



## COMPARITIVE STUDY OF IMMEDIATE EFFECT OF CHEST MOBILITY EXERCISE AND CONVENTIONAL BREATHING EXERCISE ON MARBLE FACTORY WORKER- AN EXPERIMENTAL STUDY

### Physiotherapy

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### ABSTRACT

**Context:** As an average normal person spend maximum of its time in his working environment it is major contributor in determining the person's overall health. A good quality of air is an important factor for normal health of an individual.

**Aim:** To find out immediate effect of Chest Mobility Exercises and Conventional Breathing Exercises on Marble Factory Worker.

**Settings and Design:** The interventional study was carried out in Marble Factories of Abu Road.

**Method and Material:** 40 subjects were included in the basis of inclusion and exclusion criteria and divided into 2 groups with 20 participants in each group. One group received Chest Mobility Exercises and other group received Conventional Breathing Exercises.

**Statistical analysis:** Data was analyzed by using SPSS Version 20. Wilcoxon signed-rank test was used for the pre treatment and post treatment comparison within both the groups & Mann-Whitney U test was used for the inter group comparison.

**Results:** Statistically is significant ( $p < 0.05$ ) the result showed high significant difference within & between the two groups. There was more effect of Chest Mobility Exercises compared to Conventional Breathing Exercises.

**Conclusion:** The above study concluded that both the technique showed marked improvement but the Chest Mobility Exercises is more effective for the Marble Factory Workers and it is easy to perform for the participants.

### KEYWORDS

Chest Mobility Exercise, Conventional Breathing Exercise, Marble Factory Workers, PEFR.

### INTRODUCTION

Marble is metamorphic rock composed of recrystallized carbonate minerals most commonly calcite or dolomite.<sup>1</sup> Person employed in carving statues from stones and marble rocks, are exposed to the dust, containing particles of the calcium carbonate and silica.<sup>2</sup> Complains including respiratory symptoms like coughing, shortness of breath, chest pain, chest tightness, abnormal breathing pattern are frequent with these workers. The worldwide incidence of pneumoconiosis and other occupational chronic respiratory diseases have been estimated at 453,000 and 2,631,000 cases per year respectively.<sup>3</sup>

In recent times estimate from India, more than 3 million workers exposed to silica dust, whilst 8.5 millions more work in construction and building activities, similarly exposed to quartz. Several recent reports on lung function assessment show both restrictive and obstructive patterns. The reaction of lung to mineral dusts depends on many variables, including size, shape, solubility and reactivity of particles. For example, particles size greater than 5 to 10  $\mu\text{m}$  are unlikely to reach the distal airways, whereas particles smaller than 0.5  $\mu\text{m}$  move in and out the alveoli, often without substantial deposition and injury, Particles that 1 to 5  $\mu\text{m}$  in the diameter is the most dangerous, because they lodge at the bifurcation at the distal airways.<sup>3</sup>

Epidemiological studies indicates that workers exposed to marble dust stand an increased suffering from asthma symptoms, chronic bronchitis, nasal inflammation and impaired lung function. The affected workers were having body problems like headache and stressed due to under payment.<sup>5</sup> the exposure to silica has been described in many occupations with different prevalence indices depending on degree of exposure.<sup>4</sup>

Therefore, inhalation of different pollutants exposed from industries can cause damage to the membrane structure and mechanical efficiency. This leads to alteration in functional properties of lungs resulting in various respiratory disease.<sup>5</sup>

### Wright's Peak 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.<sup>6</sup>

PEFR is an accepted index of pulmonary function and is widely used in respiratory medicine. Measurement of PEFR is simple, non invasive, rapid, and economical method to assess the strength and speed of expiration in L/min. It is used to detect the reduction in pulmonary function associated with narrowing of airways.<sup>5</sup>

### NEED OF STUDY

Many studies have been conducted on Occupational disease and other respiratory condition. But no study has been conducted for the respiratory function for marble factory workers. Physiotherapy can be beneficial to check the detouring condition of the workers and decrease the further respiratory health consequences. Both Breathing exercises and Chest mobility exercises have shown effect on chest wall expansion and has increase forced expiratory volume in other cardio pulmonary conditions. But comparison has not been made between two techniques for the marble factory workers.

