Original Article

Prevalence of Chronic Obstructive Pulmonary Disease in Cotton Mill Industries Workers of the Miraj Taluka

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Abstract

Background: Chronic obstructive pulmonary disease is a preventable and treatable disease state characterised by progressive airflow limitation that is not fully reversible.It includes two main conditions-1.Emphysema 2.Chronic bronchitis.These are associated with fixed airway obstruction.Patients with COPD complaints of breathlessness,chest tightness,generalized weakness,fever & cough(with expectorations).

Materials & Methodology: Both male and female workers from cotton mill industries of Miraj Taluka who were aged between 35-45 were included in this study.Data was collected using COPD Assessment test (CAT) and PEFR.

Results: There were 54.17% workers who had a no obstruction with low impact of disease,30% workers showed mild obstruction with moderate impact of disease,15.83% workers showed moderate obstruction and high impact of COPD,and there were no workers who had severe obstruction of the airways.p value=0.1437

Conclusion: This study concluded that cotton mill industries of Miraj taluka showed that there were 54.17% of workers with no obstruction of airways.There were prevalence of mild obstruction of COPD in 30% of workers,moderate obstruction of COPD in the 15.83% of workers,also there were no workers with severe obstruction of COPD.

***Keywords**: COPD, Cotton mill workers, Miraj Taluka, COPD Assessment test (CAT) score, PEFR..*

Introduction

Chronic obstructive pulmonary disease is a preventable and treatable disease state characterised by progressive airflow limitation that is not fully reversible[1]. Chronic obstructive pulmonary disease is the fourth leading cause of death worldwide[2]. Prevalence of this disease in India lies between 6.6 to 7.7%[3].

It includes two main conditions-1.Emphysema 2.Chronic bronchitis.These are associated with fixed airway obstruction.long term occupational exposure to the organic cotton dust may lead to obstructive lung disease[4].Bacterial endotoxins present in the cotton dust may be a major causative agent contributing to the airway inflammation and obstruction[5].This endotoxins comes from the cell wall of Gram negative bacteria that grows on cotton.this particles causes alveolar injury results in local inflammatory reaction in the form of macrophages and B & T lymphocytes.Activated macrophages causes recruitment of neutrophils & also produces cytokines. These neutrophils causes liberation of protease & oxidants which injures type 1 pneumocytes.Cytokines leads to proliferation of type 2 pneumocytes.The result is inflammatory destruction of pulmonary parenchyma followed by fibrosis.Widespread destruction of alveolar capillary wall resulting in end stage lung[4-7].Thereafter patient starts complaining of breathlessness,chest tightness,generalized weakness,fever & cough(with expectorations).A very common effects of the exposure are clinical symptoms of bronchoconstriction & declined expiratory flow[8].Generalized weakness limits the patient's activities at work place and even the activities of daily living.The exposure length & type of work influences the respiratory morbidity among the workers.

This leads to the chronic illness and absenteeism at work place.

Materials and Method

An approval for the study was obtained from the institutional ethical committee.An observational study was conducted in the cotton mill industries workers of Miraj Taluka.Sample was achieved by simple random sampling method.A total of n=120 subject were included in study. All the subjects were screened for inclusion criteria i.e. Both males and females of age 35-45 years. Subjects excluded were those having neurological,musculoskeletal or cardiac disease,tuberculosis and uncooperative subjects. Subjects were briefed about the nature of the study. The demographic data including age, gender and occupation of the subject was collected through data sheet. Subjects were given written consent prior to the study.Data was collected using COPD Assessment test (CAT) and PEFR.

CHRONIC OBSTRUCTIVE PULMONARY DISEASE ASSESSMENT TEST (CAT)[9]: Correlation coefficient between SGRQ and CAT,r=0.8. this includes total 8 items scoring 40.Out of 40,the score is interpretated as 0-10 low(mild),11-20 as moderate,21-30 as high and 31-40 as very high impact of chronic obstructive pulmonary disease on the health of the workers.

PEAK EXPIRATORY FLOW METER[10-12]:Forced expiratory volume through the peak flow meter,indicating 300-201L/min as mild obstruction,200-101 L/min as moderate obstruction,whereas less than 100L/min as sever obstruction of the airways.

Findings

Data Analysis was performed with SPSS version 20.0.Chi square test for independence was done to check the association between,gender,peak flow rate and CAT score.

Table 1: Gender distribution of the Cotton Mill Industries Workers

Gender	Frequency	Percentage
Females	37	30.8
Males	83	69.2
Total	120	100

Table 1 shows that there were 37(30.8%) female subjects and 83(69.2%)male subjects in cotton mill industries workers.

Table 2: Age group wise distribution of the Cotton Mill Industries Workers

Age groups	Frequency	Percentage
35-40 years	82	68.3
41-45 years	38	31.7
Total	120	100

There were 82(68.3%) subjects between 35-40 years and 38(31.7%) subjects between 41-45 years of age in the cotton mill industries shown in table 2.

Table 3: CAT score and PEFR wise distribution of the Cotton Mill Industries Workers

CAT Score and PEFR	Frequency	Percentage
No obstruction	65	54.16%
Mild	36	30%
Moderate	19	15.83%
Severe	0	0%
Total	120	100%

According to CAT score and PEFR,65(54.16%) workers had no obstruction,36(30%) had mild obstruction,19(15.83%) had moderate obstruction,there were no workers with severe obstruction.

