# Prevalence and Therapy of Chronic Obstructive Disease in Karachi

Adeel Arsalan<sup>1</sup>, Zufi Shad<sup>2</sup>, Arif Sabah<sup>3</sup>, Farraukh Rafiq Ahmed<sup>4</sup>, Ayesha Malik<sup>5</sup>, Osama Shakeel<sup>6</sup>

## ABSTRACT

**Background:** Chronic obstructive pulmonary disease (COPD) has been one of the main causes of mortality worldwide. The impact of COPD has been increasing socio-economically over time to make COPD an alarming condition for health associated professionals due to the severity of prevalence and its expensive treatment. Due to COPD, patients not only suffer from the illness as well as the financial costs associated with it

Objectives: To determine the prevalence and the medication of COPD.

**Methods:** The medical records of patients suffering from COPD were collected from different tertiary care hospitals in Karachi from June 2011 to May 2012 comprising of middle adulthood to mature aged patients.

**Results:** Out of 1260 patients 174 (13.80%) were suffered from COPD. Nearly all the patients of COPD were associated with co-morbidity like diabetes mellitus, hypertension, urinary tract infections, renal failure, pneumonia, cardiovascular diseases, and other diseases. Anti-allergy, oxygen supply, intravenous and oral montilukast, atrovent and other nebulizers, cough syrups, inhalers, antibiotics, and other treatment were used for the treatment of COPD as directed by the world renowned guidelines for COPD.

**Conclusion:** The prevalence of COPD is high and is detected through a standalone pulmonary function test (PFT) e.g Spirometry, or in conjunction with a clinical examination. In most cases the guidelines provide by the British Thoracic Society, Americans Thoracic Society, and European Respiratory Society are used to treat COPD.

# <sup>1</sup> Adeel Arsalan Assistant Professor, Faculty of Pharmacy, Baqai Medical University <sup>2</sup> Zufi Shad Lecturer, Faculty of Pharmacy, Baqai Medical University. <sup>3</sup> Arif Sabah Assistant Professor, College of Pharmacy, Ziauddin University & Hospitals Karachi. <sup>4</sup> Farrukh Rafiq Ahmed Assistant Professor, College of Pharmacy, Ziauddin University & Hospitals Karachi. <sup>5</sup> Aysha Malik Faculty of Pharmacy, University of Karachi <sup>6</sup> Osama Shakeel MBBS (Student), Karachi Medical and Dental College. Corresponding Author Adeel Arsalan Pakistan Journal of Medicine and Dentistry 2013, Vol. 2 (04)

### **KEY WORDS:** Chronic Obstructive Pulmonary Disease; Prevalence; Treatment.

# INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is declared as the fourth main reason of death in the United States, exceeded only by cancer, heart disease, and cerebro-vascular accidents.<sup>11</sup> The impact of COPD has been increasing socioeconomically with passage of time. There are numerous hypotheses regarding the pathogenesis of COPD however the airway inflammation, proteolysis in the lungs, and oxidative stress have been attributed as the major causes of COPD.<sup>2</sup>

COPD, amongst leading causes of death for the last 30 years, has been projected to be the third leading cause of mortality by 2020.<sup>3</sup> It has been estimated that expenses on COPD was \$ 23 billion in 2000 and which may be increased to \$ 37.2 billion in 2004.<sup>4</sup> COPD is a lung disease in which the lungs are damaged, making it difficult to breathe with the loss of the elastic quality of air sacs (alveoli). Common signs and symptoms of COPD are coughing, increased sputum production, shortness of breath, and wheezing.<sup>5</sup>

