International Journal of Basic and Applied Medical Sciences ISSN: 2277-2103 (Online)
An Online International Journal Available at http://www.cibtech.org/jms.htm
2012 Vol. 2 (3) September- December, pp.51-57/Kulkarni et al.
Research Article

HEALTH PROBLEMS & LUNG FUNCTION TESTS AMONG COTTON TEXTILE WORKERS – A CROSS SECTIONAL STUDY AT A TEXTILE MILL

***S.K. Kulkarni, B.M. Kuril and M.K. Doibale**
Department of Preventive & Social Medicine
DR.S.C.G.M.C. Nanded, Maharashtra, India
**Author for Correspondence*

ABSTRACT
Recent industrialization and globalization has changed the occupational morbidity drastically. Cotton textile workers are susceptible to various morbid conditions by virtue of workplace and working conditions. The objective was to study health problems among cotton textile workers and to assess lung function by using computerized, portable 'MEDSPIROR' in textile mill workers. The present cross-sectional study was carried out among 298 permanent cotton textile workers in a Nanded textile mill from March 2008 to February 2009. Mean age of male and female worker was 48.05 and 53.8 yrs respectively. 93.62% of textile workers were males. The most common 138(46.30%) morbidity was iron deficiency anemia, followed by COPD 73(24.49%), dental caries 36(12.08%), bronchial asthma 33(11.07%), refractive error 33(11.07%), dental stains 32(10.73%), skin problems 32(10.73%). Comparison of smoking and COPD shows that COPD significantly associated with smoking as compared to non smokers (Chi sq. =5.55, d.f. =1 $p<0.05$ significant).

Key Words: *Cotton Textile Workers, Occupational Morbidity, Copd (Chronic Obstructive Pulmonary Disease) and Lung Function Test*

INTRODUCTION

Recent industrialization and globalization has changed the occupational morbidity drastically, the new pathologies like cancers, stress, AIDS, geriatrics, psychological disorders and heart diseases are on raise. With this new transition pose challenges to health care system with new concepts of environmental legislation, ethical issues, new safety regulation, insurance and high cost of health care (Agnihotram, 2005).

Government of India has launched "National Programme for Control and Treatment of Occupational diseases" in 1998-99. Occupational health has been included in National Health Policy 2002. The National Institute Of Occupational Health, Ahmadabad (ICMR) has been identified as the nodal agency (Kishore, 2007).

In India 58% employment is in agriculture. The employment in service sector is 22% and 14% in industrial sector. Worldwide, India is the second largest producer of textile goods. The Textiles sector is the second largest provider of employment after agriculture. The Indian Textiles Industry has an overwhelming presence in the economic life of the country. Currently, it contributes about 14 percent to industrial production, 4 percent to the GDP, and 17 percent to the country's export earnings. It provides direct employment to over 35 million people. Thus, the growth and all round development of this industry has a direct bearing on the improvement of the economy of the nation. (W H O 2005, annual report 2008-2009, Kishore 2007, Indian textile industry).

Cotton textile workers are susceptible to various morbid conditions by virtue of workplace and working conditions. These morbid conditions may range from anaemia because of nutritional deficiency to chronic respiratory diseases due to cotton dust inhalation (like bronchial asthma, byssinosis, chronic obstructive lung diseases etc) and varicose veins, low backache due to working postures. High prevalence of dental problems, skin problems, worm infestations are due to substandard personal hygiene (Tiwari *et al.,* 2003 & Tiwari *et al.,* 2001).

Considering the large number of textile industries with large no. persons employed in it and relatively less availability of information about the health problems amongst them and so with this background in mind the present was planned in an attempt to study the health problems, to determine type and degree of lung function changes cotton textile workers.

Objectives

The present cross-sectional study was carried to identify health problems and to assess lung function tests of workers. We planned the present study with the following objectives:

To study health problems among cotton textile workers.

To assess lung function by using computerized, portable 'MEDSPIROR' in textile mill workers.

MATERIALS AND METHODS

The present cross-sectional study carried out in a Nanded textile mill from March 2008 to February 2009. After explaining the nature and purpose of the study to the General Manager and Laborer's officer, present study was carried out with their due permission and co-operation. The study was approved by the ethical committee of Dr. S.C. Government Medical College & Hospital, Nanded.

This textile mill worked 6 days/week with a weekly off on Thursday. There were total 864 staff including managerial, clerical staff and security guards and cotton textile workers (temporary and permanent) engaged in various sections/departments of the mill where exposure to cotton fiber dust was direct . Workers directly exposed to cotton dust were included in the study. Other persons who were not directly exposed were excluded from the study like canteen provider, security guards /watchman and managerial/ clerical staff.

