

# LIVING WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE: A CASE STUDY

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## ABSTRACT

**Background:** Chronic Obstructive Pulmonary Disease (COPD) is in the top five leading causes of death. It is a preventable and treatable disease with some significant extra pulmonary effects that may contribute to the severity in individual patients. Health care professional can play a key role in educating patients about preventions and self management of COPD. A case of COPD is presented.

**Methodology:** An 80 years old coal miner, presented with shortness of breath and productive cough. COPD was diagnosed by chest radiograph, Arterial Blood Gases and oxygen saturation. Patient was in third stage of COPD according to Global Obstructive Lung Disease criteria for COPD. Holistic care approach was adopted to manage the case.

**Result:** Patient has modified his lifestyle accordingly and achieved better functional status.

**Conclusion:** COPD can only be treated pharmacologically. A holistic care approach should be used to reduce exacerbations. It is recommended that interdisciplinary approach should be used to manage such cases.

**Keywords :** *Chronic diseases, Smoking, Obstructive pulmonary disease, Breathlessness, Ventilation and Pollutants*

## INTRODUCTION

The incidence of chronic diseases has continued to increase, especially in low and middle income countries. The chief chronic diseases are Cardiovascular Disease (CVD), cancer, Chronic Obstructive Pulmonary Diseases (COPD) and diabetes. These four diseases are the major killers; causing approximately 35 million deaths every year, 60% deaths worldwide with 80% in low and middle income countries (Fehrenbach, 2002). It is also estimated that world wide, chronic disease death will rise by 17% over the next ten years. The greatest increase will be seen in the African region (27%), the eastern Mediterranean region (25%) and the highest number of deaths will occur in the Western Pacific and the South-East Asian regions. This burden of chronic disease not only causes premature deaths, but also has major adverse effects on the quality of life of an individual, their families and the whole community (WHO, 2008). World Health Organization's (WHO) global report mentions, the projected main cause of death in Pakistan is chronic diseases that is estimated as 700

per 100,000 (WHO, 2005) Unfortunately, preventions and control measures for chronic disease are frequently ignored. Priority was given to reproductive health and communicable disease prevention and control by Ministry of Health (Nishtar, 2004).

COPD are increasing in prevalence and it is widely under-diagnosed and under-treated in Pakistan (Laniado-Laborín, 2009). However, according to the country's requirement injuries and mental health are also included (Nishtar, 2004). Chronic respiratory diseases remain the most neglected area of work by public and private sector. Recently a national action plan for non-communicable diseases has been developed for preventions and control of non-communicable diseases; it includes CVD, chronic lung diseases, cancer and diabetes.

## CASE PRESENTATION

Mr. Akram is 80 years old and he has an extended family. He lives in a rented house with his wife, son, daughter-in-law and six grandchildren, in a slum area of

Lahore. Mr. Akram has migrated from a village to a big city after marriage. He has five sons and one daughter and they all are married and living a healthy life. Mr. and Mrs. Akram are uneducated and they did not send their children to school. He worked as a coal miner and manual labor for fifty years and six years ago he retired from his job. Mr. Akram lives with his middle son Saleem and the rest of his children live in a five kilometer radius. They often come to see him, but for the last few months they have not visited him much. Mr. Akram has a history of tobacco smoking: for more than 55 years; he smokes 20 cigarettes per day. Mr. Akram's father was also a smoker, and his all sons smoke as well. For the last five years he has complained of productive cough off and on. He also complained of dyspnoea which limited his mobility. He was treated by many physicians and several emergency room visits. Mr. Akram has never visited tradition herbal doctor (Hakeem) neither has he gone to any shrine for spiritual healings. He has a history of hospital admissions every year but for last six months he has second hospital admission.

Mr. Akram has been counseled many times by different health care providers to stop smoking but these interventions were unsuccessful until six months ago. Five months before his admission. One day Mr. Akram was seen at the out-patient department for shortness of breath and productive cough. He was prescribed antibiotics, bronchodilators and oral steroids according to his medical record. The very next day he received treatment in an emergency room for Asthma in a different hospital. He did not have any previous record of his medication or lab reports. His wife Razia told to the hospital staff that he is not taking medicine regularly because they can not afford it.