### AIMS

- The aim is to compare the immediate effect of Chest Mobility Exercises and Conventional Breathing Exercises on Marble Factory Workers.

### OBJECTIVES

- To find out the immediate effect of Chest Mobility Exercises on Marble Factory Workers.
- To find out the immediate effect of Conventional Breathing Exercises on Marble Factory Workers.
- To compare between two techniques the immediate effect of Chest Mobility Exercises and Conventional Breathing Exercises on Marble Factory Workers.

**HYPOTHESIS**

**NULL HYPOTHESIS**

There is no significant difference between the immediate effect of Chest Mobility Exercises and Conventional Breathing Exercises.

**ALTERNATE HYPOTHESIS**

There is significant difference between the immediate effects of Chest Mobility Exercises and Conventional Breathing Exercises.

**MATERIAL AND METHODOLOGY**

- **Study Setting:** Shri U S B College of Physiotherapy, Abu Road.
- **Source of data:** Various Marble Factories at Abu Road.
- **Study population:** Marble Factory workers.
- **Sample size:** 40 Marble Factory workers.
- **Sampling method:** Convenient sampling.
- **Study Design:** An Intervention study.

**Inclusion Criteria:**

- Male
- Work experience 10 or more than that<sup>3</sup>
- Smoking & Alcohol addicted
- Non use of Protective device

**Exclusion Criteria:**

- Female
- Subjects with any chest deformity or COPD.
- Subjects on Medications.
- Uncooperative participants.

**MEASUREMENT PROCEDURE**

- The study was ethically approved by Shri USB College of Physiotherapy.
- Before starting the study consent was taken from the patients. The patients have been selected on the basis of inclusion and exclusion criteria.
- Anthropological and other data were collected. (Height, Weight, BMI, SpO<sub>2</sub>)
- 40 participants were divided into 2 groups randomly.
- **Group A** received Chest Mobility Exercises which include
  - Rib Rotation Exercise
  - Chest wall rotation
  - Lateral Flexion of chest wall
  - Chest wall expansion
  - Pectoralis Major Muscle Stretching<sup>7</sup>
- **Group B** received Conventional Breathing Exercises, which include
  - Deep Breathing
  - Deep Coughing
  - Pursed lip Breathing
  - Forced expiratory huffing technique
  - Deep Breathing

**Repetition-** Each maneuver was repeated for 3 times for both the group PEFR was used as outcome measure which was recorded before and after intervention. The recordings were taken thrice & each time mouth piece was disinfected with antiseptic solution to avoid cross infection.

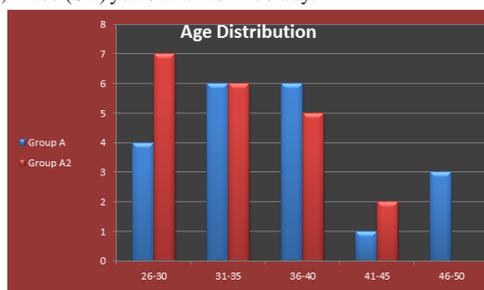
**RESULTS**

All statistical analysis was done by SPSS statistics version 20.0 for windows software.

**Table 1: Mean and SD of age in years.**

Group	N	Mean	SD
Group A	20	33.75	± 4.75
Group B	20	33.76	± 4.75

**Interpretation:** The Table 1 shows the mean age of the subject's i.e. 33.75, ± 4.75 (SD) years taken for the study.



**Graph 1:** Age distribution of Chest Mobility Exercise Group (Group A) and Conventional breathing exercise group (group B)

Interpretation: The above Table 1 and Graph 1 show the age distribution in age (year) in Group A and in Group B.

