

Effect of breathing exercises on respiratory problems

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Introduction

Textile industry is one of the largest manufacturing industries, in which workers especially in the bale opening, carding, spinning and weaving sections are exposed to large amount of cotton dust with deleterious effects on their lung function.- Wang et.al.,(2005) .

In low and middle income country , including Africa, occupational respiratory symptoms and diseases are very high due to the expansion of investments , high unemployment rate , workers are more likely to continue working even when having poor health status and old machines that are producing excessive dust to work environment are still used for production purpose. –WHO (2010)

According to ILO world ay report for safety and health at work , worldwide an estimated 2.34 million people die each year from work related accidents and diseases. Nowadays, the world community has been facing increasing risks of respiratory diseases due to smoke,dust exposure , indoor air pollution, occupational hazards and infections in different industrial sectors . –ILO (2013)

Breathing rehabilitation techniques are designed to reduce symptoms, decrease disability, increase participation in physical and social activities and improve the overall quality of life for individuals with chronic respiratory disease.

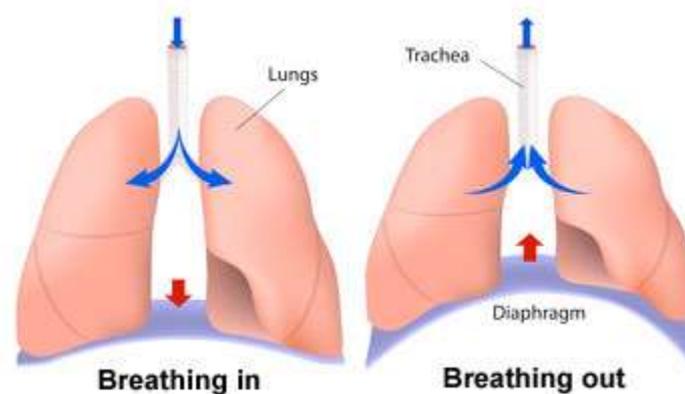
Flzadi – Avangy et.al., (2010) A before and after quasi experimental research was conducted on 40 patients with COPD at Shahid Beheshti Hospital in Kashan. Spirogram and ABG were tested before and after three months of PLB (Pursed lip breathing) exercise and a questionnaire was used to assess day to day activities. From the results of the study the researcher concluded that PLB education can improve lung function, arterial blood gas levels and also the levels of day to day activities.

Breathing means the action of breathing in and out is due to changes of pressure within the chest (thorax). This action is also known as external respiration, and is created by the muscles of the chest and the diaphragm changing the size of the chest cavity (and air pressure).

Mechanics of breathing

When we inhale the intercostal muscles (between the ribs) and diaphragm contract to expand the chest cavity. The diaphragm flattens and moves downwards and the intercostal muscles move the

rib cage upwards and out. This increase in size decreases the internal air pressure and so air from the outside (at a now higher pressure than inside the thorax) rushes into the lungs to equalise the pressures.



Regulation of breathing

Respiration is controlled by the autonomic nervous system, which enables us to alter our breathing without thinking about it. The autonomic nervous system consists of two branches, the sympathetic nervous system (the pedals) and the parasympathetic nervous system (the breaks).

BREATHING EXERCISES

Also called as ventilatory training. •

An aspect of management to improve pulmonary status and the prevention or comprehensive management of impairments related to acute or chronic pulmonary disorders. Simply, Breathing exercises are designed to retrain the muscles of respiration, improve ventilation, lessen the work of breathing, and improve gaseous exchange and patient's overall function in daily living activities. Depending on a patient's underlying pathology and impairments, exercises to improve ventilation often are combined with medication, airway clearance, the use of respiratory therapy devices, and a graded exercise (aerobic conditioning) program.