## DISCUSSION

Global initiative for Chronic Obstructive Lung Disease (GOLD, 2008) defines COPD as “a preventable and treatable disease with some significant extra pulmonary effects that may contribute to the severity in individual patients”. Pulmonary effects described as airflow limitation that is not fully reversible. Noxious particles of gases cause abnormal inflammation of lungs that result in airflow limitation that is usually progressive. COPD may include diseases that cause airflow obstruction e.g. chronic bronchitis, emphysema or any combination of these disorders.

Some other diseases as bronchiectasis, asthma and cystic fibrosis were previously classified as type of chronic obstructive lung diseases but now bronchiectasis and cystic fibrosis is classified as chronic pulmonary disorders and asthma is considered a separate disorder (Smeltzer *et al.*, 2010).

In COPD submucosal glands in the large bronchi are increased in number and size, which increase mucous production and the increased goblet cells also secrete mucous. As a result ciliary function becomes impaired and reduces the mucus clearance. Therefore, the mucociliary defenses are impaired and the susceptibility of infection increases. During infection, mucous production increases and the bronchial walls become inflamed, thickened and obstruct airways that cause expiration difficult. The airway collapses and the air gets trapped in the distal portions of the lungs and causes reduced alveolar ventilation and partial pressure of i.e  $PO_2$  falls (Cronin, 1997). Alveoli may get damaged and this results in altered functions of macrophages that play an important role in destroying foreign particles including bacteria. It keeps the patient more susceptible to wide range of respiratory infections such as viral, bacterial and mycoplasmal that may produce acute episodes of bronchitis (Suzanne *et al.*, 2008).

Mr. Akram hospitalized with complains of severe shortness of breath, fatigue, unable to perform daily activities, was unable to talk much, and had a history of mild weight loss. On physical examination, the patient was in third (sever) stage according to GOLD, (2008) stages of COPD. The blood pressure was 110/60 mm Hg, the pulse 100 beats per minute, and the temperature was 99° F, the respirations were 25 per minute, and the oxygen saturation was 92-94% while the patient was breathing the ambient air. The result of spirometry was  $FEV_1$  40, FVC 0.70; 30%. Arterial blood gases ware  $PO_2$  is 73.2 mm Hg and  $PCO_2$  is 33.6 mm Hg, and the wheeze was heard on expiration. There was no digital clubbing or cyanosis, the neck veins were not distended and no peripheral edema was seen. The chest radiograph showed wider spaces oblong chest bilateral lung field showed emphysematous changes with depress dooms of diaphragm bilaterally, with tubular heart and prominent aortic knob. Mild fibrotic shadows were present in lung field. During hospitalization Mr. Akram and his family was educated about the disease, the medication, the

nutrition and the respiratory therapy. Nurses helped family members to understand apprehensive behavior of patient with COPD.

The symptoms of COPD include limitation of daily activities, shortness of breath, difficulty in breathing, problem in social interaction, isolation and depression (Gold, 2008). A diagnosis of COPD should be consider for any individual who has chronic cough, sputum production, dyspnea, and had an exposure to risk factors especially tobacco smoking and aged over 40 years, and the diagnosis should be confirmed by spirometry (GOLD, 2009). The other diagnostic measures include chest radiograph, arterial blood gases, oxygen saturation and hemoglobin level (Porth, 2014).

Mr. Akram has a limited social life, no friends and no activity out of home. His children come to see him, but he never went to visit them. They live in a congested and poorly ventilated house. Furthermore, they burnt wood in open fire for cooking; all these things aggravate the symptoms. Mr. Saleem used to smoke inside the house after work and the passive smoking and indoor pollution increased the risk for Mr. Akram.

The identification of risk factors is very important for the preventions and treatment of COPD. The most common known factor linked to COPD is genetic factor, the hereditary deficiency of alpha-antitrypsin, and tobacco smoking remains the most important cause of COPD. According to WHO 73% of COPD mortality in high income countries and 40% in low and middle income countries were related to smoking. Passive smoking also contributes to respiratory symptoms by increasing the burden of inhaled particles or gases. Occupational exposure to organic and inorganic dust, chemical agent and fumes is a factor for many people with COPD. GOLD conducted a survey among 10,000 people aged from 30-75 years in America which showed that 19.2% of COPD cases were attributable to occupational exposure, and 31.1 % amongst people who never smoked (Mannino & Buist, 2007; Gold, 2008).