Permanent workers were those workers who were appointed by director of central government, working since 10 yrs and so their exposure was regular. Temporary workers were those workers who were appointed by contractor on the contract basis and they used to get change for 15-20 days in a month and so their exposure was irregular. Only permanent workers engaged in various sections were included. Total no. of permanent workers was 324. Out of which, finally 298 cotton textile workers were included in the study due to unwillingness to participate in the study, absence after repeated follow ups subsequently data was tabulated & analyzed later on.

Inclusion criteria for study

Permanent workers engaged in various departments like mixing, blow room, card room, frame and ring frame, winding etc.

Exclusion criteria for study

All temporary workers who used to get work change for 15 -20 days in a month and so their exposure was irregular.

Persons who are not directly exposed to cotton dust like canteen provider, security guards / watchman, managerial/clerical staff.

Not willing to participate, absence after repeated follow ups.

Workers were interviewed to obtain information about socioeconomic status, present and past occupational history, use of protective devices (PPD), and presenting complaints, past medical history, personal history especially about addiction, which is followed by clinical examination and laboratory investigations of cotton textile workers. Clinical findings are correlated with laboratory investigations. Blood pressure (B.P.) was recorded by auscultatory method using a mercury sphygmomanometer. Haemoglobin (Hb%) estimation and random blood sugar level was carried out. Lung function test (LFT) by spirometry was carried out. Thorough clinical examinations were carried out and anthropometric (Jelliffe, 1966) and blood pressure measurements (WHO, 1996) were done as per WHO guidelines. For classification of hypertension & anemia W.H.O. criteria were followed (Hutchison, 1997, Park, 2009, Manual of glucometer). Spirometry was done by using computerized, portable 'MEDSPIROR' in textile mill workers.

Research Article

Pilot study

Data was prospectively recorded in pretested proforma which was prepared from review of previous studies. The proforma was pretested on 30 workers during February 2008 to ascertain whether it needs modification in light of difficulties encountered. The proforma was modified likewise.

Occupational asthma is defined as, "variable airflow limitation caused by a specific agent in the work-place". The Industrial Injuries Advisory Council in Great Britain defined occupational asthma as, "asthma which develops after a variable period of symptom less exposure to a sensitizing agent at work". It is caused by an allergic or no allergic work-related injury/ inflammation of airways (e.g. trachea, bronchi, bronchioles) and is manifested by variable and work related airflow limitation and the presence of specific and/ non-specific airway hyper responsiveness. (WHO 1986, Tarlo 2008)

The working definition of COPD, as noted in the 2006 update of global initiative for obstructive lung disease (GOLD) guidelines, is that COPD is "a preventable and treatable disease with significant extra pulmonary effect that may contribute to the severity in individual patient. Its pulmonary component is characterized by airflow limitation that is not fully reversible. The airflow limitation is usually progressive and associated with an abnormal inflammatory response of the lungs to noxious particles or gases."

Chronic bronchitis and emphysema comprise the syndrome of COPD. Chronic bronchitis is defined by clinically by the American Thoracic Society and the United Kingdom research Medical Research council as "the production of sputum on most days for at least 3 months in at least 2 consecutive years when another cause of chronic cough has been excluded. Emphysema is defined as abnormal, permanent enlargement of the airspaces distal to the terminal bronchioles, accompanied by destruction of their walls and without obvious fibrosis. As with chronic bronchitis the definition of emphysema does not require the presence of airflow obstruction.

Diagnosis of COPD was based on Global initiative for Obstructive Lung Disease guidelines i.e. cough, sputum production, or dyspnea with history of exposure for risk factors (like occupational and environmental dust and for gaseous exposure, age, smoking etc.) and spirometry showing FEV1/FVC < 70% and FEV1 < 80% predicted with poor bronchodilator reversibility.

Classification of copd severity (according to the 2006 revision of gold criteria)

GOLD(MILD)	FEV1/FVC ≤0.70 and FEV1 ≥ 80% predicted
GOLD(MODERATE)	FEV1/FVC <0.70 and 80% FEV1≥50% predicted
GOLD(SEVERE)	FEV1/FVC<0.70and 50% FEV1 > 30% predicted
GOLD(VERY SEVERE)	FEV1/FVC <0.70 and FEV1 <30% predicted or FEV1 < 50% plus chronic respiratory failure

Persons with an FEV1/FVC ≥ 0.70 and respiratory symptoms of chronic cough and sputum production are no longer included as COPD stage (formerly GOLD stage 0). (COPD 2006)

Spirometry ***:-*** Spirometry is not done in 30 subjects.

Reasons are already diagnosed cases of COPD and asthma (08), known cases of ischaemic heart diseases (04), patients of severe anaemia (08), workers not given consent (10).

Statistical Analysis: Percentages and Chi-Square test were applied wherever necessary.

