosis is still high in MousalTexitle factory- Iraq. It is statistically estimated that the prevalence of byssinosis after 8 years will be 35.2%, the reason for this may be attributed to bad occupational safety measures..

KEYWORDS: byssinosis, peak expiratory flow rate.

INTRODUCTION :

The first known written account, however, is only from 1555, when the Danish bishop Olaus Magnus published his findings on threshers' disease. About 150 years later, the Italian physician Ramazzini in his book, De Artificum DDiatriba Morbis described respiratory disease among flax and hemp workers. 18th and 19th century physicians in Belgium, France, Italy, and the United Kingdom had noted the existence of a

*Medical Depart, College of Medicine, Baghdad University.

* *Medical city, Baghdad Teaching Hospital.

respiratory disease, peculiar to textile "workers. Proust deserves credit for introducing the name Recognition of byssinosis as an occupational lung disease has been delayed mainly because of the absence of characteristic physical and x-ray signs indicating pathological changes in the lungs. Until lung function tests became available for use in field surveys in the 1950s, the diagnosis was based only on the typical history of shortness of breath and chest tightness on the first day of the working week during dust exposure. The demonstration that these "Monday" symptoms" were usually accompanied by changes in lung function provided objective evidence of changes in the lungs during dust exposure. Subsequently, several studies showed that the lung function changes also occurred in persons who did not complain of symptoms during dust exposure. Epidemiological studies of workers exposed to cotton dust have been greatly encouraged by Schilling's development of a standard respiratory questionnaire, which has been tested for reliability and validity. Use of this questionnaire has revealed a worldwide prevalence of byssinosis and often an accompanying increase in bronchitis prevalence among cotton textile workers/[(1).]

The classical form of byssinosis is characterized by a feeling of chest tightness and difficulty in breathing which the worker experiences as being most severe on the first day of the working week, after a period of absence from work. The symptoms continue after the individual has finished work and may even progress during the evening. However, they are perceived as being less troublesome on subsequent days. The reason for this lessening of symptoms remains unknown. The affected worker will not experience the symptoms until he or she has worked for many years in the industry; indeed, it may be seen for the first time 25 years after starting to work in the industry and is rare in individuals continuously exposed for less than 10 years. This clearly distinguishes if from occupational asthma, and makes specific sensitization an unlikely cause"[(1)]

A lung function grading system has been used in addition to the clinical grading system. It is based on changes in FEV which is the measurement of lung function about which most is known. The acute effect is graded according to the degree of lung function loss during work exposure and the chronic effect according to the degree of permanent loss,- as percentage of the predicted value. The disadvantage of the lung function grading system is that it is based on relatively small absolute changes in FEV1during the work shift, and these changes are not necessarily are liable indicator of exposure effects..

Therapy for early stage byssinosis focuses on reversing airway narrowing Antihistamines may be prescribed to reduce tightness in the chest. Bronchodilators may be used with an inhaler or taken in tablet form. Reducing exposure is essential. Any worker who has symptoms of byssinosis or who has trouble breathing should transfer to a less-contaminated area-[(3)]The use of salbutamol, beclomethasone and sodium cromoglycate are necessary for symptomatic patient. However drugs are not substitute for prevention"[(9)]

Smoking, impaired lung function, and a history of respiratory allergy increase a textile worker's risk of developing byssinosis. Prolonged exposure makes patients wheeze more often and can cause chronic bronchitis. It does not lead to permanently disabling lung disease"[(6)]

Eliminating exposure to textile dust is the surest way to prevent byssinosis. Using exhaust hoods, improving ventilation, and employing wetting procedures are very successful methods of controlling dust levels to prevent byssinosis. Protective equipment required during certain procedures also prevents exposure to levels of contamination that exceed the current United States standard for cotton dust exposure"[(8)]

The most effective method is replacement of the natural fibers by synthetic ones; water washing reduces dust production significantly. Spraying of ripening cotton with bactericides and fungicides and treatment of row cotton with gaseous hydrogen chloride or acetic acid have been found to inactivate the active components in cotton bracts and dusts<(3)

PATIENT AND METHOD :

Tow hundred and fifty Mosul Textile factory male workers occupationally exposed to cotton dust, aged (22 -65) years were randomly selected and were interviewed to get information about age, work duration, smoking habit, and about chronic cough, phlegm, wheeze and chest tightness, and workers were examined clinically, and special considerations attended to the chest. The workers involved in this study were in good health at the time of engagement to this work, and any worker

with bronchial asthma, or other chest diseases were excluded.