Indoor air pollutants are important risk factor of the development of COPD globally; it includes exposure to biomass fuels such as coal, straw, wood, croup residues and animal dung which are used to burn in open fire for cooking in poorly ventilated houses. According to WHO report 36% of mortality from lower respiratory diseases is also related to indoor smoke exposure.

Outdoor pollutants also contribute to development of COPD, but it is much smaller than indoor pollutants. The others contributing factors are gender, respiratory infection, socioeconomic status, nutrition and asthma (Mannino & Buist, 2007; WHO, 2005).

COPD had the enormous impact not only on Mr. Akram it involved every member of this family. He had lost money, his social life had been destroyed, some time he reacted aggressively due to his condition and was unable to do his daily activities. Saleem is the only earning member of this family. He usually works 8 hours a day, but due to the hospital expenditures he has to earn more. Mrs. Saleem and Razia stay at the hospital to take care of Mr. Akram. Sleem's wife visits her children and does some chores at home every day and she has to travel by bus. Her elder daughter, who is just 15, takes care of all house holds and the younger siblings. She has missed many days at school, for that reason she was expelled from school. All routine of the family has been disturbed; children miss their mother and could not pay full attention to their studies. Family routine has changed due to prolonged illness of a family member; it has also increased the domestic and social burden on the family.

Mr Akram's breathlessness leads to severe disability and eventually effects daily life and patients feel loss of independence, lack of self esteem and guilt (Booker, 2005). Chronic diseases can cause poverty in individual and families. The family members get stuck in to a vicious circle of poverty and worsening of disease. Poor people with less education are more likely at risk because of poor nutrition, unhealthy living conditions, risky behavior and limited access to good health care. Younger members of the family lose opportunities in order to care ill member or to compensate the household economy (WHO, 2005).

The first step of managing COPD is to stop smoking. Mr. Akram managed to stop smoking six months ago without any Nicotine therapy. He quit smoking because his condition was getting worst day by day. During hospitalizations and clinic visits he was also encouraged to quit smoking by health care providers. Smoking cessation can reduce the rate of decline of lung function and should be actively encouraged. Lost lung function can not be regained, but worth wile salvage of lung function and life expectancy is possible at any stage of the disease. Nicotine

replacement therapy (NRT) can be very helpful in smoking cessation (Mannino & Buist, 2007).

During exacerbations of his pulmonary disease Mr. Akram needed oxygen therapy (GOLD, 2008). Nurses administered oxygen and educated him about the benefits and the safety measures. Now the oxygen saturation level of Mr. Akram was 92-94% that's why he did not require oxygen therapy. Oxygen therapy is given to hypoxic patients to maintain hemoglobin oxygen saturation of at least 90%. Oxygen decreases dyspnoea and pulmonary hypertension, improve neurological functions and activity intolerance (Porth, 2014). Long term oxygen therapy (LTOT) is indicated in patients with PaO<sub>2</sub> less than 7.3 kPa when stable, and one of the secondary polycythemia, nocturnal hypoxemia, peripheral edema or pulmonary hypertension. LTOT should be supplemented at least 15 hours a day to maintain oxygen saturation above 92%. Ambulatory and short-burst oxygen therapy is prescribed to those patients who are already on LTOT and want to continue with therapy outside the home and should only consider when breathlessness is not relieved by any other treatment (NICE, 2004).

On discharge Mr. Akram was advised to take a bronchodilator inhaler on time. Bronchodilators are the key drugs to treat COPD, although they do not significantly improve FEV<sub>1</sub>, but can reduce air trapping. They also improve respiratory movements, exercise capacity and reduce breathlessness on exertion. Three different classes of bronchodilators are used in COPD according to patient response and drug effectiveness. They may be used alone or in combination. An anticholinergics inhaler, two puffs three times a day was advised by the physician to Mr. Akram. The nurse explained him that, the effect of medication will reduce after six hours and would be almost gone after 8 hours. So, it is important to use the inhaler after every 8 hours. She also reassured that, dry mouth and urine retention may occur if it is used in high doses (Booker, 2005). The correct use of inhaler was also explained and monitored later to make sure that he uses inhaler correctly at home. The cholinergic tone is an important component of airflow obstruction in COPD; anticholinergics blocks parasympathetic stimulation, resulting in reduced cholinergic tone in airway, they are only valuable in inhaled form.

