International Journal of Applied Research 2021; 7(8): 01-03

ISSN Print: 2394-7500
ISSN Online: 2394-5869
Impact Factor: 8.4
IJAR 2021; 7(8): 01-03
www.allresearchjournal.com
Received: 10-05-2021
Accepted: 03-07-2021

Rushikesh Sanjay Pawar
Intern of LSFPEF's COP, LSFPEF's College of Physiotherapy, Nigdi Pradhikaran, Pune, Maharashtra, India

Dr. Pallavi Chicholikar
Associate Professor of LSFPEF's OP, LSFPEF's College of Physiotherapy, Nigdi Pradhikaran, Pune, and Maharashtra, India

Corresponding Author:
Rushikesh Sanjay Pawar
Intern of LSFPEF's COP, LSFPEF's College of Physiotherapy, Nigdi Pradhikaran, Pune, Maharashtra, India

Peak expiratory flow rate in printing press workers exposed to powder toner: An observational study

Rushikesh Sanjay Pawar and Dr. Pallavi Chicholikar

Abstract
Aim: To check peak expiratory flow rate in printing press workers exposed to powder toner.
Procedure: An observational study done on 100 Printing Press Workers. Peak expiratory flow rate was taken and the predicted PEFR was calculated from given equation.
For Males: PEFR = -1.807(Age) + 3.206(Height)
Result: Out of 100 printing press workers, 32 workers are in Green zone, 68 workers are in Yellow zone and, 0 workers in red zone.
Conclusion: Data analysis shows that out of 100 subjects PEFR values are reduced in 68 workers.

Keywords: Printing press workers, respiratory disease, work related respiratory disorder

Introduction

The modern definition of occupational health is "the promotion and maintenance of [8] highest degree of physical, mental and social well-being of workers in all occupation. It is observed that substantial economic losses are incurred by health and safety hazards at work and the reduction or loss of working capacity. Possible harmful effects of inhaled photo copier toner dust have been a matter of concern since the publication of several case reports suggested the existence of toner related pulmonary disorders.

However, little evidence is available regarding the potential health risk associated with toner dust inhalation in occupational and general home environments where photocopier machines and laser printing devices are in use. The specific polymer used varies by manufacturer but can be a styrene acrylate copolymer, a polyester resin, a styrene butadiene copolymer, or a few other special polymer. Originally the particle size of toner averaged 14-16 micrometers or greater. To improve image resolution, particle size was reduced eventually [10] reaching about 5-10 micrometers for 600 dots per inch resolution.

Powder toner dust contain hazardous substances like respiratory irritants, systematic toxins, complex particulate matter. Exposure of substances like systemic toxins affects the parts of the body then the organs'.

It has been observed that respiratory irritants contains the substances which is source for non-specific inflammation of the lung." It has been observed that particles act as vehicles of absorbed toxicants into the [10] respiratory tract. Respiratory tract contains nasopharyngeal region, trachea, bronchi, bronchioles and alveoli. Particles between 5-30 micron affected on the nasopharyngeal region. Particles between 1-5 micron affected on the large airways of the trachea, bronchi and bronchioles. Particles smaller than 1 micron affected the alveoli. The peak expiratory flow rate is measured with help of Standardized Peak Flow Meter. Peak flow meter device is designed to indicate the greatest expiratory flow rate. Peak expiratory flow rate is a person's maximum speed of expiration. Peak expiratory flow has been correlated with age, height, and body surface [4] area" [14]. Normal values in adults range from 400-1200 L/min. For lung functions peak expiratory flow rate (PEFR) is the simplest appraisal. Peak expiratory flow rate indicates severity of airflow limitation. "Peak expiratory flow meter (PEFM) is a device used to measure Peak expiratory flow rate (PEFR). Peak expiratory flow meter (PEFM) is a simple, easy to handle and inexpensive device. It has diagnostic and prognostic value in patients with airway disease [14, 18] (Reliability 0.90) [19].

NEED of study

The workers working in various printing press have exposure to toner dust and thus are at risk of compromised respiratory function. Exposure to toner dust has also been associated with a systemic inflammatory response further leads to airway inflammation.

This study is done to analyze the effect of powder toner on respiratory health and spread awareness about the various pathological respiratory condition to the workers and improve the quality of life.

Previously there has been many researches done on various populations like chefs, fire fighters, singers. But there is no research done on printing press workers. Thus, there is need to evaluate Peak Expiratory Flow Rate in printing press workers.

AIM: To check peak expiratory flow rate in printing press workers exposed to powder toner.

Objective: To check peak expiratory flow rate in printing press workers exposed to powder toner using peak flow meter using Wright's Peal Flow Meter

Methodology: Present study was an observational study. Subjects were selected by purposive sampling from printing press workers from Solapur. Subjects were enrolled in the study after their detailed evaluation of medical history. Subjects with known cardiovascular illness, allergic asthma and recent surgeries were excluded. Those with age 25-35 and minimum 5 years of experience were included in history.

Outcome measure: Peak expiratory flow rate by Wright's Peak flow Meter.

Procedure

Ethical approval was taken from the ethical committee.

Subjects was chosen on the basis of the inclusion and exclusion criteria. The participants had explained about how the test will be performed. The test then be performed with 3 readings. The best of [3] for each of the subjects had considered and recorded [2] Predicted PEFR was calculated from equation –

Equation- For Males- PEFR = -1.807(Age) + 3.206(Height)
Data was analyzed for results.

