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Original Research Article.

A Prospective Study to Assess the Prevalence of Osteoporosis in COPD Patients Based on Dual Energy X-Ray Absorptiometry (DXA)

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ABSTRACT

Background: Chronic obstructive pulmonary disease (COPD) is a condition observed by a gradual airflow limitation that is not fully reversible and an inflammatory response of the lung to noxious particles and gases is observed. The amount of airflow limitation can be assessed by basic spirometry and stratified in accordance with the Global Initiative for Chronic Obstructive Pulmonary Disease, referred as GOLD. Although being mainly a pulmonary disease, there are significant extra-pulmonary effects in COPD also.

Materials and Methods: An elaborated study was conducted in Department of T. B & Chest and Department of Orthopaedics, Government Medical College, Barmer, Rajasthan (India) for a period of 18 months. A prior consent was obtained from the ethical board of our institute. A total of 78 patients diagnosed with COPD were included in the study, and were randomly divided into two groups.

Results: In total 78 patients diagnosed with COPD, 43 (55%) were male and 35 (45%) were female. (GRAPH1). In group A 39 patients suffering from COPD, 25 patients (64%) showed signs of osteoporosis and was confirmed by low values of BMD and based on dual energy x-ray absorptiometry (DXA). In group B out of 39 patients 21 patients (53%) showed signs of osteoporosis.

Conclusion: Prevalence of osteoporosis and osteopenia seems to be high in COPD suffering patients. Chances of osteoporosis in COPD are body composition measurements, measures of disease severity and corticosteroids.

Keywords: Corticosteroids, Osteoporosis, Osteopenia.

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INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a condition observed by a gradual airflow limitation that is not fully reversible and an inflammatory response of the lung to noxious particles and gases is observed.[1] The amount of airflow limitation can be assessed by basic spirometry and stratified in accordance with the Global Initiative for Chronic Obstructive Pulmonary Disease, referred as GOLD. Although being mainly a pulmonary disease, there are significant extra-pulmonary effects in COPD also.[2-5] Indeed, the GOLD guidelines included these extra-pulmonary effects in their definition of COPD. The examples of extra-pulmonary effects include increased arterial stiffness, skeletal muscle atrophy, systemic hypertension and osteoporosis.[6,7] Osteoporosis is a systemic skeletal condition characterised by a low bone mass and/or micro-architectural deterioration of bone tissue which leads to increased bone fragility and increased fracture risk.[8]

Other visible risk factors for osteoporosis in the general population are, among others, females, advancing age, low body weight, chronic glucocorticoid therapy and endocrine disorders such as hyperthyroidism and primary hyperparathyroidism.[9-11] In case of COPD, the occurrence of osteoporosis is assumed to be two- to five times higher than in age-matched subjects without any airflow obstruction.[12] The burden of osteoporosis varies with the chances of fracture risk. Fractures of the hip, vertebrae and forearm are the most common areas to be fractured in patients with osteoporosis, although fractures of other body parts might also be the result of osteoporosis. The present study was conducted to assess the prevalence of osteoporosis in subjects with COPD.

MATERIALS AND METHODS

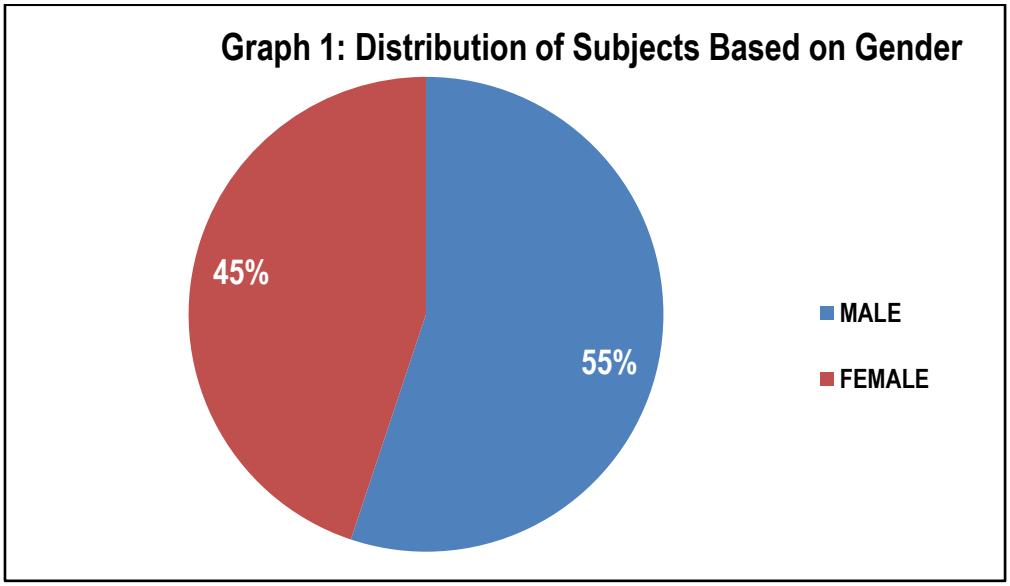
An elaborated study was conducted in Department of T. B & Chest and Department of Orthopaedics, Government Medical College, Barmer, Rajasthan (India) for a period of 18 months. A prior consent was obtained from the ethical board of our institute. A total of 78 patients diagnosed with COPD were included in the study, and were randomly divided into two groups. The inclusion criteria was kept simple, i.e. patient should be diagnosed from our institute, patient should be not less than 18 years of age and not