Table 4: Association between gender, peak expiratory flow rate and CAT score of the Cotton Mill Industries Workers.

Gender	Peak expiratory flow rate and COPD assessment test score								Chi square statistic	p value
	Normal		Mild obstruction		Moderate obstruction		Total			
	F	%	F	%	F	%	F	%		
Females	17	14.16	16	13.33	5	4	37	30.83	3.881	0.1437
Males	48	40	20	16.66	14	11.66	83	69.17		
Total	65	54.16	36	30	19	15.83	120	100.00		

Chi square test for independence was done to check association between gender, peak expiratory flow rate and CAT score of the cotton mill industries workers of Miraj taluka. P value=0.1437.

Table 5: Descriptive statistics of the age, PEFR, CAT score of Cotton Mill Industries Workers Miraj Taluka

Descriptive Statistics	N	Minimum	Maximum	Mean	Std. Deviation
Age	120	35	45	39.34	3.25
PEFR (L/min)	120	120	380	285.23	67.81
CAT Score	120	5	19	11.96	5.39

Table 5 showing that the minimum age was 35years and maximum was 45years,minimum PEFR was 120L/min and maximum PEFR was 380L/min,minimum CAT score was 5 whereas maximum score was 19.The mean age of workers was 39.34 years with 3.25 std deviation, mean PEFR was 285.23 and standard deviation was 67.81,mean CAT score was 11.96 and standard deviation was 5.39.

Discussion

The purpose of this study was to find out the prevalence of chronic obstructive pulmonary disease in the cotton mill industries workers of Miraj Taluka. Endotoxin is the disease leading source that grows in cotton[5].It causes pathophysiological changes that leads to the prolonged illness in the workers hence,this was done to analyze the number of subjects suffering from chronic obstructive pulmonary disease in the cotton mill

industries.

In our study,we included both male and female workers.Out of 120 workers,we found that female workers were 37(30.8%) whereas,the frequency of the male workers was higher than the female workers i.e.83(69.2%).There were 82(68.3%) who were having their age between 35-40 & 38(31.7%) were having age between the range of 41-45.We used the PEFR and COPD assessment test score as out come measures. According to the PEFR and CAT score,65(54.17%) workers had a no obstruction with low impact of disease,in which there were 48(40%) male workers and 17(14.16%)female workers.36(30%)workers showed mild obstruction with moderate impact of disease which was distributed as 20 (16.66%)male and 16 (13.33%) female workers,remaining 19 (15.83%) workers showed moderate obstruction and high impact of COPD,which was included 14(11.66%) male workers and 5(4%) female workers.there were no workers who had severe obstruction of the airways. P value=0.1437.This study has also found that the mean age of workers was 39.34 years, mean PEFR was 285.23 and mean CAT score was 11.96.

Important strengths of this study includes subjective assessment was done using COPD assessment test which is having,r=0.8 correlation coefficient with SGRQ.This questionnaire was administered by trained personnel in the native language of participants.we were able to find age as well as gender related differences as we have included both male and female workers in this study.

There are few limitations those should be considered for this study.We were able to include the workers from only two industries of Miraj taluka. Possible overlapping of the diagnosis such as byssinosis ,asthma ,other lung diseases and COPD may have affected the outcomes of this study.We were not able to take in any long term changes that are affecting the respiratory health of these cotton mill workers as this was a cross-sectional study.

A study conducted by Shi J showed that endotoxin exposure was significantly associated with chronic bronchitis and byssinosis[13].A report by DC Christiani has proved that the cotton dust is strongly associated with chronic airflow limitations seen in COPD[14].An analysis of pulmonary functions and respiratory symptoms by Bharat D concluded that there is significant decrease in spirometric parameters and increase in respiratory symptoms in the cotton mill workers of the Ahmedabad city in India[15].Similarly a statistical study done by Pandey S. has estimated that there was significantly low PEFR (Lit/min) in cotton spinning smoking workers as compared to normal healthy individuals[16].An exposure assessment done for the prevalence of lung related disease in cotton operatives (ginners) by H.Chaudhry postulated that the prevalence of chronic bronchitis and chronic obstructive pulmonary disease were 42% & 6% respectively among the exposed vs (0%) unexposed[17].

Conclusion

This study concluded that cotton mill industries of Miraj taluka showed that there were 54.17% of workers with no obstruction of airways.There were prevalence of mild obstruction of COPD in 30% of workers,moderate obstruction of COPD in the 15.83% of workers,also there were no workers with severe obstruction of COPD,hence the experimental hypothesis of prevalence of COPD in the cotton mill industries workers of Miraj taluka has proved.To protect the cotton mill industries workers from the cotton dust exposure that leading to the COPD,the personal protective equipments should be provided to the workers as well as curative and preventive measures need to be undertaken.

Conflict of Interest: None.

Source of Funding: Self.

Ethical Clearance: The ethical clearance was obtained from the Institutional Ethical Committee of College of Physiotherapy, Wanless Hospital, Miraj Medical Centre, Miraj

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