Goals of Breathing Exercises

1. • Improve or redistribute ventilation.
2. • Increase the effectiveness of the cough mechanism and promote airway clearance.
3. • Prevent postoperative pulmonary complications.
4. • Improve the strength, endurance, and coordination of the muscles of ventilation.
5. • Maintain or improve chest and thoracic spine mobility.
6. • Correct inefficient or abnormal breathing patterns and decrease the work of breathing.
7. • Promote relaxation and relieve stress.

8. • Teach the patient how to deal with episodes of dyspnea.
9. • Improve a patient's overall functional capacity for daily living, occupational, and recreational activities
10. Aid in bronchial hygiene---Prevent accumulation of pulmonary secretions, mobilization of these secretions, and improve the cough mechanism.

Indications of breathing exercises

cystic fibrosis

Bronchiectasis

Atelectasis

Lung abscess

Neuromuscular diseases

Pneumonias in dependent lung regions.

Acute or chronic lung disease

COPD

or patients with a high spinal cord lesion/ Deficits in CNS: spinal cord injury, myopathies etc.

Prophylactic care of preoperative patient with history of pulmonary problems

After surgeries (thoracic or abdominal surgery)

Airway obstruction due to retained secretions.

For patients who must remain in bed for an extended period of time.

PRECAUTIONS:

Never allow a patient to force expiration. Expiration should be relaxed or lightly controlled. Forced expiration only increases turbulence in the airways, leading to bronchospasm and increased airway restriction. Do not allow a patient to take a highly prolonged expiration. This causes the patient to gasp with the next inspiration. The patient's breathing pattern then becomes irregular and inefficient. Do not allow the patient to initiate inspiration with the accessory muscles and the upper chest. Advise the patient that the upper chest should be relatively quiet during breathing. Allow the patient to perform deep breathing for only three or four inspirations and expirations at a time to avoid hyperventilation.

CONTRAINDICATIONS:

- Increased ICP
- Unstable head or neck injury
- Active hemorrhage with hemodynamic instability or hemoptysis
- Recent spinal injury
- Empyema
- Bronchopulmonary fistula
- Flail chest
- Uncontrolled hypertension
- Anticoagulation
- Rib or vertebral fractures or osteoporosis
- Acute asthma or

tuberculosis • Patients who have recently experienced a heart attack. • Patients with skin grafts or spinal fusions will have undue stress placed on areas of repair.

TYPES OF BREATHING EXERCISES:

1. Diaphragmatic breathing
2. Pursed lip breathing
3. Segmental breathing(costal expansion exercise) a)Apical breathing b)lateral costal expansion c)Posterior basal expansion
4. Sustained maximal inspiration (deep breathing).

DIAPHRAGMATIC BREATHING : The semireclining and semi- Fowler's positions are comfortable, relaxed positions in which to teach diaphragmatic breathing. •When the diaphragm is functioning effectively in its role as the primary muscle of inspiration, ventilation is efficient and the oxygen consumption of the muscles of ventilation is low during relaxed (tidal) breathing. • When a patient relies substantially on the accessory muscles of inspiration, the mechanical work of breathing (oxygen consumption) increases and the efficiency of ventilation decreases.

GOALS OF DIAPHRAGMATIC BREATHING: • To improve the efficiency of ventilation and oxygenation • Decrease the work of breathing • Increase the excursion (descent or ascent) of the diaphragm • Improve gas exchange and oxygenation. • Diaphragmatic breathing exercises also are used during postural drainage to mobilize lung secretions. • Reduces work of breathing • Reduces the incidence of post operative pulmonary complications • Improve ventilation • Eliminates accessory muscle activity • Decrease respiratory rate • Increase tidal ventilation • Improve distribution of ventilation.