Bronchodilators relax the muscles around the bronchi allow easier breathing. to Bronchodilators can be either short acting or long acting. Short-acting bronchodilators such as albuterol or ipratropium and long-acting bronchodilators including formoterol and salmaterol are usually used in severe condition. The American Thoracic Society has recommended anti-cholinergic as the first line of maintenance therapy for COPD patients. β-2agonists produce the desired effects by stimulating receptors in the sympathetic nervous system through dilation of muscles tissues around the airways. Theophylline, previously a widely prescribed COPD medication, has lost favor because of its side effects. Studies report that 10% of the patients of COPD have been shown a significant improvement in lung function when treated with corticosteroids.<sup>18</sup> Antibiotics are prescribed in COPD for prevention and cure of acute bronchial infections like acute bronchitis, sinusitis, and even pneumonia.<sup>19</sup>

Medications along with pulmonary rehabilitation programs have been recommended to prevent complications, prolong life, and improve quality COPD of life. treatment also include bronchodilators, steroids, and influenza and pneumococcal vaccines. The trend of increasing COPD mortality likely reflects the long latency period between smoking exposure and complications associated with COPD.<sup>16</sup>

# METHODOLOGY

This retrospective study was conducted at different tertiary care hospitals, Karachi, Pakistan. Medical records of patients attending medical units of different tertiary care hospitals from June 2011 to May 2012 and diagnosed through pulmonary function test (PFT). bronchodilator reversibility test (BRT), lung function test (LFT) and chest x-ray were reviewed. These patients included referrals from both outpatient and hospital inpatient services. Age, sex, co-morbid conditions such as diabetes mellitus, hypertension, urinary tract infections, renal failure. pneumonia, cardiovascular diseases, and other diseases, were reported complaints during COPD. The current treatment of COPD and symptomatic relief that followed was noted. The treatments consisted of medications like anti-allergy, oxygen supply, cough syrups, inhalers, antibiotics, intravenous and oral montilukast, atrovent and other nebulizers, and other treatment were noted. The risk factors associated with COPD diseases such as smoking were also noted.

# RESULTS

Observation and diagnosis revealed out of 1260 patients 174 had COPD. The age of patients on average was ≥40 years to ≤90 years. The patients were divided into five groups according to age as shown in Fig. 1. Patients were further classified based on gender as depicted in Fig. 2. It has been noticed that patients mainly suffer from difficulty in breathing or shortness of breath. Out of 101 male patients 32 were regular smokers, 11 were irregularly smokers, with only

Pakistan Journal of Medicine and Dentistry 2013, Vol. 2 (04)

7 female smokers. A large number of patients suffered from cough with sputum, chest pain, fever, irritation in throat and gastrointestinal tract (GIT) disturbance as shown in Table 1 and Fig. 3. The present study has revealed co-morbidity of diabetes mellitus, hypertension, urinary tract infections, renal failure, pneumonia, cardiovascular diseases, and other diseases associated with COPD as shown in Table 2 and Fig. 4.

The medications were prescribed according to the guidelines of the British Thoracic Society, Table 1: Complaints in COPD

Americans Thoracic Society, Global Initiative of Chronic Obstructive Lung Disease, and European Respiratory Society. It has been revealed from the current study that patients were generally prescribed cough syrups, antibiotics, and inhalers by way of treatment. The therapy of COPD such as anti-allergy, supply, oxygen intravenous and oral montilukast, ipratropium and other nebulizers, cough syrups, inhalers, antibiotics, and other medication as shown in Table 3 and Fig. 5. Few prescribed drug-drug interactions observed are discussed in the following section.

Age	No. of Patients	Sex	Complaints
		MF	

				Chest Pain	Dry Cough	Cough w Sputum	Difficult/ Shortness in breath	Fever/ Chills	GIT Disturbance / Vomiting/ Nausea	Sore Throat/ Irritation	Other
<40-50	34	18	16	15	13	21	27	12	07	12	18
51-60	23	14	09	17	09	12	21	13	11	17	16
61-70	57	32	25	31	21	33	52	36	30	29	26
71-80	48	34	14	23	21	27	44	37	41	37	29
81-90>	12	03	09	04	05	07	12	08	11	07	06