A combination of long-acting Beta<sub>2</sub>-agonist plus

glucocorticosteroids in one inhaler is also advised to Mr. Akram (Salmeterol + Fluticazone). Two puffs in morning, and two puffs in evening with universal inhaler. Inhaled corticosteroids should be used with long-acting Bronchodilator. The combination inhaler Symbicort® 400/12 Turbohaler (budesonide 400mcg and formoterol fumarate 12 mcg) and Seratide 500 accuhler® (fluticasone propionate 500mcg and salmeterol 50 mcg) have been licensed for COPD (Booker, 2005).

Beta<sub>2</sub>- agonist act on beta<sub>2</sub>-receptors in the lungs, resulting in relaxation of smooth muscles and bronchodilatation. Stimulation of beta- receptors of other part of the body as heart can cause tachycardia or arrhythmia, and in skeletal muscles can cause tremor. But these side effects are minor and disappear by continue use of the medicine. Glucocorticosteroids in inhaled form do not produce a sustainable results in mild cases of COPD but beneficial in moderate and severe conditions. It reduces the frequency of exacerbation and reduces the rate of decline of health related quality of life. The dose should be kept as low as possible and the patient should be observed for osteoporosis (Booker, 2005).

As Mr. Akram has problem in expectoration, Mucolytics in syrup form was advised. Mucolytic drugs make the secretions thin that promotes easy expectoration (Poole and Black, 2001). They have also been shown to reduce exacerbation rates. Mr. Akram was educated about the postural drainage and sputum expectoration. It should be considered when cough and sputum are a problem and should be continued if the patient shows improvement (National Collaborating Center for Chronic Conditions, 2004). Antibiotic was given to control infection. He was also instructed to watch for changes in his cough, sputum color or volume, as well as increase in temperature so he could get immediate medical treatment (Royle & Walsh, 1992).

Mr. Akram was also encouraged to change his life style to prevent exacerbations and frequent hospital admissions. Regular exercise that starts with walking was also advised. Physically active COPD patients show better functional status (Garcia-Aymerich *et al.*, 2009). He is at risk for depression due to lack of activities and social reluctance. Studies have shown that the risk of depression is high among COPD patients (van den Bemt *et al.*, 2009) and they have worse physical functioning than patients with other chronic

conditions. He was advised to minimize indoor pollution at home by using non-pollutant stove or cook in open air and family members should avoid smoking inside house. To prevent infection physician suggested him to get vaccination for flue and pneumococcal disease. He was referred to the pulmonary rehabilitation center after one week. It was informed to the family that, if he does not take his medicine regularly he will develop the complications soon like corpulmonale or respiratory failure (Royle & Walsh, 1992).

GOLD suggested that for the prevention and control of COPD the single most effective step is smoking cessation. It reduces exposure and cost that can be utilized for the treatment. Government of Pakistan has established the legislation to keep public places smoke free, but implementation is still an issue. Pakistan Chest Society observes that government is not actively implementing the law; out of 160 million population of Pakistan only three persons have been charged under the law promulgated since 2003 to prohibit smoking on public places (Pakistan Chest Society, 2007).

To prevent respiratory infections, patients with COPD should avoid, large gathering during flu and cold weather and exposure to individuals with known respiratory infections. The risk of these infections can be reduced by vaccination for influenza and

pneumococcal infections. Wearing a cold weather mask for patients with COPD can prevent dyspnoea and bronchospasm caused by cold air. Exposure to pollutants can be reduced by achieving proper ventilation or using non-polluting stoves. Respiratory protective equipment during work reduces the occupational exposure (Porth, 2014).

## CONCLUSION

The burden of chronic diseases has increased globally. Unfortunately, preventions and control of chronic diseases have always been ignored in our country. Although an action plan has been developed in recent past but this is not enough. Government should take concrete and immediate steps to minimize this burden and initiate public awareness programs about healthy life styles. Government should also take some serious steps for the implementation of anti smoking law. Health care professionals can also play a key role in educating patients about preventions and self management of chronic disease like COPD. There are many drugs that can help patients but these drugs alone cannot cure the ailment. Mr. Akram in his case has to change his lifestyle. Living in congested and polluted environment is a continued risk for him even if under the treatment of drugs. Drugs alone cannot make any difference in the improvement of the patient. Holistic care approach should be used to manage chronic disease. Furthermore, interdisciplinary approach

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