Journal of Advances in Medicine and Medical Research

22(6): 1-13, 2017; Article no.JAMMR.33207
Previously known as British Journal of Medicine and Medical Research
ISSN: 2231-0614, NLM ID: 101570965

Incidence and Outcome among COPD Patients Attending the Emergency Department of the King Abdul-Aziz Medical City Hospital, Riyadh, Saudi Arabia

Salem Al Qahtani[1], Noora Mumenah[2], Gadhah Al- Oshish[2], Sahar Al Joiser[2], Kavita Sudersanadas[3], Winnie Philip[4] and Shoeb Qureshi[5*]

[1]College of Applied Medical Sciences (COAMS), King Saud Bin Abdulaziz University for Health Sciences (KSAU-HS), King Abdul Aziz Medical City (KAMC), King Abdullah International Medical Research Centre (KAIMRC), National Guard Health Affairs (NGHA), Riyadh, KSA.
[2]Respiratory Program, COAMS, KSAU-HS, KAMC, KAIMRC, NGHA, Riyadh, KSA.
[3]Department of Nutrition, COAMS, KSAU-HS, KAMC, KAIMRC, NGHA, Riyadh, KSA.
[4]Department of Biostatistics, COAMS, KSAU-HS, KAMC, KAIMRC, NGHA, Riyadh, KSA.
[5]Department of Research, COAMS, KSAU-HS, KAMC, KAIMRC, NGHA, Riyadh, KSA.

Authors' contributions

This work was carried out in association between all authors. Author SAQ was the principal investigator of the research project, accountable for designing of the entire work. Authors NM, GAO and SAJ were responsible for the data collection, data management and assisted in collection of literature and write up. Authors KS and WP were liable for data analysis and for the write up. Author SQ assisted in writing and attending to comments of the referees and rewriting some parts of the manuscript. He was responsible to correspond with the journal. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JAMMR/2017/33207
Editor(s):
(1) Domenico Lapenna, Department of Medicine and Aging Sciences, University "G. d'Annunzio" Chieti-Pescara, Chieti, Italy.
(2) Andrea S. Melani, Antismoking Centre, Azienda Ospedaliera Senese, Italy.
(3) Murali P. Vettath, Department of Cardiovascular-Thoracic & HeartTransplantation, Director-International Center of Excellence in OPCAB surgery, Malabar Institute of Medical sciences, Govindapuram, Kozhikode, Kerala, India.
Reviewers:
(1) Salil K. Das, Meharry Medical College, USA.
(2) Charlene Babcock, Beaumont Hospital and Medical Center, USA.
(3) Mariusz Chabowski, Wroclaw Medical University, Poland.
Complete Peer review History: http://www.sciencedomain.org/review-history/19766

Original Research Article

Received 4th April 2017
Accepted 21st June 2017
Published 29th June 2017

**Corresponding author: E-mail: qsab2002@yahoo.co.in;*

ABSTRACT

Background: Chronic Obstructive Pulmonary Disease (COPD) is a common chronic lung disease.
Objectives: The aim of this study is to determine the incidence and outcome among the patients attending the emergency department of the King Abdul-Aziz Medical City (KAMC) Hospital, Riyadh and receiving a discharge diagnosis of COPD.
Methods: We reviewed all the charts of subjects attending the Emergency Department of the KAMC (King Abdul-Aziz Medical City) hospital in the period, from 1 June to 31 September 2016. We analyzed the chart of all subjects receiving a diagnosis of COPD. They formed the subjects of this retrospective study.
Results: Two hundred and ten subjects accessed the emergency department into the study period**.** We selected 140 subjects with mean (±SD) age of 71.9 (± 9.84) years; males 54, 38.6 %) with a discharge diagnosis of COPD. The incidence of COPD was 1.9%. The outcome of COPD management indicated that the majority of the subjects discharged with home ventilation were 85 (60.7%), 30(21.4%) subjects were shifted to different wards, whereas 22 (15.7%) were discharged in stable condition, while 3 (2.2%) died.
Conclusion: The study revealed a high pervasiveness of COPD (66.66%) among the Saudi patients. The outcome of COPD ranged from living with home ventilation to mortality.