Table 2: Co-Morbidity with COPD

		Sex								
Age	No. of Patients	м	F							
			-	DM	HTN	HPC	UTI	RD	CVD	OD
<40-50	34	18	16	23	32	27	12	27	07	01
51-60	23	14	09	17	19	16	07	20	10	03
61-70	57	32	25	31	36	31	19	53	09	07
71-80	48	34	14	33	39	27	14	39	11	08
81-90>	12	03	09	09	11	08	07	10	09	06

F: Female

DM: Diadetes Mellitus

HTN: Hypertension

HPC: Hypercholestrolemia

UTI: Urinary Tract Infection

RD: Respiratory Disease (Pneumonia, Asthma, Bronchitis, Emphysema)

CVD: Cardiovascular Disease (Angina, Congestive Heart Failure, and Myocardial infarction)

OD: Other Diseases (Depression, Cancer, Gastrointestinal Problem, Joint Pain, Osteoporosis)

#### Table 3: Treatment of COPD

Age	No. of		Treatment									
	Patient	AA	OS	IV M	Oral M	Ν	С	CS		Α	ОТ	
<40-50	34	13	06	11	21	23	09	31	21	29	06	
51-60	23	11	09	07	13	11	09	21	31	21	09	
61-70	57	31	13	14	29	37	14	51	49	52	13	
71-80	48	27	19	21	19	31	13	47	39	46	15	
81-90>	12	09	11	07	05	08	04	11	12	12	03	
AA:	Anti-Allergy	Allergy										
OS:	Oxygen Supply											
IV M:	IV Montilukast											
Oral M:	Oral Montilukast											
N:	Nebulizer											
C:	Corticosteroids											
CS:	Cough Syrups											
1:	Inhalers											
A:	Antibiotics											
OT:	Other Trea	ther Treatements										

#### Figure 1: Number of COPD Patients



#### Figure 3: Complaints of COPD Patients



Figure 2: Gender of COPD Patients



Figure 4: Co-Morbidity with COPD



# DISCUSSION

COPD is a major health problem across the world with its prevalence inversely proportionate with socioeconomic status. COPD has been ranged from 3.2% in France to 5.4% in the Netherlands.  $^{20}$  WHO has reported 0.8% prevalence of COPD world-wide while.<sup>21</sup> Several other studies have also reported the prevalence of COPD to be approximately 4 to 6%.<sup>22,23</sup> Our study depicted similar results as that of Halbert et al. (2003) reporting COPD rates to be higher for male than female.<sup>21</sup> The present study has been supported by Alam (1998) in which prevalence of smoking was 21.6% while our study reports 28.73% patients were smokers.<sup>24</sup> COPD varies with age and smoking status, occurring rarely in individuals more than 40 years old, and less frequently in non-smokers. Nearly all physicians acknowledge that the first step in patient management is the cessation of smoking.25

There are many factors that may provoke the incidence of COPD like smoking, dust, pollen,  $\alpha$ -1 antitrypsin (AAT) deficiency, lung infections, and air pollution. Smoking or exposure to tobacco is a primary cause of COPD with the mortality ten times higher in smokers as compared to non-smokers<sup>6</sup>. The most striking example of the potential mismatch between risk factor exposure and COPD prevalence concerns the primary risk factor for COPD, cigarette smoking. Many countries or regions with high rates of smoking have a low reported COPD

prevalence. In some cases, local theories involving genetic differences have been developed to explain differences in the expected rates of COPD<sup>7</sup>. It has been proved that cough and sputum were also produced in COPD by exposure of dusts, chemicals, vapors, and fumes. The improvement in arterial blood gas tensions may leads to COPD and/or may establish respiratory muscle fatigue<sup>8</sup>. The diagnosis of COPD is based on the patient's symptoms including cough, sputum production, chest pain, and shortness of breath.

