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Physiotherapy

A STUDY TO FIND OUT AN IMMEDIATE EFFECT OF RESPIRATORY MUSCLE STRETCHING ON PEFR IN CEMENT FACTORY WORKERS – AN EXPERIMENTAL STUDY

Dr. Sarfraj Khan	Principal Shri Usb College Of Physiotherapy, Aburoad
Riddhi Bhatt*	B.P.T Student Shri Usb College Of Physiotherapy, Aburoad *Corresponding Author
Harmisha Kanpariya	B.P.T Student Shri Usb College Of Physiotherapy, Aburoad

ABSTRACT **Context:** Exposure to cement dust has long been associated with the prevalence of respiratory symptoms varying degrees of of airway obstruction and reduction in lung function. It may also lead to acute post-work reduction in Peak Expiratory Flow (PEF).

Aim: A study to find out an immediate effect of respiratory muscle stretching on PEFR in cement factory workers.

Settings and design: The interventional study was carried out in various cement factories of aburoad.

Method and materials: Respiratory muscle stretching technique was given to 30 subjects. Also, the inclusion and exclusion criteria were taken into consideration.

Statstical analysis: Data was analysed by using SPSS version 20. Wilcoxon signed-rank test was used for the pre treatment & post treatment comparison of PEFR within the group.

Result: Statistically is significant ($p<0.05$) effect of respiratory muscle stretching technique in cement factory workers.

Conclusion: There is significant effect of respiratory muscle stretching technique in cement factory workers. Therefore, the respiratory muscle stretching technique can be use to improve PEFR in cement factory workers.

KEYWORDS : Respiratory muscle stretching, PEFR, cement factory workers.

INTRODUCTION

Occupational respiratory disease can be defined as an acute or chronic disorder that arises from the inhalation of air-borne agents in the work place. Subjects with workplace exposure to organic dust have high prevalence of respiratory diseases. The diseases of the respiratory system induced by occupational dusts are influenced by the type of dust and duration of Exposure.[1]

Every year, there are 50 million cases of occupational respiratory diseases caused by inhalation of toxic dust and chemicals, which are allergenic and carcinogenic agents.[2] Environmental and occupational pollution has always been a major cause of morbidity and mortality.[3]

Cement manufacturing is one of these industries. Cement is one of the most widely used construction material on earth. Because cement has been used commonly, its health effects have become an important issue both for employees and the environment. In addition to the various health hazards, cement workers are especially exposed to dust which causes lung function impairment, chronic obstructive lung disease, restrictive lung disease, pneumoconiosis and carcinoma of the lungs, stomach and colon at various production process such as quarrying, crushing, raw material grinding, blending, kiln burning, cement grinding and packaging in cement industry. Cement is a fine powder that consists of a mixture of hydraulic cement materials comprising primarily calcium silicates, aluminates and aluminoferrites. More than 30 raw materials, which are divided into four basic categories (calcium, silica, alumina, iron), are known to be used in the manufacture of portland cement.[4]

Dust within the size range of 0.5 to 3 micron, has a health hazard producing, after a variable period of exposure, a lung disease known as a pneumoconiosis, which may gradually cripple a man by reducing his working capacity due to lung fibrosis and other complictions. Particles between the o.5 to 3 micron are the more dangerous because the reach the interior of the lungs with the ease. The longer the duration of exposure, the, greater the risk of developing silicosis. This particles ingested by phagocytes which accumulate and block the lymph channels. Pathologically silicosis characterized by a dense nodular fibrosis the nodules ranging from 3 to 4mm in diameter with more advance disease, impairment of total lung capacity(TLC) is commonly present.[5]

PEAK EXPIRATORY FLOW METER

Wright"s Peak flow (WPF) meter is an instrument, introduced by Hadron 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 alight 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 l/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.[6]

NEED OF THE STUDY

One of the major work related illnesses is occupational lung disease that is usually induced by extended exposure to irritating or toxic substances. In developing countries millions of people work daily in dusty environment, especially in cement industry. Physiotherapy can be beneficial to check the detouring condition of the workers and decrease the further health consequences. There are many ways to reducing respiratory problems but very few techniques give an immediate result.

