

# A Case Study on Breathing Re-education in an Obese Person with Orthopnea

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## ABSTRACT

### BACKGROUND

Orthopnea is sensation of breathlessness in the recumbent position.

There are various causes of orthopnea; most common cause is heart failure. However, it can also occur in the patients with diaphragmatic paralysis and pulmonary diseases such as severe COPD as well as morbid obesity.

This is case report of a 65 year old male having complain of orthopnea as well as dyspnea while walking and stair climbing along with co morbidities. 4 week of breathing re-education was given in form of different kind of breathing exercises. Breathing retraining techniques are used to relieve and control dyspnoea, improve ventilation and ventilatory efficiency and as well as gas exchange. Physiotherapy intervention can be used to relieve orthopnea as choice of treatment through the different kind of breathing strategy.

**Key Words:** Orthopnea, physical therapy, breathing exercise, obesity.

## INTRODUCTION

Orthopnea is dyspnea that occurs when the patient is in the recumbent position. [1] Orthopnea is caused by increased pressure in the blood vessels of lungs when the person lie down, blood flows back to the heart and then to lungs. In normal person this redistribution does not cause any problem but if the person having heart disease, heart may not strong enough to pump blood back to heart, this can increase pressure in capillaries and veins inside

lungs, causing fluid leak out into lungs. This extra fluid could be reason to make person effort for breathing. Sometimes persons with pulmonary disease have orthopnea when their lungs produce excess mucus, because of excessive secretion may cause orthopnea.

The mechanical properties of the lungs and chest wall are altered significantly in obesity, largely due to fat deposits in the mediastinum and the abdominal cavities. These alterations reduce the compliance of the lungs, chest wall and entire respiratory system and likely contribute to the respiratory symptoms of obesity such as wheeze, dyspnea and orthopnea. [2] In terms of respiratory compromise, obese patients experience a reduced expiratory reserve volume and a diminished functional residual capacity. [3]

In particular, a low functional residual capacity increases the risk of both expiratory flow limitation (EFL) and small airway closure. Thus, expiratory flow may be limited during tidal breathing in healthy obese individuals, and this may be even more pronounced when in the supine position. This is an important point because the basic physiologic principle in terms of functional residual capacity is that it should increase when a patient goes from the sitting to the supine position. However, physiologic changes occur in obese individuals that may be more profound in the supine position due to excess adipose

tissue affecting the abdomen and chest wall. As a result of EFL and airway closure, there could be a ventilation/perfusion imbalance where some areas of the lungs might be under ventilated and overperfused. [4] In the supine position the diaphragm must work against and lift the abdominal contents during contraction, so when the diaphragm is too weak or the load is increase ventilation is reduced and dyspnoea develops. [5]

Purpose of this case study is to describe role of physical therapy in a obese subject with orthopnea.

### CASE DESCRIPTION

A 65 year old male visited OPD with complain of dyspnea in supine lying and during walking as well as stair climbing at S.S. Agrawal Institute of Physiotherapy at Navasari Gujarat. He was suffering from these problems from past six months. Past Medical history included Diabetes Type 2 and Hypertension since 3 year along with all these co morbidities he has also Obesity grade 1 with BMI=34kg/m<sup>2</sup>. Vitals revealed at a time of evaluation was BP=130/100 mmHg, HR=85beats/min, RR=20 breaths/min, Spo2=97%. He had not take physiotherapy treatment of orthopnea before.

### MANAGEMENT

Goal of treatment set to reduce orthopnea and improve exercise tolerance. Before starting the treatment complete cardiopulmonary evaluation was taken and informed consent also taken from the subject. Proper demonstration was given to patient for all breathing exercises. Diaphragmatic breathing and pursed lip breathing exercise performed in semi fowler position. Breathing control was performed during stair climbing, subject was instructed to inhale during one step up and exhale during next step up for breathing control. Exercises have been performed under supervision followed by pre and post vitals taken to check any fluctuation.

Breathing re-education include Diaphragmatic breathing exercise, Breathing control during stair climbing, Pursed lip breathing.

**Repetition and Hold:** Starting with 5 repetitions of Diaphragmatic breathing and pursed lip breathing exercises along with hold of 5 second and gradually repetition increase by 10 with hold of 15 second. For breathing control starting with one step inhale and next step exhale, progression made up to inhale for 2 steps and exhale to third step.

Frequency: 5 days a week for 4 weeks.

### RESULT

Gradually over a 4 week time period of breathing exercises subject was able to sleep in supine position for a period of time. Previously, He could not tolerate supine position for more than 15 seconds; He could not walk for more than 100 steps, while stair climbing RPE (6-20) was 17. After 4 week treatment programme he can sleep in supine for 15 to 20 min. Subject showed functional improvement as evidenced by now he can walk up to 250 steps, during stair climbing RPE is 9. So, there was a marked reduction in orthopnea and improve exercise tolerance in a subject.

### DISCUSSION

Breathing re-education shows a greater improvement in this particular subject. Evidences of breathing training in orthopnea have been done some extent. Diaphragmatic breathing exercise is traditionally performed to improve ventilation, decrease the work of breathing, mitigate dyspnea, normalize breathing pattern and reduce incidence of pulmonary complications. [6]

Pursed lip breathing which aims to increase the volume of expired air, limit dynamic hyperinflation during periods of increased ventilator demand and slow the expiration. [5] It has been shown to decrease the respiratory rate and minute ventilation, improve gas exchange, increase tidal volume and reduce work of breathing thus

relieving dyspnea and increase exercise tolerance.<sup>[7,8]</sup> Obesity leads to ventilation perfusion mismatch which could be corrected by breathing strategy leads to ventilation perfusion matching in lungs and relieve from dyspnea.

## CONCLUSION

Case study revealed that breathing re-education training plays important role in breathing impairment in obese subject as well as improve functional capacity. This case report can be used as evidence for using breathing strategy in comprehensive rehabilitative management of this kind of subjects along with co morbidities.

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