Keywords: COPD; pervasiveness; occurrence; management; outcome.

1. INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a lung disease characterized by chronic obstruction of lung airflow limitation. Currently, this disease is the fourth highest cause of death in the world. Patients with COPD are frequently exposed to Human Rhinovirus, Respiratory Syncytial and Influenza Virus, as well as to Haemophilus influenza, Streptococcus pneumoniae, and Moraxella catarrhalis. These infectious agents are sometimes responsible for exacerbations increasing morbidity and mortality in COPD patients [1]. Pulmonary emphysema is a pathologic condition characterized by permanently enlarged airspaces distal to the terminal bronchiole with destruction of the alveolar walls. Functional information of the lungs is important to understand the pathophysiology of emphysema and that of COPD [2].

Smoking, asthma, and genetic problems (deficiency in alpha-1-antitrypsin) are the etiological bases of developing COPD. Smoking cessation is the most effective strategy for slowing down the progression of COPD and reducing mortality in the approximately 50% of patients with diagnosed COPD [3]. The results of various studies among nonsmokers show that some occupations are associated with an increased risk of developing COPD. The newly identified occupations with high COPD prevalence include machine operators, construction trades, financial record processing, cotton workers, farm machinery workers, construction workers, and bus drivers. To reduce the prevalence of COPD in the workplace, etiologic research and preventive interventions should focus on occupations at risk for occupational exposures [4]. Variants in FAM13A have been found in genome-wide association studies to associate with lung function in the general population as well as in several common chronic lung diseases such as COPD, asthma, as well as in idiopathic interstitial pneumonias. The redundancy of its genetic contribution in chronic lung diseases suggests a major function of this gene both in lung physiology and chronic lung disease [5].

COPD can be diagnosed according to symptoms, signs, and chest X- ray or pulmonary function test (PFT) which are strong indicators for COPD diagnosis. Symptoms involve productive cough, wheezing, and dyspnea on exertion. Signs include tachypnea, respiratory distress, usage of accessory muscles, elevated jugular venous pulse, cyanosis, edema fromcor-pulmonale, change in mental state due to hypercapnia and hypoxia, physiological distress and limitation on daily activity [6]. Measurements of lung function, including spirometry and body plethesmography, are easy to perform and are the current clinical standard for assessing disease severity. However, these lung functional techniques do not adequately explain the observed variability in clinical manifestations of disease and offer little insight into the relationship of lung structure and function [7]. In a study based on a combination of multi-detector

computed tomography scanning of an intact specimen with microcomputed tomography and histological analysis of lung tissue samples, Hogg [8] reported that the number of terminal bronchioles were reduced from approximately 44,500/lung pair in control (donor) lungs to approximately 4800/lung pair in lungs donated by individuals with very severe chronic obstructive lung disease stage 4 COPD treated by lung transplantation. High-resolution chest computed tomography is one of the most useful techniques available to verify destruction of airspace, attenuated vasculatures and hyper-lucent as well as hyper-inflated lungs [9].

Treatment recommendations can be divided into four elementary steps: the first step is the removal of all risk factors, the second is the standard therapy including inhaled bronchodilators, pulmonary rehabilitation and treatment of severe co morbidities, the third is the targeted therapy centered on clinical phenotypes of COPD. The fourth step is the treatment of respiratory insufficiency and palliative care of the terminal COPD [10]. Biomarkers (quantitative cell counts in sputum, fraction of nitric oxide in exhaled breath, various metabolites in exhaled breath) with a particular emphasis on how eosinophil and neutrophil counts in sputum are used to manage asthma and COPD [11]. Besides, these cost effective treatments, the pressurized metered dose inhalers and dry powder inhalers are the most widely used devices for inhalation therapy in asthma and COPD [12].