Respiratory muscle stretching are efficient methods for improving respiratory functions. However, even though stretch exercise increase both respiratory muscle activation and chest expansion. Many studies have been conducted on cement factory workers. But no study has been conducted for the respiratory function for cement factory workers. So, this study is an effort to find out the immediate effect of respiratory muscle stretching on PEFR in cement factory workers

AIM OF THE STUDY

The aim of study is to find out an immediate of respiratory muscle stretching on peak expiratory flow in cement factory workers.

OBJECTIVES OF STUDY

- To assess the pre respiratory muscle stretching on peak expiratory flow in cement factory workers.
- To assess the post respiratory muscle stretching on peak expiratory flow in cement factory workers.

- To assess the difference between pre and post respiratory muscle stretching on peak expiratory flow rate in cement factory workers.

HYPOTHESIS

- **NULL HYPOTHESIS:** Respiratory muscle stretching is not an effective technique on peak expiratory flow rate in cement factory workers.
- **EXPERIMENTAL HYPOTHESIS:** Respiratory muscle stretching is an effective technique on peak expiratory flow rate in cement factory workers.

MATERIALS AND METHODOLOGY

- **STUDY SETTING:** Shri U.S.B. College of Physiotherapy, Abu Road.
- **SOURCE OF DATA:** Various Cement Factories at Abu Road.

METHOD OF COLLECTION OF DATA:

- **STUDY POPULATION:** Cement Factory Workers.
- **SAMPLE SIZE:** 30 Cement Factory Workers.
- **SAMPLING METHOD:** Convenient sampling.
- **STUDY DESIGN:** An Experimental study.

MATERIAL

- Peak expiratory flow meter
- Consent form
- Assessment form
- Treatment table
- Tissue paper
- Antiseptic solution
- Inch tap
- Weight machine
- Pulse oxymeter

CRITERIA FOR SELECTION:

Inclusion Criteria:

- Male
- Smoking
- Tobacco chewing
- Alcohol consumption
- Non use of protective device
- Work experience 10 or more than that

Exclusion Criteria:

- Female
- Participants with other form of neurological impairments.
- Participants with other form of congenital impairments.
- Participants with any COPD conditions.
- Participants with any chest deformity.
- Participants on medications.
- Uncooperative participants.

MEASUREMENT PROCEDURE

Peak expiratory flow meter was used for measuring ventilator function. Each participant was tested their maximum expiratory capacity through peak flow meter before and after the respiratory muscle stretching. It is a small portable device with a mouth piece and calibrated scale in liters per minute.

Before the procedure proper instruction were given to the subjects for using peak expiratory flow meter Subject were asked to stand upright maximally and then blow out fast as they as can into mouthpiece of flow meter by locking the mouthpiece with lips to avoid leakage of air.The procedure was repeated 3 times at interval of 2 minutes and the best recording was taken by only one researcher to avoid human error.

Each time the mouthpiece was disinfected with the antiseptic solution to avoid cross infection. Anthropometrical parameters (height in cm, weight in kg, BMI in kg/ liters) cardio respiratory parameters like respiratory rate [in breaths/min], pulse rate [bpm] spo_2 [in%] by pulse oxymeter, PEFR [in liters/min] by peak flow meter.

RESPIRATORY MUSCLE STRETCHING

PROTOCOL FOR RESPIRATORY MUSCLE STRETCHING:
Respiratory muscle stretching were performed passively by a therapist. Subjects were placed in the supine or lateral position, knees bent to correct the lumbar curve, with repositioning of the scapular waist as well as scapular and arm abduction in order to prevent postural compensation. Stretching was performed bilaterally as follows :

Upper trapezius: patient in supine position with lateral flexion of the head to the opposite side of that stretched, the therapist supported the occipital region with one hand and the shoulder with the other hand, causing displacement of two support points in the cranio-caudal direction.[7]