PURSED LIP BREATHING

• Pursed-lip breathing is a strategy that involves lightly pursing the lips together during controlled exhalation. •

USES OF PURSED LIP BREATHING

• Deal with episodes of dyspnea. • Improves ventilation • Releases trapped air in the lungs • Keeps the airways open longer and decreases the work of breathing • Prolongs exhalation to slow the breathing rate • Improves breathing patterns by moving old air out of the lungs and allowing for new air to enter the lungs • Relieves shortness of breath • Causes general relaxation

SEGMENTAL BREATHING

•Performed on a segment of lung, or a section of chest wall that needs increased ventilation or movement. •It's questionable whether a patient can be taught to expand localized areas of the lung while keeping other areas quiet. •Hypoventilation does occur in certain areas of the lungs because

of pain and muscle guarding after surgery, atelectasis and pneumonia. •Therefore, it will be important to emphasize expansion of problems areas of the lungs and chest wall under certain conditions.

INDICATIONS: • post thoracotomy, •trauma to chest wall, •pneumonia, •post mastectomy scar, •post chest radiation-fibrosis.

GLOSSOPHARYNGEAL BREATHING

• Glossopharyngeal breathing is a means of increasing a patient's inspiratory capacity when there is severe weakness of the muscles of inspiration. • The first report of GPB was published by Dail in 1951 in patients with poliomyelitis paralysis. • It is a technique that is performed by using the muscles of mouth, cheeks, lips, tongue, soft palate, larynx and pharynx to piston boluses of air into the lungs. • The tongue is the main organ of this breathing technique. • The tongue is pushed upwards and backwards forcing the air into the pharynx. • The larynx opens and the air passes into the trachea where it is trapped by closure of larynx. • This pistoning action is mechanism of each gulp. • A gulp is defined as boluses of air projected into the trachea by pistoning action of the tongue.

• INDICATIONS: • It is taught to patients who have difficulty taking in a deep breath, for example, in preparation for coughing. • It is used primarily by patients who are ventilator-dependent because of absent or incomplete innervation of the diaphragm as the result of a high cervical-level spinal cord lesion or other neuromuscular disorders.

• Glossopharyngeal breathing can reduce ventilator dependence • Also can be used as an emergency procedure when a malfunction of a patient's ventilator occur. • It also can be used to improve the force (prevent accumulation of pleural fluid • Prevent accumulation of secretions • Decreases paradoxical breathing • Decrease panic • Improve chest mobility Lateral costal expansion .

Glossopharyngeal breathing can reduce ventilator dependence • Also can be used as an emergency procedure when a malfunction of a patient's ventilator occur. • It also can be used to improve the force (and therefore the effectiveness) of a cough • It is used to increase the volume of the voice.

• Procedure • Glossopharyngeal breathing involves taking several "gulps" of air, usually 6 to 10 gulps in series, to pull air into the lungs when action of the inspiratory muscles is inadequate. • After the patient takes several gulps of air, the mouth is closed. • The tongue pushes the air back

and traps it in the pharynx. • The air is then forced into the lungs when the glottis is opened. • This increases the depth of the inspiration and the patient's inspiratory and vital capacities

COUGHING

• An effective cough is necessary to eliminate respiratory obstructions and keep the lungs clear. • Airway clearance is an important part of management of patients with acute or chronic respiratory conditions. • The effectiveness of the cough mechanism can be compromised for a number of reasons are

1. Decreased inspiratory capacity
2. Inability to forcibly expel air.
3. Decreased action of the cilia in the bronchial tree.
4. Increase in the amount or thickness of mucus.

Bharat Dangi and Anjali Bhise , (2017) conducted a cross sectional observational study on the effect of Cotton dust exposure on pulmonary function and respiratory symptoms. The researcher concluded that cotton mill workers were significant decrease in spirometric parameters and increased in respiratory symptoms . As the duration of exposure and symptoms increased , spirometric abnormality increased.

The principle of inspiratory muscle training is to improve the strength of the diaphragm and the external intercostals muscles. Evidence showed that improvement of inspiratory muscle strength might be related to decreased effort in breathing and a positive change in the experience of breathlessness.

Conclusion :

Cotton industry workers are exposed to various hazards in the different departments of textile factories. Workers are exposed to cotton dust leads to decreased the pulmonary function . workers will practice the breathing exercise daily in their life , it can improve the respiratory status and reduced the respiratory symptoms.

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