In recent years, pulmonary function test (PFT) which is also known as spirometry had wide application in diagnosis of clinical pulmonary diseases<sup>9</sup>. Bronchodilator reversibility testing (BRT) has been recommended in all patients with COPD<sup>10</sup>. Chest x-ray are necessary to detect COPD while ultrasound has not been traditionally used for investigating lung parenchyma<sup>11</sup>. It has been found that exercise capacity in patients with COPD have severe airways obstruction, with strong relations to inspiratory muscle strength and lung function<sup>12</sup>.

Pharmacotherapy has been used to relieve patient's symptoms and improve quality of life. Guidelines recommend short-acting bronchodilators as initial therapy for patients with mild or intermittent symptoms<sup>13</sup>. Oxygen therapy may be recommended to aid in the reduction of shortness of breath during COPD<sup>14</sup> however, for patients with severe COPD surgery is recommended<sup>15</sup>. Major are provided by the British Thoracic Society, Americans Thoracic Society, and European Respiratory Society to treat COPD. More recently, Global Initiative of Chronic Obstructive Lung Disease, a joint project of National Heart, Lung and Blood Institute and the World Health Organization has issued a major statement on COPD<sup>16</sup>.

COPD is characterized by airway inflammation and progressive airflow obstruction. Cough, breathlessness, and sputum production are the major symptoms of which patients complain<sup>26</sup>. In a study, respiratory symptoms of dyspnoea, sore throat, cough, and nasal congestion/discharge (cold) has been reported for COPD<sup>27</sup> while another depicted chest pain, shortness in breathing and co-morbidity like hypertension, renal failure, GIT problems during COPD<sup>28</sup>. The present study has revealed that chest pain, cough, shortness and/or difficulty in breathing, fever, GIT disturbance, and sore throat with 51.72%, 97.12%, 89.65%, 60.90%, 57.47%, and 58.62% respectively.

A study conducted by Mannino *et al.* has found diabetes (12.7%), hypertension (40.1%), and cardiovascular disease (15.2%) in patients<sup>29</sup>. While the present study found prevalence of diabetes mellitus (64.94%), hypertension (78.73%), and hypercholesterolemia (62.64%) in patients.

Observation reveals awareness of COPD in people is limited with physicians likely to under diagnose the condition, or categorize obstructive symptoms as asthma until proven otherwise. It is generally believed that inhaled corticosteroids have less potential for serious adverse effects than do systemic corticosteroids with the most adverse effects of inhaled common corticosteroids are local reactions caused by their deposition in the oropharynx<sup>30</sup>. The approach to therapy is variable, although recently a consensus statement on the optimal assessment and management of COPD has been published on behalf of the European Respiratory Society. The benefit of inhaled bronchodilators and inhaled corticosteroids has

# REFERENCES

been also debated by patients<sup>25</sup>. With respect to other bronchodilator classes, the majority of physicians (80%) prescribed ipratropium bromide for their COPD patients.

Anti-allergic has been prescribed in COPD patients. In COPD, carbon dioxide toxicity can be prevented by careful control of the supplemental oxygen<sup>31</sup>. Rubinstein et al. supported that COPD patients were treated by montelukast with moderate to severe condition<sup>32</sup>. Current guidelines recommend inhalation therapy (handheld inhalers pressurized metered-dose inhalers (pMDIs), dry powder inhalers (DPIs) - and nebulizers,) for treating COPD<sup>33</sup>. Inhaled beta-agonists alone are considered first-line medication, having been selected by 53% of physicians Antibiotics are also a major preventative therapy used to reduced COPD. Several studies have supported the use of antibiotics<sup>19,34</sup>. Oral antibiotics are the first choice of drug therapy of 63% of the time. The present study reveals medicines prescribed for COPD to be at par with international practices.