RESULTS AND DISCUSSION

Distribution of various morbidities amongst cotton textile workers reveals that most common 138(46.30%) morbidity was iron deficiency anaemia, followed by COPD 73(24.49%) , dental caries 36(12.08%), bronchial asthma 33(11.07%), refractive error 33(11.07%), dental stains 32(10.73%), skin problems 32(10.73%), acid peptic disease 17(5.70%), low back pain 27(9.06%), hypertension 13(4.02%) , diabetes mellitus 11(3.69%). In the present study, total of 567 morbid conditions were found among cotton textile workers giving an average of 1.9 morbid conditions per worker. As most of the subjects were belonged to lower socioeconomic class so they had poor purchasing capacity, lack education, ignorance of health status, smoking habits, worm infestations which may be responsible

directly/indirectly for a high prevalence of iron deficiency anaemia 46.30% and other morbid conditions because of nutritional deficiency. High prevalence of respiratory morbidity 35.56% was due to inflammatory and allergic response to inhaled cotton dust, working dusty sections, non use of personal protective devices and smoking habits, past tuberculosis history, unawareness about health status

Table 1: Distribution of Health Problems in Textile Workers as per icd-10[(5)] Coding

		Male	Female	Total
J00-J99	**Respiratory system**			
J 44.9	COPD	71 (23.82)	2(0.67)	73(24.49)
J 45.9	Bronchial asthma	31(10.40)	2(0.67)	33(11.07)
D50- D89	**Diseases of blood**			
D50.9	Iron deficiency anaemia	125(41.94)	13(4.36)	138(46.30)
K00-K93	**Gastro-intestinal system**			
K 12.0	Stomatitis	16(5.36)	0	16(5.36)
K13.0	Chelitis	7 (2.34)	0	7(2.34)
K02.9	Dental caries	31(10.40)	5(1.67)	36(12.08)
K03.6	Dental stains	28(9.39)	4(1.34)	32(10.73)
K25.7	Acid peptic disease	16(5.36)	1(0.33)	17(5.70)
K82.0	Worm infestation	9(3.02)	0	9(3.02)
K13.2	Leukoplakia	11(3.69)	0	11(3.69)
K40.9	Inguinal hernia	1(0.33)	0	1(0.33)
M00-M99	**Musculo-skeletal and connective tissue**			
M79.1	Myalgia	12(4.02)	2(0.67)	14(4.69)
M13.9	Osteoarthritis of knee	22(7.38)	2(0.67)	24(8.05)
M54.5	Low back pain	24(8.05)	3(1.00)	27(9.06)
L00-L99	**Diseases of skin**			
L30.9	Dermatitis	17(5.70)	1(0.33)	18(6.04)
L49	Fungal infection	8(2.68)	2(0.67)	10(3.35)
L86	Scabies	4(1.34)	0	4(1.34)
G40-47	**Circulatory system**			
I 10	Hypertension	12(4.02)	1(0.33)	13(4.02)
I 83.9	Varicose veins	2(0.67)	0	2(0.67)
I 84.9	Haemorrhoids	4(1.34)	0	4(1.34)
E00-E90	**Endocrine, nutritional and metabolic system**			
E 11.9	Diabetes mellitus	11(3.69)	0	11(3.69)
E 50.5	Vit. A deficiency	14(4.69)	0	14(4.69)
E 54	Vit. C deficiency	7(2.34)	1(0.33)	8(2.68)
H00-H59	**Diseases of eye**			
H52.7	Refractive error	29(9.73)	4(1.34)	33(11.07)
H25.9	Senile Cataract	3(1.00)	0	3(1.00)
Ear diseases				
H83.3	Noise induced hearing loss	9(3.02)	0	9(3.02)
H66.3	Chronic suppurative otitis media	2(0.67)	0	2(0.67)

resulting in chronic bronchitis and bronchial asthma. Varicose veins, low backache were due to long standing nature of job and working postures. Presence of skin problems, worm infestations suggests
Figures in parenthesis indicate percentages.Substandard personal hygiene, negligence about health. High prevalence of dental problems suggests a poor oral hygiene and smoking among seen in them only during shifts. Presence of hypertension (4.02%) and diabetes mellitus indicates lack of awareness of health,

smoking, obesity and stress factor. Kamat *et al.,* (1981) at Mumbai observed that prevalence of chronic bronchitis among cotton textile workers was 11-33%. Rajnarayan R. Tiwari et al (2001**)** researchers at Shri Bapurao Deshmukh Sut Girni Wardha, observed that most common morbid conditions among cotton textile workers were iron deficiency anaemia 52.7%, eosinophilia 19.8%, refractive errors 8.8%,chronic bronchitis 4.5%,hypertension 1.9%, amoebiasis 4.1%,upper respiratory tract infection 7.2%, dental caries 8.2%, dental stains 5.6%, allergic rhinitis 0.4%, acid peptic disease 1.2%.
Mishra *et al.,* (2004) at Pondicherry revealed that prevalence of chronic bronchitis was 17%. Jannet JV, Jeyanthi GP *et al.,* (2006**)** at Tirupur, India observed that 23.07% were chronic bronchitic symptomatics and 10.53% were occupational asthmatic symptomatic.