Notwithstanding the symptomatic and treatments for insidious conditions, the obstructive lung disorders are responsible for functional limitations and the deaths of millions of Americans and COPD is said to be the top 5 leading causes of death and the incidence is increasing [13]. The Breath Study Group [14] conducted a survey of COPD in eleven countries, namely; Algeria, Egypt, Jordan, Lebanon, Morocco, Pakistan, Saudi Arabia, Syria, Tunisia, Turkey and United Arab Emirates. They screened a total 62,086 subjects and identified 2,187 subjects were diagnosed with COPD.

COPD is one of the major health problem leading to death in the world, however; little is known about pervasiveness, occurrence and consequences of COPD among Saudi Population in Riyadh. This might lead to a delay in diagnosing patients and might result in a high risk for mortality and morbidity [15]. “The World Health Organization has estimated that approximately 44 million people – mainly men – suffer from COPD. By 2030, the number of cases will increase by 65% and COPD will become the fourth leading cause of death. In Europe, COPD affects up to 8%-10% of population above 30 years of age” [16].

The aim of the Study is to estimate the pervasiveness, occurrences and consequences of COPD patients attending KAMC which represents Saudi population.

2. MATERIALS AND METHODS

The period of the study was 6 months starting from 01 June to 31 September 2016 including the collection and analysis of data and computing of results. The materials and methods used in order to achieve the objectives of the study are elaborated as follows:

2.1 Study Area/Setting

The proposed study was conducted by using the data of patients with respiratory diseases from the Information database of Ministry of National Guard Health Affairs. The electronic medical record contained data on patient demographics, descriptions, patient reported signs and symptoms, diagnoses, treatment modalities, clinical and biochemical and microbiological assessments. The study was approved by the Institutional Review Board (IRB), King Abdullah Institutional Medical Research Center (KAIMRC).

2.2 Study Subjects

All registered patients of NGHA who visited the hospital, with history of respiratory diseases and newly diagnosed as COPD formed the subjects for the study. The inclusion criteria was for the patients of both genders (age ≥ 40 years), registered in NGHA for respiratory diseases for one year prior to the study.

2.3 Study Design, Sample size and Sampling Technique

Design of the proposed study was chart review. According to the data from NGHA, 210 patients (on an average) visited the Emergency Department with respiratory disorders per quarter of a year. The sample size was fixed to be 140 with 95% confidence level and 5% margin of error. Random sampling was used to select the

subjects. The calculation of incidence and prevalence was done by the following formulae.

Incidence of COPD =

$$\left(\frac{Number\ of\ new\ cases\ of\ COPD\ over\ a\ period\ of\ time}{Population\ at\ risk\ during\ that\ period}\right) \times 100$$

$$= \left(\frac{4}{210}\right) \times 100$$

= 1.9% (4)

Prevalence of COPD=

$$\left(\frac{Number\ of\ all\ (new+Old) cases\ of\ COPD\ over\ a\ period\ of\ time}{Population\ at\ risk\ during\ that\ period}\right) \times 100$$

$$= \left(\frac{4+136}{210}\right) \times 100$$

= 66.66% (140)

2.4 Data Collection Methods, Instruments Used, Measurements

All registered patients with a history of respiratory diseases were assessed with Global Initiative for Chronic Obstructive Lung Disease guidelines. Those who were confirmed COPD before the start of the study were screened out to assess the pervasiveness of COPD. Those who were diagnosed newly with COPD as per PFT (<0.70) were also selected for their data with respect to demographic characters along with past clinical history of selected patients and data with respect to descriptions, reported signs and symptoms, diagnoses, treatment modalities, clinical, biochemical and microbiological assessments were taken for the study.

2.5 Data Management and Analysis Plan

The collected data was recorded into Microsoft Excel before importing the same to SPSS (Version 22) for statistical analysis. The Wilcoxon signed-rank test was used. Data is presented as tables and figures. Frequencies and percentages were used for categorical variables. Continuous variables represented as mean and standard deviation. Population who are at risk of getting COPD during the study period, global clinic outcomes were used to assess the acute exacerbations by using indexes which are Saint George's Respiratory Questionnaire (SGRQ) and Chronic Respiratory Questionnaire (CRQ) [17,18]. SGRQ contains the symptoms, activity, and impacts, it also has a range from 0 (Normal) to 100 (Very ill patient). Whereas, CRQ contains dyspnea, fatigue, emotional function, and mastery, it has a score of seven (which is a good health) as when it becomes lower meant that the condition of the patient is worsening [19]. Miscellaneous outcomes are radiological examination to detect the abnormalities of lungs with COPD patient by using CXR and CT. Anxiety is an outcome which has to be considered among COPD patient in order to know how psychological functioning is associated with outcomes of this disease [20].