Peaked expiratory flow (PEF) was carried out for all 250 workers by Right's Peak flow meter (W18416.Harlow, England).

The workers were examined on two occasions, first at the beginning of the week, while the workers are in the work and are exposed to the dust, and the second at the end of week before they enter the work, each time three readings were obtained for each worker and the highest level was depended, and the PEF value was corrected according to the age, height and sex.

The rule of determination of normal PEF is, (Height(m)} - {age x 0.019} x 6.58 = PEF Of male (Height (m)}x{ 6.23} - {age x 0.035} -1.88 = PEF of female

The cotton dust standard adopted by (OSHA) U.S Occupational Safety and Health Administration considers across work shift fall of 5% FEV1 [5], or of PEF [14] to be suggestive of byssinosis. The subjected workers were from three departments of factor contains 1- ginning room which contains the highest concentration of dust, 2-Spinning room which contains lower dust concentration, and 3-Weaving room, which contains the lowest dust concentration.

Dust concentration was not measured in this study, because this measurement was not available, but places roughly assumed to be high or low dust level from observations, and previous knowledge mentioned by most of references.

The workers were also divided in to smokers, non-smokers and Ex- Smokers. The smokers are subdivided in to A: 1-9 cigarette/day B; 10-19 cigarette/day C; > 20 cigarette/day

The workers were grouped according to the work duration A-1-9 years B-10 - 19 C-20 - 29and D- > 30 years.

The severity of byssinosis is graded according to clinical bases[10]

1-Mild when a worker experiences occasional dyspnoea.

2-Moderate when he suffers from typical Monday chest tightness with subsequent adaptation.

3-Sever ewhen he complains of symptoms and signs of chronic bronchitis.

Chest X-rays don't show changes specific to byssinosis (16), and was not carried out, and also other investigations weren't done because there has no any pathology been identified specific to byssinosis[5].

RESULTS:

All of the workers were male their age ranged 22-65 years with mean age of 45.3 years .There was no byssinosis before the age of 30 years, in those between 31-40 years the incidence was 10.8%, this increased to 49.3% in those whose age was over 51 years.

Table 1: Shows the relation of byssinosis with age.

Age Groups years	Total No.	No. of Affected	Incidence
21-30	45	0	0%
31-40	74	8	10.8%
41-50	56	11	19.6%
51-65	75	37	49.3%
Sum	250	56	22.4%

The mean work duration was 18.2 years, ranged (2 - 4 4) years. The prevalence was 12.6% in age groups 10-19 year work duration, 47.2% in 20-29 years, and 49.2% in those over 30 year work duration..

Table 2: Shows relation of work duration and byssinosis.

Duration Of	Total	No. of	Incidence
1-9	88	0	0% .
10-19	63	8	12.6%
20-29	36	17	47.2%
30>	63	31	49.2%
Over all	250	56	22.4%

In age group 10-19 years work duration moderate cases of byssinosis was 4.7% and no any sever case and mean PEF 106%, while in age group over 30 year work duration there was 33.3% moderate and 7.9% sever cases of byssinosis and mean PEF 94.9%.

Table 3: A- Relation of work duration to the severity

Work Duration years	Dyspnoea					
	Mild		Moderate		Severe	
	No.	%	No.	%	No.	%
1-9	-	-	-	-	-	-
10-19	3	4.7	5	6	-	-
20-29	4	11.1	11	30.5	2	55
30>	5	7.9	21	33.3	5	7.9
Sum	11		37		8	

Table 3: B, Mean PEF in relation to work duration.