Table 2: Lung Function Test Patterns of Cotton Textile Workers

Pattern	Male	Female	Total
Normal	51(19.02)	8(2.98)	59(22.01)
Obstruction with good BDR	68(25.37)	4(1.49)	72(26.86)
Small airway	28(10.44)	1(0.37)	29(10.82)
Obstruction with poor BDR	40(14.92)	1(0.37)	41(15.29)
Mixed (obstruction +restriction)	57(21.26)	1(0.37)	58(21.64)
Restrictive	9(3.35)	0	9(3.35)
Total	253(94.40)	15(5.59)	268 (100)

Figures in parenthesis indicate percentages. (BDR: bronchodilator response)

Out of total 298 workers, spirometry was done in 268 textile workers due to contraindications to spirometry like severe anaemia, not giving consent etc. Pulmonary function test pattern distribution in cotton textile workers shows that 72(26.86%) workers, had obstruction with good BDR pattern followed by 59 (22.01%) having normal pattern, 45(21.64%) mixed pattern, 41(15.29%) had obstruction with poor BDR ,29 (10.82%) small airway disease pattern , and 9 (3.35 %) had restrictive pattern. Jannet JV and jeyanthi GP et al (2006) at Tirupur researchers observed that 61.5% had normal, 33.7% had obstructive, 0.9% had restrictive and 4 (3.8%) had mixed pattern.

Table 3: Relationship of COPD and Age

*Age group (yrs)	COPD	Non COPD	Total
< 30	0	0	0
30 – 34	0	0	0
35 – 39	0	35(11.74)	35 (11.74)
40 – 44	4(1.34)	36(12.08)	40 (13.42)
45 – 49	6(2.01)	74(24.83)	80 (26.51)
50 – 54	37(12.41)	53(17.78)	90 (30.53)
≥55	26(8.72)	27(9.06)	53 (17.78)
Total	73(24.49)	225(75.50)	298 (100)

** Age taken in completed years. Figures in parenthesis indicate percentages.*
(Chi. Sq =19.89, D.F. =1, p<0.05 significant)

Age wise distribution of COPD workers found that all workers 73(24.49%) with COPD were ≥ 40 yrs age group. Amongst workers those who were not having COPD only 35(11.74%) were < 40 yrs and 190 (63.75%) were ≥ 40 yrs. Comparison of workers as per age and COPD shows that COPD significantly associated with higher age (>40 yrs). (Chi. Sq =19.89, d.f. =1, p<0.05 significant.) Mishra AK , Rotti SB

et al (2004) in cross sectional study at Pondicherry observed that the risk chronic bronchitis was 7.6 times more for workers with age of ≥ 40 yrs compared to those with age <40 yrs (95% CI -1.9,29.9).

Table no. 4 Relationship of Smoking and COPD

Smoking habit	COPD	Non COPD	Total
Smokers	57(19.12)	142(47.65)	199(66.77)
Non smokers	16(5.36)	83(27.85)	99(33.22)
Total	73(24.49)	225(75.50)	298(100)

Figures in parenthesis indicate percentages. (Chi sq. =5.55 d.f. =1 p<0.05 significant)

Above table reveals that of 73(24.49%) workers with COPD, of which 57(19.12%) were smokers and 16 (5.36%) were non smokers. 57(19.12%) smokers 142 (47.65%) without COPD were having history of smoking and 83(27.85%) were not having history of smoking.
Comparison of smoking and COPD shows that COPD significantly associated with smoking as compared to non smokers. (Chi sq.=5.55 d.f. =1 p<0.05 significant). Mishra AK, Rotti SB *et al.,* (2004) in cross sectional study at Pondicherry observed that the prevalence of chronic bronchitis was 17%. The prevalence of chronic bronchitis was 26.5% among smokers and 11.9% among non smokers. The workers, smoking were also found to have 2.8 times (95% CI-1.8, 4.09) higher risk of development of chronic bronchitis.

CONCLUSION

Health education for maintenance personal hygiene, use protective devices, creating health awareness, health hazards of smoking should be given.

ACKNOWLEDGEMENT

The authors would like to thank all the workers for sharing their time for the interview & investigations and special thanks to Dr. B.M. Kuril madam for their valuable guidance & Dr. M.K. Doibale, our honourable professor & head of department for their constant inspiration & support.

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