2.6 Ethical Consideration

Privacy and confidentiality were completely protected; no identifiers or personal information, including participant's name, IDs and others were leaked.

3. RESULTS

The results of the present study are detailed as follows:

3.1 Demography of the Subjects

The results of our study show that majority 61(43.6%) of the subjects belong to the age group of 70-80 years. The female patients constituted 86(61.4%).Hundred and five (75%) patients were married. Furthermore 135 (96.4%) of the subjects were unemployed. Among the patients 22(15.7%) were smokers, while 118(84.3%) were nonsmokers.

3.2 Pervasiveness and Occurrence of COPD

Among the 140 cases of COPD studied, the pervasiveness was calculated to be 66.66%. The calculated rate of occurrence of COPD was identified as 1.9 % (Table 1).

Table 1. Pervasiveness and occurrence of COPD

Cases of COPD	Percentage
Pervasiveness	66.66 (140)
Occurrence	1.9 (4)

Study design, sample size and sampling technique may be seen for clarification on percentage

3.3 Diagnostic Parameters at the Time of Hospital Admission

The major diagnostic parameters at the time of hospital admission are provided in Table 2.

As indicated in Table 2, parameters related to ABG such as pH and PO_2 were found decreased. The mean pH of the subjects was 7.31± 0.34 and the mean PO_2 was 61.84±19.35. In contrast, parameters like PCO_2 and HCO_3 found to be elevated. The mean PCO_2 was 62.74±14.67 and HCO_3 mean; 32.85 ± 6.44.Parameters related to vital signs such as Spo2 were found decreased (82.56 ±18.76), while other vital signs including Respiratory Rate (RR) and Temperature showed elevation. These means were 25.06 ± 5.13 and 38.69 ± 10.47 respectively. Heart Rate (HR, 91.84 ± 15.76), Systolic (129.10 ± 23.59) and Diastolic blood pressure (69.90 ±18.70) were found to be in the normal ranges.

3.4 Biomedical Parameters at the Time of Hospital Admission

The main biomedical parameters at the time of hospital admission are provided in Table 3. The means of parameters such as sodium (136.84±6.55), Potassium (4.51 ± 0.77), creatinine clearance (males, 124.57± 67.99 and females 113.31±84.78), and albumin (36.37±13.75) were found to be in the normal range. The hematological parameter WBC (12.25±33.10) showed an elevation where as platelets (258.03±98.15) was in the normal range.

3.5 Microbiological Analysis at Admission

Microbiological results at the time of hospital admission are given in Table 4. Ten patients (7%) positively had *Pseudomonas aeruginosa*. It was observed that majority (139, 99.3%) of the subjects indicated negative microbiological results and some of the subjects were infected with more than one microbe.

3.6 Management of COPD in Hospital

At the hospital, COPD patients were managed either by pharmacological, non-pharmacological or through pulmonary rehabilitation measures. The management of the COPD patients is provided in Table 5.

As detailed in the Table 5, pharmacologic management indicated that the majority (133, 95%) were prescribed with bronchodilators and 118(84.3%) with steroids. One hundred and thirty three (95%) of the subjects were on oxygen therapy through non pharmacologic management where as 120(85.7%) received non-invasive ventilation. COPD management by intubation was on 22(15.7%) patients and 9(6.4%) were managed with tracheostomy. The subjects who were under pulmonary rehabilitation were 26 (18.6%).

3.7 Pre- and Post-managerial Changes in Diagnostic Parameters

The major pre- and post-managerial changes in diagnostic parameters are listed in Table 6.

