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Research Article

Comparative Study of Peak Expiratory Flow Rate among Power Loom and Non Power Loom Workers in Rural Area in Salem District

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Abstract: The textile industry is one of the oldest and second largest industries in the world. So, power loom provides a major source of employment to the rural people in India. It also plays a magnificent role in the socio-economic development of a society. The power loom workers can be exposed to dust, generated from the textile products in various stages during the textile manufacturing process. Numerous epidemiological studies have documented decrements in pulmonary function and various other health problems associated with long-term air pollution exposure. The power loom workers are generally at risk due to constant exposure to different types of pollutants emitted from the industries. The study was designed to compare the peak expiratory flow rate among power loom and non power loom workers in rural area in Salem district. 500 subjects between the age group of 30-70 years who volunteered to enroll for the study were selected. It included 250 power loom workers and 250 non power loom workers. in a rural area in Salem district. Peak expiratory flow rate was measured by using Wrights peak flow meter. The result shows decreased PEFR in power loom workers compared to non power loom workers. This present study may be used to know the hazards of cotton exposure and this study may also be used to prevent the occupational hazards in Power loom workers by using the preventive measures of decreased exposure to work by shift method, proper ventilation, using mask while working time, and routine physical examination for every one year.

Keywords: Power loom workers, Non –power loom workers, Peak expiratory flow rate, Pulmonary function.

INTRODUCTION

India is a developing country with majority of its masses living in rural areas. Occupation is the one in which person not only earns daily bread but also spends one third of their life time.

According to World Health Organization (WHO), over 1000 million people in worldwide are employed in small-scale industries [1]. It is been estimated by the government of India that small-scale industries contribute 40% of the gross industrial value in Indian economy [2].

Health problems caused by the pollutants at the work environment of an individual are closely linked to the nature and level of exposure to these hazardous pollutants [3]. The power loom workers can be exposed to dust, generated from the textile products in various stage during the textile manufacturing process. The worldwide incidence of dust related disease byssinosis among workers in the dusty section of textile mills is nearly 40% [4].

Occupational pulmonary diseases are more widespread and more disabling than any other group of occupational disease. Different occupational pulmonary diseases asbestosis, silicosis etc. are influenced by the type of dust, duration of exposure and the concentration and size of airborne dust in the breathing zone [5-7]. Byssinosis is a most common restrictive lung disease occurring in powerloom workers caused by exposure to cotton fibres and flax dust at cotton and textile mills [8, 9]. Various other diseases like asthma and chronic obstructive pulmonary disease (COPD) also occur due to cotton dust exposure [10].

The cotton dust is an airborne dust. Its particles are variable in length. The smallest size of cotton fibre, is about 2 mm in diameter. All the particles with aerodynamic diameter more than 2 mm are deposited in the nose and pharynx. Particles between 3-10 mm in diameter are deposited in the tracheobronchial tree and particles between 0.1-3 mm are deposited in the alveoli.

Cotton dust consists of ground up plant matter, cotton contaminants, which may have accumulated during the growing, harvesting and subsequent processing or due to storage procedures [11]. The main sources of dust production in cotton mills where the mean annual dust exposure is above100 ug/m^3 are ginning room, blower room, card room and during spinning.

The excess decline in lung function can be expected at mean cotton dust exposure of 200 ug/m^3 annually and exposure must be reduced to 100 ug/m^3 annually in order to prevent dust related decline in the lung functions [12].

Exposure to cotton dust in industrial environments causes an inflammation in the airways [13]. Short term exposure to cotton dust has caused bronchitis and acute Byssinosis (called "brown lung disease" or "Monday fever"), a reversible respiratory disease produced by inhalation of cotton dust. Chronic exposure causes lung airway obstruction (reduces ventilator capacity) and has lead to disability and premature death [14].

PULMONARY FUNCTION TESTS

Tests that could assess the function of the pulmonary system are called pulmonary function tests (PFT) or the standardized measurement for assessing the presence and severity of respiratory dysfunction is pulmonary function test. PFT offer the best hope for early detection of COPD and for objective documentation of the severity of occupational lung disease. Assessing pulmonary function is a simple standardized techniques that can be performed rapidly and accurately to detailed methods that are time consuming. Respiratory problems can be detected by using an instrument called Wright's peak flow meter. By using this instrument, we estimate the peak expiratory flow rate (PEFR) which is the important screening test for detecting the obstructive lung diseases [15].

MATERIALS AND METHODS

In the study 500 subjects between the age group of 30-70 years who volunteered to enroll for the study were selected. It included 250 powerloom workers and 250 non powerloom workers. The study was done in a rural area in Salem district. Written informed consent was taken from all the subjects. Institutional ethical clearance was obtained before starting the study. A detailed history consisting of name, age, sex, socio economic status, duration of work and smoking habits were taken from the subjects.