more than 65 years of age patients should have not received any bisphosphonate treatment at any instance of life. Any patients with history of AIDS, hepatitis and other immune compromised conditions were excluded from the study. Pregnant women and patients receiving any chemotherapy were also excluded from the study.

A mandatory CBC and bone mineral density test (BMD) was conducted on every patient. The results were confirmed for every patient with the help of dual energy x-ray absorptiometry (DXA).Any patients showing deficit in the bone density were marked as positive for osteoporosis. The reports were saved for future analysis. Patients of both groups i.e. group A (patients with COPD more than 3 years) and group B (patients with COPD less than 3 years) received medication for COPD as well as osteoporosis. It included lifestyle interventions in osteoporosis, bisphosphonates, calcium supplementation and vitamin D supplements. The results were then evaluated manually and later on interpreted electronically for data analysis.

Table 1: Features of subjects

GROUP	Symptoms Get Better After 6 Mts.	Symptoms Get Better After 12 Mts.	Symptoms Get Better After 18 Mts.
GROUP A	3	13	9
GROUP B	5	18	10



Graph 1: Genderwise Distribution

RESULTS

In total 78 patients diagnosed with COPD, 43 (55%) were male and 35 (45%) were female. (GRAPH1). In group A 39 patients suffering from COPD, 25 patients (64%) showed signs of osteoporosis and was confirmed by low values of BMD and based on dual energy x-ray absorptiometry (DXA).In group B out of 39 patients 21 patients (53%) showed signs of osteoporosis. The treatment so offered for 12 months was recorded and the results were analysed for next 6 months. All patients were followed up after every 15 days to evaluate the progress of the treatment offered. It was interesting to know that overall, female were more affected by osteoporosis than male. Group B patient showed better results than Group A patients. (Table 1)

DISCUSSION

The treatment of osteoporosis should consist of bisphosphonates in combination with calcium supplementation and with vitamin D supplements, because the values of these components are generally low in blood serum. The protective effect of bisphosphonates has been found in various studies.[13-15] However, no studies were able to investigate the drug treatment to prevent fractures in patients with osteoporotic COPD only. Yet no evidence was found that investigated the effect of lifestyle changes on BMD in COPD patients. However, in an RCT, lung transplantation patients who performed 6 months of proper exercise on a lumbar extensor machine significantly gained lumbar BMD. In our study, in group A 39 patients suffering from COPD, 25 patients (64%) showed signs of osteoporosis and was confirmed by low values of BMD and based on dual energy x-ray absorptiometry (DXA).In group B out of 39 patients 21 patients (53%) showed signs of osteoporosis. The treatment so offered for 12 months was recorded and the results were analysed for next 6 months. All patients were followed up after every 15 days to evaluate the progress of the treatment offered. It was interesting to know that overall, female were more affected by osteoporosis than male. Group B patient showed better results than Group A patients. Another RCT evaluated the effect of alendronate plus mechanical loading to alendronate alone and to control patients (without alendronate and without mechanical loading) in lung transplant patients.[16] The treatment of osteoporosis basically aims at fracture prevention and, according to the World Health Organization (WHO), should mainly consist of lifestyle modification (such as smoking cessation, weight-bearing physical

exercise and adequate calcium intake) and drug treatment. The drug treatment should consist of bisphosphonates, calcium supplementation. Majorly in COPD patients it is important to prevent vertebral fractures since they might result in a decreased forced vital capacity.[17] Also, (osteoporotic) hip fractures in COPD patients tend to show a greater problem than hip fractures in otherwise healthy subjects because of the increased operative risk in COPD patients.[18-20]

CONCLUSION

Prevalence of osteoporosis and osteopenia seems to be high in COPD suffering patients. Chances of osteoporosis in COPD are body composition measurements, measures of disease severity and corticosteroids.

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