/work duration year	Mean PEF	
	PEF before exposure	PEF after exposure
1-9	109.7%	108%
10-19	107.1%	106%
20-29	100.7%	96%
>30	99.8%	94.9%

Table (4) Shows increased prevalence and severity of byssinosis in sections where the dust concentration was high. In the weaving room 12%, were byssinotic, where the dust concentration was lowest, 25%, in spinning room where the dust concentration was higher, while in ginning room where the dust concentration is highest the prevalence was 41.8%.

Table 4: A -Weaving room.

Variables	.Total NO	No. of byssinosis	%
No. of byssinosis	108	13	12%
Main PEF	109.6%		

Table 4: B -Spinning room.

Variables	Total NO.	No. of byssinosis	%
No. of	99	25	25.2%
Main PEF	98%		

Table 4: C-Ginning room.

Variables j	| .Total NO	No. of byssinosis	
No. of byssinosis 1	43	18	44.44%
Main PEF	96%		

the prevalence and severity of byssinosis are higher in smokers than non-smokers. 2.9% of non-smokers were byssinotic, compared with 29.7% of smokers , meanwhile cough , and wheeze were higher in smokers than non-smokers as shown in table(5)a & b.

Table 5: A -Non-smokers.

Total No	Mea PEF %	No. Of Byssi.	%	Cough	Wheeze
131	106.2%	17	29	1399%	1291%

Table 5: B- Smokers.

Total No.	Mean PEF %	No.Of Byssin.	%	Cough	Wheeze
101	96.2%	30	29.7%	23	17
				22.7%	16.8%

A Significant number of workers revealed feeling of chest tightness without significant decrement or even very well PEF record, 12.4% of all workers reported chest tightness with normal PEF as shown in table (6).

Table 6: Those of chest tightness with normal PEF.

Smoking state	Total No	Chest tightness with Normal PEF	%
Non-Smokers	131	12	9.1%
Smokers	101	19	18.8%
Ex-smokers	18		-
Sum	250	31	12.4%

DISCUSSION:

The over all prevalence of byssinosis in our study was 22.4% , compared with 47% reported by Altai in Kut textile factory in 1983[16], there is great difference between the two results, and this difference may be attributed to that 35% of workers involved in our study have less than 10 years exposure to cotton dust, while in his study only about 7 % were from this age group.

We have found that the prevalence and severity of byssinosis increased with increasing work duration, the prevalence of 12.6% in those who have 10-19 years work duration, while it was 49.7% in those whose work duration was over 30 years P<0.01 which is highly significant, this is consistent with study reported by Abebe from Ethiopia in 1995[9], Our study also has shown that the severity of respiratory disability increased with increasing duration of exposure to cotton dust, similar results reported by Wali from Eygept in 1993[10]. In this study we have also shown that a minimum of 10 years period required for a worker in cotton dusty environment to develop byssinosis , and this is similar to that reported by Jone F. Murray[5], and others(2'4)7).

Regarding the effect of age to development of byssinosis, we have shown that there is increase in prevalence of byssinosis with increasing age, there was no byssinosis in workers with age group below 30 years compared with 41.3% in age groups more than 50 years this is consistent with results reported by Dr. Basil be attributed to increase in work duration with increasing age.

As far as dust concentration is concerned this study has shown that the prevalence, and severity of respiratory disability were higher in factory sectors where dust concentration was high, the prevalence was 12% in weaving room compared with 41.8% in ginning room P<0.01, while Altai reported 35% in weaving room, and 60% in ginning room[16] which is higher than our results, and this difference can be explained either by high percentage of workers who have less than 10 years work duration in our study, or the difference in dust concentration in both factories , or by both reasons.