Data analysis and Result

PEFR in printing press workers:- The diagram shows that
Out of 100 printing press workers 32 workers are in Green zone and 68 workers are in Yellow zone and 0 workers in red zone.

Fig 1: Data analysis and Result

Table: Data analysis and Result

PEFR	Subjects	Percentage%
Green		
Zone	32	32%
Yellow		
Zone	68	68%
RED		
ZONE	0	0
Total	100	100%

Discussion

The present study was designed to assess the PEFR in printing press workers exposed to powder toner dust in Solapur district. During this study we found that average actual value of subject is decreasing as compared to average predicted value. This study was conducted in 100 printing press workers and we found that 32 workers are in green zone, 68 workers are in yellow zone, and zero workers are in red zone of PEFR. According to personal best value there are three zones of PEFR.

Green Zone (Stable): Peak flow rate is between 80% to 100% of personal best. As long as no symptoms are present, the patient is considered at study state.

Yellow Zone (Caution): Peak flow rate is between 50% to 80% of personal best. Measurement in this zone are sign that your large airways are starting to narrow. Patient may start to have mild [18] symptoms.

Red Zone (Danger): Peak flow rate is less than 50% of your personal best. Patient may have severe symptoms [18].

PEFR is a person's maximum speed and amount of expiration, as measured with peak flow meter. A peak flow meter is a small hand-held device used to monitor a person's ability to breathe out air. PEFR measurement by peak flow meter is an easy way to access lung expiratory capacity and ventilatory functions of the subject [18, 14].

Printing press workers have average lung function due to exposure of respiratory irritants, systemic toxins, complex particulate matter. Printing press workers have more respiratory symptoms as the filtering mechanism of lung become overloaded and get damaged once they are damaged by various bacteria, viruses etc. [16]. With regards to the health effect of toner dust, in 1994 the first case was reported as a toner –induced health effect. This was followed by case reports on sarcoidosis, allergic rhinitis, and asthma. These reports raised concern about the health effects associated with toners and copy printers [9].

Conclusion

This study shows that out of 100 subjects PEFR values are reduced in 68 workers. 2) Hence we can conclude that PEFR values of workers are reduced due to inhaling the powder toner.

Limitation of study 1: It is not done comparing other occupations compromising respiratory symptoms. Working experience of printing press workers was not considered.

Recommendation and scope of study

1) PEFR should be assessed and monitored periodically in printing press workers.
2) PEFR monitoring along with Exercise protocol should be given to the printing press workers.
3) In future pulmonary function testing should be done.

References

1. Amar Taksande, Manish Jain. “Peak expiratory flow rate of rural school children from Wardha district, Maharashtra in India.
2. Kodgule RR *et al*. J Postgrad; Reference values for peak expiratory flow in Indian adult population using a European Union Scale peak flow meter.
3. by Frans Greven, Josh Rooyackers, Huib Kerstjens, Dick Heederik Respiratory symptoms in fire fighters” in a American Journal of Industrial Medicine 2011.
4. Bhardwaj P *et al*. Effect of age and body mass index on peak-expiratory flow rate in Indian population 2014.
5. Brandt-Rauf PW, Fallon LF *et al*. At New York on "Health hazards of firefighters: exposure assessment", in a British Journal of Industrial Medicine. Two Buffalo, New York 1987.
6. Padaki Samata K, Dambal Amrut, Kokiwar Prashant. “Peak expiratory flow rate in asymptomatic male workers exposed to chemical fumes, in various industries of Hyderabad 2014.
7. Miedinger D, PN Chhajed D, *et al*. at Switzerland, on "Respiratory Symptoms, atopy and bronchial hyperactivity in professional firefighters". In European Respiratory Journal, Comparative study and PARK’S textbook of Preventive and social medicine. 22 edition. 2007.
8. Niina Terunuma, Kazunori Ikegami, Akira Ogami. All on A Cohort Study on Respiratory Symptoms and Diseases Caused by Toner-Handling work: Longitudinal analysis from 2013.
9. Zainab Abdulateef N, Adel H. Talib in 2016 “Impacts of Printing Presses Emissions upon Occupationally Exposed Workers Health.
10. Bandyopadhyay A, Basak AK, Tripathy S, Bandyopadhyay Posk P. Epizory How rate in female brick-field workers of West Bengal, Indie year 2006.
11. Robert Wilkins L, James Stoffer K, Craig Scanlan. Egan's Fundas Respiratory Care 8th edition: Chapter 17 Pulmonary Function Test.
12. Ibhazehiebo Dimpka K, Uche U, Lyawe OK, Peak VI. Expiratory Flow Rate and Respiratory Symptoms Following Chronic Domestic Wood Smoke Exposure is Women in Edo. Nigeria: African Journal of Biomedical Research 2007, 10.
13. Donna Frownfelter, Elizabeth Dean Cardiovascular an Pulmonary Physical Therapy edition.
14. Ahmed A, Al- Taweel *et al*., Peak expiratory flow rate in a sample of normal Saudi males at Riyadh, Saudi Arabia in Journal of Family and Community Medicine, 1999.
15. Zainab Abdulateef N, Adel Talib H. Conducted study on “Impact of printing press emissions upon occupationally exposed workers health.
16. Petey Laohaburanakit, Andrew Chan. On “Obstructive Sarcoidosis.
17. De Vrieze BW, Modi P, Giwa AO. Peak Flow Rate Measurement.
18. Peak Expiratory Flow Rate (PEFR)-A Simple Ventilatory Lung Function Test by Mridha MAA, Amin MR, Kabir ARML.