Sternocleidomastoid: patient in supine position with lateral flexion with rotation of the head to the opposite side of that stretched; the therapist placed one hand on the occipital region and the other on the sternal region, which was displaced in the cranial-caudal direction.[7]

Scalene: patient in supine position, with one hand on the occipital region and the other on the sternum region, the therapist promoted displacement of the two support points, in opposite directions.[7]

Pectoralis major: patient in supine position, on the side to be stretched, the patient s arm was abducted, forearm flexed and hand resting on the occipital region. The displacement was performed with one of the therapist‟s hands on the upper third of the arm and the other on the lateral region of the upper chest, following the direction of muscle fibers.[7]

Intercostal: patient in supine and lateral position on a half moon-shaped foam roller in the infra-axillary region, forearms flexed and hands resting on the occipital region; the therapist used both palmar region hand‟s to mobilize the ribs in the craniocaudal direction.[7]

Stretching occurred during the expiratory phase, with two sets of ten consecutive incursions for each muscle and a one-minute interval between the series. For intercostal muscles stretching, a side stretch was performed in lateral decubitus at the moment of inspiration and the ribs were monitored during expiration. The intervention took 20 min in total.[7]

RESULT

All statistical analysis was done by SPSS statistics version 20.0 for windows software. Wilcoxon signed rank test was used to find out effect of respiratory muscle stretching on PEFR in cement factory workers.

Total 30 subjects were taken. (n=30)

Table 5.1: Intra-group comparison of mean and SD of pre-data, post-data and difference.

	MEAN	SD
PRE-DATA	301.73	53.49
POST-DATA	383.80	57.91
DIFFERENCE	82.07	4.42

Graph 5.1: Intra-group comparison of mean and SD of pre-data, post-data and difference.

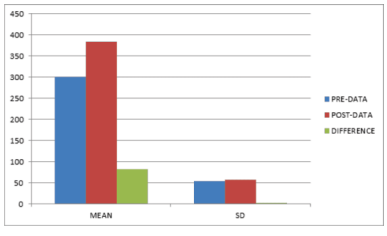
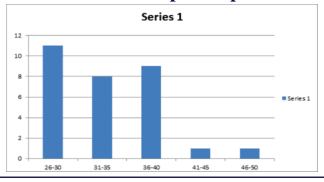


Table 5.2: Age distribution of the participants.

AGE	PARTICIPANTS
26-30	11
31-35	8
36-40	9
41-45	1
46-50	1
TOTAL	30

Graph 5.1: Age distribution of the participants.



Interpretation: The above Table 5.2 and Graph 5.1 show the age distribution in
age (year).

Wilcoxon sign rank test was used for pre treatment and post treatment comparison.

	Z	P
PEFR	-4.789[b]	0.00

INTERPRETATION:
The above Table 5.4 shows the result of Wilcoxon sign rank test which shows there was significant different between the pre and post peak expiratory flow rate after giving respiratory muscle stretching.

DISCUSSION
The intent of the study was to find out an immediate effect of respiratory muscle stretching on peak expiratory flow rate in cement factory workers. In present study, the value of pre-treatment and post-treatment respiratory muscle stretching was analyzed and it was proved statistically significant.

Rafaela Barrosde Sá et al, (2017) conducted a study to find out an Immediate effects of respiratory muscle stretching on chest wall kinematics and electromyography in COPD patients and concluded that single session of respiratory muscle stretching in patients with COPD promoted increases on the variations of Vrcp, Vrca and reductions on the variations of end-inspiratory Vrcp, end-expiratory Vrcp, Te, RR and MV. In addition a decrease on electrical activity was observed in muscles that are normally overloaded in COPD patients, as sternocleidomastoid and upper trapezium.[7]

REKHA K1 et al, (2016) conducted a study to find out an effect of stretching respiratory accessory muscles in chronic obstructive pulmonary disease and concluded that This study showed that respiratory accessory muscle stretching significantly improved chest expansion, reduced dyspnea, and increase exercise tolerance level in patients with COPD.[8]

Vikram Mohan et al, (2012) conducted a study to find out effect of intercostal stretch on pulmonary function parameters among healthy males and concluded that there were increases in dynamic ventilatory parameters only in FEV1% among healthy conscious subjects who underwent IC stretch compared to the subjects who underwent breathing control exercises alone for ten breaths. This change in ventilator parameters, enhanced lung volume when a stretch is performed. It can be necessitated that this IC stretch method might be an alternative for subjects incapable of engaging in active rehabilitation exercises.[9]

CLINICAL IMPLICATIONS
The results suggest that the respiratory muscle stretching is proved to be effective in improving the peak expiratory flow rate in cement factory workers.