# CONCLUSION

COPD, one of the leading causes of mortality, can be minimized by reducing the risk factors like smoking, dust, pollen,  $\alpha$ -1 antitrypsin (AAT) deficiency, lung infections, and air pollution. Major guidelines have been provided by various societies to prevent and treat COPD. Smoking is one of the main factors of COPD and cessation can reduce the probability of COPD incurrence. The medicines commonly prescribed to treat or decrease worsening condition of COPD patients include short and long acting bronchodilators as initial therapy, bronchodilators short acting or long acting' B-2-agonists, corticosteroids and antibiotics. Oxygen therapy aid in the reduction of shortness of breath surgery has also been recommended. The prevalence of COPD varies and it is concluded that COPD aside from treatment, preventive measures need to be taken to reduce the prevalence of COPD.

<sup>&</sup>lt;sup>1</sup> Barnes PJ. Small airways in COPD. N Engl J Med. 2004; 350 (26): 2635-2637.

<sup>&</sup>lt;sup>2</sup> Chilosi M, Poletti V, Rossi A. The pathogenesis of COPD and IPF: Distincthorns of the same devil. Respir Res. 2012; 13:3.

<sup>&</sup>lt;sup>3</sup> Restrepo M, Mortensen EM, Pugh JA. COPD is associated with increased mortality in patients with community-acquired pneumonia. Eur Respir J. 2006; 28(2):346-351.

<sup>&</sup>lt;sup>4</sup> Stang P, Lydick E, Siberman C. The Prevalence of COPD Using Smoking Rates to Estimate Disease Frequency in the General Population. Chest. 2000; 117(5 Suppl 2):354S-359S.

<sup>5</sup> Pauwels RA, Rabe KF. Burden and clinical features of chronic obstructive pulmonary disease (COPD). Lancet. 2004; 364(9434):613-620.

<sup>6</sup> Afonso ASM, Verhamme K, Sturkenboom MCJM. COPD in the general population: Prevalence, incidence and survival. Respir Med. 2011; 105(12):1872-1884.

<sup>7</sup> Homma H, Yamanaka A, Tanimoto S. Diffuse panbronchiolitis. A disease of the transitional zone of the lung. Chest. 1983; 83(1):63-69.

<sup>8</sup> Bednarek M, Gorecka D, Wielgomas j. Smokers with airway obstructive are more likely to quit smoking. Thorax. 2006; 61(10):869-873.

<sup>9</sup> Matera MG, Page CP, Cazzola M. Novel bronchodilator for the treatment of chronic obstructive pulmonary disease. Trends Pharmacol Sci, 2011; 32(8), 495-506.

<sup>10</sup> Hnizdo E, Vallyathan V. Chronic obstructive pulmonary disease due to occupational exposure to silica dust review of epidemiological and pathological evidence. Occup Environ Med. 2003; 60(4):237-243.

<sup>11</sup> Armentia A, Asensio T, Subiza J, Arranz ML, Gil FJM. Living in towers as risk factor of pollen allergy. Allergy. 2004; 59(3):302-305.

<sup>12</sup> Silverman EK, Sandhaus RA. Clinical practice. Alpha1antitrypsin deficiency. N Engl J Med. 2009; 360(26):2749-2457.

<sup>13</sup> Wegner RE, Jorres RA, Kristen DK. Factor analysis of exercise capacity, dyspnoea ratings and lung function in patients with severe COPD. Eur Respir J. 1994; 7(4):725-729.

<sup>14</sup> Currie GP; Lipworth BJ. ABC of chronic obstructive pulmonary disease: Pharmacological management – inhaled treatment. Bri Med J. 2006; 332(7555)1439-1441.

<sup>15</sup> Criner GJ, O'Brien G, Furukawa S. Lung volume reduction surgery in ventilator-dependent COPD patients. Chest. 1996; 110(4):877-884.

<sup>16</sup> Barnes PJ, Stockley RA. COPD: Current therapeutic interventions and future approaches. Eur Respir J. 2005; 25(6):1084-1106.

<sup>17</sup> Lehmann S, Vollset SE, Nygaaerd HA, Gulsvik A. Factors determining performance of bronchodilator reversibility test in middle aged and elderly Respir Med. 2004; 98 (11):1071-1079.

