



## A COMPARATIVE STUDY TO FIND OUT IMMEDIATE EFFECT OF CHEST MOBILITY EXERCISE AND INCENTIVE SPIROMETRY EXERCISE ON CEMENT FACTORY WORKERS –AN EXPERIMENTL STUDY

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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 persons 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 exercise and incentive spirometry exercise on cement factory worker.

**Setting and design:** The interventional study was carried out in cement factories of aburoad.

**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 exercise and other group received incentive spirometry exercise.

**Results:** Statistically is significant ( $p < 0.05$ ) the result showed high significant difference within & between the two groups .There was more effect of incentive spirometry exercise compared to chest mobility exercise.

**Conclusion:** The above study concluded that both the technique showed marked improvement but the incentive spirometry exercise is more effective for the cement factory workers and it is easy to perform for the participants.

**KEYWORDS :** Cement factory workers, Incentive spirometry, Peak flow meter, chest mobility exercise

### INTRODUCTION

The worldwide community, especially the people in developing countries, is facing increasing risks of respiratory diseases due to production of smoke and dust in different occupational and industrial sectors [1,2]. The health risks posed by inhaled dust particles are influenced by the duration of exposure and the biological responses exerted by the particles [3]. Cement industry is one of the largest manufacturing industries and its workers are exposed to dust at various manufacturing and production processes [4]. Portland cement dust is a mixture of calcium oxide, silicon oxide, aluminum tri oxide, ferric oxide, magnesium oxide, sand and other impurities [5]. The aerodynamic diameter of cement dust particles is within the respirable extent [6], consequently occupational exposure to cement dust can cause numerous health hazards including the onset of acute or chronic respiratory diseases and respiratory function deficits.

Lung function impairment is the most common occupational respiratory problem in subjects exposed to dust in industrial sectors [2]. Studies are available on lung function and cement dust, but most of these studies were conducted without considering the long term duration-response effect between years of exposure and respiratory function impairment [7] and were not explained by promising physiological factors which greatly influence the lung function such as age, height, weight, ethnicity, and socioeconomic status. The present study has attempted to minimize mystifying interpretational factors by using matched controls, excluding smokers and workers with previous industrial exposure other than cement industries. Moreover, occupational and respiratory physicians should know the magnitude of problem of lung function impairment with duration of exposure to cement dust. Therefore, this study aimed to determine the effects of length of exposure to cement dust on lung function and also provide information to cement mill workers about the hazards of cement dust on lung function and measures for its prevention.

### WRIGHTS PEAK FLOW METER

Wrights peak flow meter is an instrument, introduced by

Hadron in 1942. This instrument is used to measure PEFR for physiological studies, are found to be suitable. It is an accurate, rugged, and portable instrument. The instrument is alight plastic cylinder measuring 15×5 cm and weighing 72 g(without mouthpiece). It consists of spring piston that slides freely on a road within the body of instrument. The piston drives an independent sliding indicator along 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 return to zero by the operator. In use of 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 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 reading were taken in standing position. PEFR was recorded thrice and the highest of three readings were taken in lit/min.<sup>8</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>8</sup>

### AIM OF STUDY

The aim of the study was to compare the immediate effect of chest mobility exercise and incentive spirometry exercise on cement factory workers.

### OBJECTIVE

To find out immediate effect of chest mobility exercise on cement factory workers.

To find out immediate effect of incentive spirometry exercise on cement factory workers.

To compare between two techniques the immediate effect of chest mobility exercise and incentive spirometry exercise on cement factory workers.

**HYPOTHESIS**

**NULL HYPOTHESIS**

There is no significant difference between the immediate effect of chest mobility exercise and incentive spirometry exercise.

**ALTERNATE HYPOTHESIS**

There is significant difference between the immediate effect of chest mobility exercise and incentive spirometry exercise.

**MATERIALS AND METHODOLOGY**

**Study setting:**

**Source of data:** Various cement factories at Ahmedabad

**Study population:** Cement factory workers

**Sample size:** 40 cement factory worker

**Sampling method:** Convenient sampling

**Study design:** An intervention study

**Inclusion criteria**

- Male.
- Work experience 10 or more than that.
- Smoking and alcohol addicted.
- Non use of protective device.

**Exclusion criteria**

- Female.
- Subject with any chest deformity or COPD.
- Subject on medicine.
- Uncooperative participants.

**MEASUREMENT PROCEDURE**

- The study was ethically approved by SHRI USB COLLEGE OF PHYSIOTHERAPY.
- Before starting the study consent was taken from the patient. The patients have been selected on the basis of inclusion and exclusion criteria.
- Anthropological and other data were collected. (weight, SpO<sub>2</sub>)
- 40 participants were divided into 2 groups randomly.
- **Group A** received chest mobility exercise which include
  - Chest wall rotation
  - Lateral flexion of the chest wall
  - Chest wall expansion
  - Pectoralis major muscle stretching<sup>8</sup>
- **Group B** received incentive spirometry exercise

**Repetition –**

Each maneuver 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 and each time mouthpiece was disinfected with antiseptic solution to avoid cross infection.

**RESULTS**

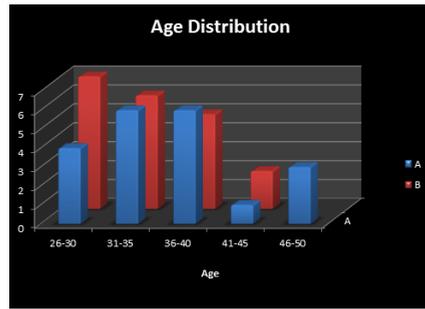
All statistical analysis was done by SPSS statistics version 20.0 for windows software.

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

GROUP	N	MEAN	SD
Group A	20	36.3	± 6.37
Group B	20	33.75	± 4.74

**Interpretation:**

The Table 1 shows the mean age of the subjects i.e. 36.3, ±6.37(SD) years taken for the study.



**Graph 1:** Age distribution of chest mobility exercise(Group A) and incentive spirometry (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: Intra group comparison of pre and post treatment of Group A and Group B**

MEAN		SD		Z	P
Pre	Post	Pre	Post		
447.75	561.5	88.66	104.85	-3.9394	0.05
429.25	510.25	66.4	51.51	-3.8737	0.05

**INTERPRETATION:**

The above table 2 shows the result of Wilcoxon sign rank test which shows there was significant difference between the pre and post treatment in Group A and 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
	-1.8699	0.023	133.01

**INTERPRETATION:**

Table 3 shows the result of Mann-Whitney U Test which shows there was significant difference between both groups (p<0.05).

**DISCUSSION**

In present study, when the values of pre-treatment and post-treatment chest mobility exercise and incentive spirometry exercise were analyzed, it was statistically proven that there is significant improvement in incentive spirometry exercises group, when comparison was done between the groups, from both techniques incentive spirometry 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 cement 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 incentive spirometry Exercises it was found that after the exercise protocol there was marked increase in the PEFR value which stated significant outcome.

**Dean R Hess et al (Dec 26,2017)**

Given the cost of implementing IS, the low adherence rate, and the lack of reported benefit, it is worth considering whether IS should continue to be prescribed. Despite the paucity of efficacy and adherence data, physicians of ten prescribe IS in an effort to do something to reduce postoperative pulmonary complications without knowing what exactly is being prescribed, the effort required of the patient, and the relatively low adherence rate. Given their expertise in working to optimize patients' postoperative pulmonary outcomes, respiratory therapists can play an integral role in educating providers about the dearth of evidence supporting IS. Further study is needed to determine which specific patient groups, if any, might benefit from IS.

**Limitation**

- 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.

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