LIMITATIONS
1. Only male participants were taken.
2. Long term follow- up was not taken
3. Results could not be generalized to all age groups because study age group was between 25-50 years.

FURTHER RECOMMENDATIONS
1. Treatment can be given for longer duration with follow up.
2. Study can be done on female participants.
3. The further studies can be done with larger sample size.
4. This study can be done taking different outcome measures.
5. Further studies can be done with different occupational group.

CONCLUSION
The present study concludes that respiratory muscle stretching is effective in increasing peak expiratory flow rate in cement factory workers. Hence, the respiratory muscle stretching technique is an effective option in the treatment of cement factory workers.

Conflict of Interest: Nil.
Source of Found: No fund was needed.
Ethical Clearance: From Shri USB College of Physiotherapy, Aburoad.

REFERENCES
1. Poonam R Naik, Abhay S Nirgude, Peddi Megana,: Respiratory Morbidity And Peak Expiratory Flow Rate Among Rice Mill Workers In A Rural Area Of South India: National Journal Of Community Medicine | Volume 8 | Issue 5 | May 2017.
2. S. E. Urom A. B. Antai ,E. E. Osim: Symptoms And Lung Function Values In Nigerian Men And Women Exposed To Dust Generated From Crushing Of Granite Rocks In Calabar, Nigeria: Nigerian Journal Of Physiological Sciences 19(1-2): 41-47 © Physiological Society Of Nigeria 2004.
3. Arshad H. Rahmani, Ahmad Almatroudi1, Ali Yousif Babiker, Amjad A. Khan, Mohammed A. Alsahl: Effect Of Exposure To Cement Dust Among The Workers: An Evaluation Of Health Related Complications: Macedonian Journal Of Medical Sciences Published On June 13, 2018.
4. Selçuk Çankaya, Simge Çankaya: Occupational Health And Safety In Cement Industry: Journal Of International Scientific Publications, Issn 1314-7234, Volume 9, 2015.
5. K. Park: Parks Textbook Of Preventive And Social Medicine: 23rd Edition, Chapter No:15 Pg-806.
6. B. Shobana V , G. Sasi Krishnan V , Milind V Bhutkar V,"Comparative Study Of Peak Expiratory Flow Rate Among Power Loom And Non Power Loom Workers In Rural Area In Salem District" Scholars Journal Of Applied Medical Sciences (Sjams) Issn 23206691 (Online) Sch. J. App. Med. Sci., 2015; 3(2b):646-649 Issn 2347-954x (Print)
7. Rafael Barrosde Sáamaíra Florentinopessoaaana Gabriela Lealcavalcantiashirley Limacamposacésaramorimbarmèledornelas De Andradeaimmediate: Effects Of Respiratory Muscle Stretching On Chest Wall Kinematics And Electromyography In Copd Patients.: Respiratory Physiology & Neurobiologyvolume 242, August 2017, Pages 1.
8. Rekha K, Shristi Rai, Vaiyapuri Anandh, Samuel Sundar Doss D : Effect Of Stretching Respiratory Accessory Muscles In Chronic Obstructive Pulmonary Disease: Asian J Pharm Clin Res, Vol 9, Suppl. 1, 2016, 105-108.
9. Vikram Mohan, Ku Badlisyah Ku Aziz, Kamaria Kamaruddin, Joseph H. Leonard, Srijit Das, Madhana Gopal Jagannathan: Effect Of Intercostal Stretch On Pulmonary Function Parameters Among Healthy Males: Excli Journal 2012;11:284-290 – Issn 1611-2156.