 $^{18}$  Soriano JB, Kin VA, Pride NB, Vestbo J. Inhaled corticosteroids with/without long-acting  $\beta$ -agonists reduce the risk of rehospitalization and death in COPD patients. Am J Respir Med. 2003; 2(1): 67-74

<sup>19</sup> Attiya Siddiqi A and Sanjay Sethi S. Optimizing antibiotic selection in treating COPD exacerbations. Int J Chron Obstruct Pulmon Dis. 2008 March; 3(1): 31–44

<sup>20</sup> Rennard S, Decramer M, Calverley PM, Pride NB, Soriano JB, Vermeire PA, Vestbo J. Impact of COPD in North America and Europe in 2000: subjects' perspective of Confronting COPD International Survey. Eur Respir J. 2002; 20(4):799-805.

<sup>21</sup> Halbert RJ, Isonaka S, George D, Iqbal A. Interpreting COPD prevalence estimates: what is the true burden of disease? Chest. 2003; 123(5):1684-1692.

<sup>22</sup> Iqbal A, Schloss S, George D, Isonaka S. Worldwide guidelines for chronic obstructive pulmonary disease: a comparison of diagnosis and treatment recommendations. Respirology 2002; 7: 233-239

<sup>23</sup> Global Initiative for Chronic Obstructive Lung Disease. Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease. http://www.goldcopd.com/Guidelineitem.asp?I152&I25 1&intId5989 Date last updated: August 2005. Date last accessed: June 2013

<sup>24</sup> Alam SE. Prevalence and pattern of smoking in Pakistan. J. Pak Med. Asso, 1998; 48:64-66.

<sup>25</sup> Boyd G, Morice AH, Pounsford JC, Siebert M, Peslis N, Crawford C, on behalf of an international study group. An evaluation of salmeterol in the treatment of chronic obstructive pulmonary disease (COPD). Eur Respir J 1997; 10: 815-821

<sup>26</sup> Smith J, Woodcock A. Cough and its importance in COPD. International Journal of COPD 2006:1(3) 305-314.

<sup>27</sup> Donaldson GC, Wedzicha JA. COPD exacerbations 1:
Epidemiology. Thorax 2006;61:164-8. doi:
10.1136/thx.2005.041806

<sup>28</sup> Mahler DA, and Mackowiak JI. Evaluation of the Short-Form 36-Item Questionnaire to Measure Health-Related Quality of Life in Patients With COPD. Chest. 1995; 107(6):1585-1589.

<sup>29</sup> Mannino DM, Thorn D, Swensen A, Holguin F. Prevalence and outcomes of diabetes, hypertension and cardiovascular disease in COPD. Eur Respir J 2008; 32: 962-969.

<sup>30</sup> McEvoy CE, Niewoehner DE. Adverse Effects of Corticosteroid Therapy for COPD :A Critical Review. Chest. 1997;111(3):732-743. doi:10.1378/chest.111.3.732.

<sup>31</sup> Agustí, AG; Carrera, M,; Barbé, F; Muñoz, A; Togores, B (1999). Oxygen therapy during exacerbations of chronic obstructive pulmonary disease. Europ Resp J. 14 (4): 934-939.

<sup>32</sup> Rubinstein I, Kumar B, Schriever C. Long-term montelukast therapy in moderate to severe COPD-a preliminary observation. Respir Med. 2004; 98(2):134-138.

<sup>33</sup> Dhand R, Dolovich M, Chipps B, Myers TR, Restrepo R, Farrar JR. The role of nebulized therapy in the management of COPD: Evidence and recommendations. COPD. 2012; 9(1):58-72.

<sup>34</sup> Lee JS, Park DA, Hong Y, Jo KW, Lee SW, Huh JW, Oh YM, Lee SD. Systematic review and metaanalysis of prophylactic antibiotics in COPD and/or chronic bronchitis. Int J Tuberc Lung Dis. 2013; 17(2):153-162.