This study has also shown that cotton dust inhalation caused more respiratory disability among smokers, 2.9 % of non-smokers were byssinotic compared with 29.7 % of smokers P<0.02 which is statistically significant. This is similar to results that has been reported by SU MY and co-workers in 2003[15], and Molyneux, and Tomblson in 1974[18]. The mechanism by which cigarette smoking potentiates the effect of cotton dust is through interference with bronchial clearance as reported by Merchant, Et, Al[17].

We have also found that a significant numbers of workers experienced feeling of chest tightness with normal PEF, this number was doubled in smoker group when compared with non-smokers, the reason for this chest tightness couldn't be explained.

CONCLUSION :

We have shown that the prevalence of byssinosis is still high in Mosul. It is statistically estimated that the prevalence of byssinosis after 8 years will be 35.2%, the reason for this may be attributed to bad occupational safety measures. The finding can be further elucidated when we compare the concentration of dust encountered in different textile factories in our country with that reported from other countries. Different studies showed dust concentration in Iraqi textile factories ranged from (33.3mg/m 3-73mg/m3)[13,16], compared with(0.5-1.6mg/m3)inChina[6].

Recommendation :

In order to reduce the prevalence of respiratory disability, the occupational safety measures should be improved,by renewing of old machines with new ones which are covered and dust exhausting, improving ventilation system, wearing of masks, and examination of the workers annually clinically, and by FEV1, and PEF, and removal of any one who found to be complaining of respiratory disability from high dust concentration environment.

In addition employees should be followed up from beginning of their engagement to this work, and this is done by having record of their clinical examination, and baseline of FEV1, VC, and PEF values, and be examined annually.

REFERENCES :

1. 2000 Work Safe Information Service Safety Line; [Last Updated Safe Western Australia]: 1998.
2. Mark,Smith.; Inhaled endotoxins and decreased spirometric values The NewEnglJ.ofMed. september3,1987;317:695-10.
3. D .Behara ,Text Book of Pulmonary Medicine, MD FCCP ,FNCCP, PICA .Fourth edition ,2010 :595.
4. Grofton & Douglos's ,Respiratory Disease, 5th edition,2008,P:871-3.
5. Jone. F. Murry.TextbookRespiratoryMedicine,Fourth edition,2008 ,Byssinosis, P; 1967.
6. Dr.D.Christiani,Occupational and Environmental Medicine BMJ M2003 \60 \P:935-94 .
7. Frank Espeizer ,Harrison's Prenciple of Internal Medicine , 17th' edition 2008, P:1467.
8. US National library &National Institutes of Health. Medical Encyclopedia. Byssinosis.
9. Yekoye, Abebe, Teshale Seboxa ,Byssinosis and other respiratory disorders among textile mill workers, Ethiopia Med.Jour. 33,195.
10. Hatem . F.Wali, Negem M.F. The effect of cotton textile , prevalence of byssinosis The New Egyptian Journal of Medicine vol.9,No.4,October,.1993:105.
11. Rosmarie M. Bowler, Occupational Medicine Secrets, Andly and Belfus Inc. 1999, India P: 103-19.
12. David A.Kaufman ,pulmonary &critical care medicine university of Pannsylvania 12/8/2001.
13. Hafidh Idan Dhahi Occupational Hazard and control management in textile industry ,submitted as part of requirement for diploma in public health. 1976.
14. Jan-Paul Zock , Dick Heederik, The effect of endotoxin-related acute PEF. Am. J. resp. critical care Med. Vol. 159 No. 1 January 1999 137- 142.
15. SU, YM , SUJR, Shen ,Additional effect of smoking and cotton dust exposure on resp. symptoms and pul. Function tests .Ird health, 2003, Apr.41(2) 109.
16. Dr. A.A Al-tai. Field study of byssinosis in the cotton textile factory KUT. Iraq. Univ. of London 1983.
17. Dr. Basil Khadher Assoufi. Lung Function Study in workers of some factories in Mosul area. Univ. of Mosul. Master 1979 .

18. Molyneux, and Tomblson .Relationship between dust level, and byssinosis, and bronchitis, in Lancashire cotton mills.Brit. J.Indust. Med. 28, 101.