**Table 2: Intragroup comparison of pre & post treatment of Group A & Group B**

	Mean		SD		Z	P
	Pre	Post	Pre	Post		
Group A	468.49	541.48	69.86	63.29	-3.866	0.000
Group B	421.66	496.49	132.39	97.78	-3.922	0.000

**INTERPRETATION:** The above Table 2 shows the result of Wilcoxon sign rank test which shows there was significant different between the pre and post treatment in Group A & Group B (p<0.05).

**Table 3: Inter group comparison of post treatment on both groups.**

Intergroup (Group A-B)	Z	Sig.	Mann-Whitney U
	-2.316	0.021	114.500

**INTERPRETATION:** Table 3 shows the result of Mannwhitney U test which shows there was significant different between both groups (p<0.05).

**DISCUSSION**

In present study, when the values of pre-treatment and post treatment Chest Mobility Exercises and Conventional Breathing Exercises were analyzed, it was statistically proven that there is significant improvement in Chest Mobility Exercise Group, when comparison was done between the groups, from both the techniques Chest Mobility Exercises was proved more significant.

The long term exposure of the environmental dust in the working area has an adverse effect on the respiratory system of the marble factory workers. Due to long term exposure of the silica and marble dust that cause deposit in the lungs which causes fibrosis of the lungs. By performing Chest Mobility Exercises it was found that after the exercise protocol there was marked increase in the PEFR value which stated significant outcome.

**Dharmesh Parmar et al (2013)** conducted study on the immediate effect of chest mobilization technique on chest expansion in patients of COPD with restrictive impairment and concluded that Chest wall mobilization has significant effect on Chest Expansion in COPD patients who are having restrictive impairment of chest wall in later stages of disease.

**Sonia U Mulay et al (2017)** conducted study to find out effectiveness of shoulder and thoracic mobility exercise on chest expansion and dyspnea in moderate chronic obstructive pulmonary disease patients and concluded that shoulder and thoracic mobility exercise were more effective in improving chest expansion and reducing dyspnea in COPD patients.

During the study it was found that due to increase in age there was decrease in the outcome of PEFR even there was decrease in the outcome for participants who has prolong exposure of the silica dust **Seema Gupta et al (2017)** conducted study on Respiratory Functions in Textile mill workers to study the role of peak expiratory flow rate and concluded that Workers at the textile mill, with short-term exposure to cotton dust, may also present with respiratory alterations which may increase with long-term exposure. Safety controls, such as ventilation, and routine health check are very much required in textile industries.

**Shrivastav et al (2018)** conducted study to find Prevalence of symptoms of Occupational Lung diseases in marble cutting workers and concluded that prevention was the major factor for occupational lung disease and early diagnosis and treatment plays major role as prolong exposure to these factors causes irreversible damage.

This study was done to compare the immediate effectiveness of Chest Mobility Exercises and Conventional Breathing Exercises on Marble Factory Workers as there are few literatures which do the same and the present study shows that there is significant increase effect of Chest Mobility Exercises than Conventional Breathing Exercises on Marble Factory Workers.

**LIMITATIONS**

- Only Male Participants were taken.

- Long term follow up was not taken.
- Result could not be generalized as 10 years or more than that work experience were taken

#### FURTHER RECOMMENDATIONS

- Treatment can be given for longer duration with follow up.
- Further studies can be done with larger sample size.
- Further studies can be done on different occupational group.

#### CONCLUSION

Between the Chest Mobility Exercises and Conventional Breathing Exercises, there is significant increase of the PEFR results for Chest Mobility Exercises than Conventional Breathing Exercises.

There is high difference within & between the two groups. There more effect of Chest Mobility Exercises compared to Conventional Breathing Exercises.

**Conflict of Interest:** Nil.

**Source of Fund:** No fund was needed.

**Ethical Clearance:** From Shri USB College of Physiotherapy (RUHS)

#### CLINICAL IMPLICATION

Results suggest that from both the techniques i.e. Chest Mobility Exercises & Conventional Breathing Exercises it is proved that Chest Mobility Exercises are more effective for the Marble Factory Workers as there is less need of assistance and supervision. So, Chest Mobility Exercises can be use for this group of participants.

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