Inclusion criteria

Age group between 30-70 years of genders and in both power loom & non power loom workers

Exclusion criteria

Age <30yrs &> 70 years, H/O smoking and known respiratory illness.

Wright's Peak Flow Meter

Wright's Peak flow (WPF) meter is an instrument, introduced by Hadorn in 1942 .This instrument is used to measure PEFR for physiological studies, and found to be suitable .It is an accurate, rugged, and portable instrument. The instrument is a light plastic cylinder measuring 15X5 cm and weighing 72 g (without mouth-piece). It consists of a spring piston that slides freely on a rod within the body of the instrument. The piston drives an independent sliding indicator along a slot marked with a scale graduated from 60 l/min to 800 I/min. More recently, a number of Mini peak flow meters have been introduced (range usually 60–800 lpm for adults and 60–400 lpm for children). The indicator records the maximum movement of the piston, remaining in that position until returned to zero by the operator. In use the machine must be held horizontally with the air vents uncovered. The subject was asked to stand straight and comfortable. Proper instruction was given to the subject and the subject was asked to inspire maximally and put their maximum effort during expiration and breathe out maximally into the peak flow meter with nose clipped. The readings were taken in standing position. PEFR was recorded thrice and the highest of three readings were taken in lit/min [16].

RESULTS

Comparison on PEFR among power loom and non powerloom workers

This table shows PEFR decreased in powerloom workers when compared non powerloom workers which is statistically significant ($p=<0.0005$).

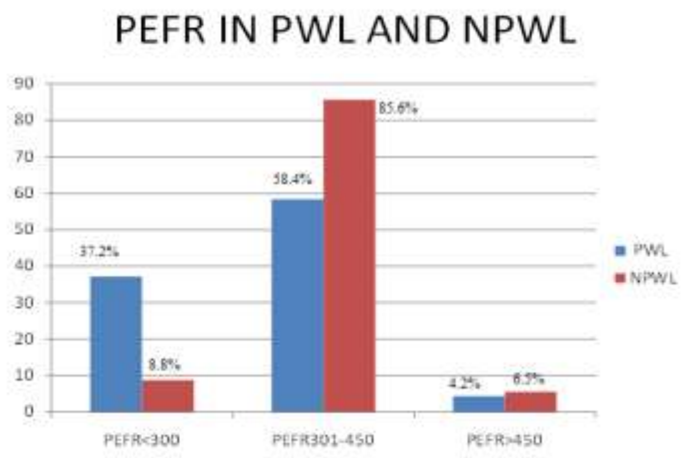

Fig. 1: Shows the comparison between the PEFR among power loom and non power workers.

DISCUSSION

Peak Expiratory Flow Rate (PEFR) is the maximum rate of air flow achieved during a forced expiration following a maximal inspiration. By definition, it is "The largest expiratory flow rate achieved with a maximally forced effort from a position of maximal inspiration, expressed in liters/min" [17]. Many indices are available for monitoring thr ventilatory function in man. Among them the peak expiratory flow rate (PEFR) is probably the only index that can be measured simply and reliably. Thus, it is a popular index for monitoring the ventilatory function of asthma patients at home [18].

A survey of Kandaswamy V on occupational hazards faced by workers at the textile industries in Tirupur, Tamilnadu had revealed that that most of the workers and family members suffer from either asthma, allergy, TB or from frequent attacks of cold [19].

Study of Hussain G *et al*. [20] on "comparative study of peak expiratory flow rate in cigarette smokers and non smoker of Lahore district" have revealed that smoking decreases the PEFR value. So in our study excluded the smokers.

David Fishwick *et al*. had done a study on "Lung function in Lancashire cotton and manmade fibre spinning mill operatives". He explained that PEFR is decreased when there is increase in years of exposure [21].

The initiation and the severity of symptoms and impaired pulmonary function seem to be associated with the magnitude of the dust level. Mill workers employed in the initial processing units of the cotton mill, develop the lung function impairment. This is particularly true when the fibre is of low quality and/or contains much dusty material.

Dust has an effect on PEFR. It is probably because of the hypertrophy of mucosal cells due to irritation by dust that results in increased secretions of mucus and formation of mucosal plugs and causing the obstruction to the exhaled air [22]. .

CONCLUSION

This present study may be used to know the hazards of cotton exposure and this study may also be used to prevent the occupational hazardous diseases by using the preventive measure of decreased exposure to work by shift method, proper ventilation, using mask while working time, and routine physical examination for every one year.

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