In comparison with pre-medical management, post-managerial parameters showed the following changes: With post-medical management: pH mean declined to 7.37 (±0.08), which appear to be within normal range. HCO_3 mean increased to 33.22 (±7.75), yet it is considered to be above the normal range. PO_2 mean increased to 66.32 (±18.37) which is below the normal range. On the other hand, PCO_2 showed a decrease in the mean 59.24 (±13.46) which is not within the normal range. Wilcoxon sign rank test indicated that the medical management in the hospital influenced the different ABG variables such as pH ($z = -5.71$; $p=0.001$), PCO_2 ($z= -3.95$; $p=0.001$) and PO_2 ($z= -3.29$; 0.001) which was statistically significant with a p value <0.05. The Vital Signs displayed the following changes after the medical management: HR, RR, Systolic blood pressure, Diastolic blood pressure, and Temperature found to decrease and within the normal ranges. HR mean 88.26 (±16.68), RR mean 23.26 (±4.69), Systolic blood pressure mean 126.36 (±19.99), Diastolic blood pressure mean 68.53 (±19.67), and Temperature mean 36.85 (±0.36). Only Spo_2 showed elevation and the mean was 92.57 (±3.04) and it is considered to be within normal ranges. Wilcoxon sign rank test indicated that the medical management in the hospital significantly influenced the different vital signs variables such as HR ($z= -2.77$; $p=0.006$), RR ($z= -3.29$; $p= 0.001$), SPO_2 ($z= -7.36$; $p= 0.001$) and Temperature ($z= -2.95$, $p= 0.003$) with p value <0.05.

3.8 Pre-and Post-managerial Changes in Biomedical Parameters

In comparison with Pre-hospital management, Post-hospital management biomedical parameters showed the following changes in Table 7. The Parameter which showed elevation, yet considered within normal range was Albumin. On the other hand, Creatinine clearance, Sodium and Potassium levels were decreased, but it was

considered within normal range. Hematological parameters after medical management were as follows: WBC mean showed elevation and not in the normal range. Platelets mean was decreased, but it was considered to be within the normal range. Post management means were as follows: Sodium 135.24 (±7.77), Potassium 4.23 (± 0.62), Creatinine clearance levels in males 112.52 (± 55.76) and in females 101.97 (± 76.35), albumin 51.13 (± 33.75).

Wilcoxon sign rank test indicated that the medical management in the hospital influenced the biomedical and hematological parameters such as Potassium (Z=-3.17; p=0.002*), and platelets (Z=-2.09; p=0.037) which was statistically significant with p value <0.05.

3.9 COPD Patients Outcome

Hospital outcome of COPD patients are given in Table 8 and Fig 1. Among 140 COPD patients, the majority (85, 60.7%) required home ventilation and 30 (21.4%) were shifted to Wards in the hospital. Twenty two (15.7%) were in a stable condition, and 3 (2.2%) died during the hospital stay.

4. DISCUSSION

The study was conducted to find the pervasiveness, occurrence and consequences of COPD among Saudi patients attending KAMC. The results of the study are discussed as follows:

4.1 Demography of the Subjects

The demographic details of the subjects indicated that majority of the patients were in advance age group, our observation is supported by earlier studies [19], which reported that adults of ≥40 years are at risk of having COPD. On a gender comparison, we found COPD is more common among females. Although various studies conclude prevalence of COPD in men is higher than women, there are studies which found the disease is markedly increased in women [21]. Although, cigarette smoking was considered one of the major etiological factors for COPD, majority (118, 84.3%) in our present

Table 2. Diagnostic parameters at the time of hospital admission

Diagnostic parameter ABG	Mean ± SD	Reference value
pH	7.31 ± 0.34	7.35-7.45
Pco_2 (mmHg)	62.74 ± 14.67	35-45
Po_2 (mmHg)	61.84 ± 19.35	80-100
Hco_3 (mEq\L)	32.85 ± 6.44	22-26
Vital signs		
HR (Beats\min)	91.84 ± 15.76	60-100
RR (breaths\min)	25.06 ± 5.13	12-18
Spo_2 (%)	82.56 ± 18.76	>90
Systolic BP (mmHg)	129.10 ± 23.59	90-140
Diastolic BP (mmHg)	69.90 ± 18.70	60-90
Temperature (°C)	38.69 ± 10.47	36.6- 37

Table 3. Biomedical parameters at the time of hospital admission

Biomedical parameter	Mean ± SD	Reference value
Sodium (mEq/L)	136.84±6.55	135-145
Potassium (mEq/L)	4.51 ± 0.77	3.5-5.0
Creatinine clearance (*mL/min*)	**Males:** 124.57±67.99	**Males:** 97 to 137
	Females:113.31±84.78	**Females:** 88-128
	All:117.66±78.67	
Albumin (g/liter)	36.37±13.75	35-55
Hematological variables		
WBC ($x10^9$/L)	12.25±33.10	4.00-11.0
Platelet ($x10^9$/L)	258.03±98.15	150 – 400

Table 4. Microbiological results at the time of hospital admission

Microorganism	Details of subjects*	
	Positive	Negative
Haemophilus_influenzae	1 (0.7)	139 (99.3)
Streptococcus_pneumoniae	1 (0.7)	139 (99.3)
MRSA	6(4.3)	134 (95.7)
Pseudomonas aeruginosa	10(7.3)	130(92.7)
Influenza A PCR	7(5)	133(95)
Influenza B (ssRNA)	3(2.2)	137(97.8)
Staphylococcus_aureus	2(1.4)	138(98.6)
Growth of yeast	1(0.7)	139(99.3)
Gram positive cocci	3(2.2)	137(97.8)
Klebsiella_pneumoniae	3(2.2)	137(97.8)
Escherichia_coli	2(1.4)	138(98.6)
H1N1	1(0.7)	139(99.3)
Candida albicans	1(0.7)	139(99.3)
Hepatits B	2(1.4)	138(98.6)
Respiratory Syncytial virus	3(2.2)	137(97.8)
Enterobacter cloacae	1(0.7)	139 (99.3)
Flu A	2(1.4)	138(98.6)
Flu B	1(0.7)	139(99.3)
Gram positive rods	1(0.7)	139(99.3)

**Numbers between the parentheses indicate percentage*

Table 5. Management of COPD in hospital

Type of management	Number of subjects*
Pharmacologic management	
Bronchodilator	133 (95)
Steroids	118 (84.3)
Non-pharmacologic management	
Oxygen therapy	133 (95)
Non-invasive ventilation	120 (85.7)
Invasive ventilation	22 (15.7)
Tracheostomy	9(6.4)
Pulmonary rehabilitation	26 (18.6)

**Numbers in parenthesis indicate percentage*

study were accounted for COPD without smoking history, while, Kotz et al. [22] found 228 smokers from the general population with an undetected COPD. Hence, it is difficult to link the smoking habit as a cause of COPD, especially when there are many other etiological factors responsible for COPD. Another reason of having more number of non-smokers may be due to the fact that the study was conducted in female patients and the Saudi culture does not permit smoking among females.

4.2 Pervasiveness and Occurrence of COPD

The current study on the pervasiveness and occurrence was among 140 cases of COPD. The pervasiveness of COPD was calculated and observed as (66.66%), while the calculated rate of occurrence of COPD was 1.9%. Other studies related to the pervasiveness and occurrence indicated increasing numbers of COPD cases [23].

4.3 Diagnostic Parameters at the Time of Hospital Admission

The study included vital signs at the time of hospital admission to conform that patients were experiencing the symptoms of this disease such as: decrease in Spo_2 (%). These changes demonstrate the typical signs of desaturation that represent patients with COPD in various cases [24]. ABG parameters in this study showed that pH and PO_2 were found decreased. In contrast, parameters like PCO_2 and HCO_3 found elevated.

Similarly, a study conducted for COPD patients indicated that in comparison with a normal person, COPD patients will have certain changes in ABG due to the pathophysiology of the disease. The study further showed ABG parameter in COPD showed decrease in pH, PO_2, while the PCO_2 and HCO_3 were increased, which is found similar to an earlier observation [25].

4.4 Biomedical Parameters at the Time of Hospital Admission

In this study, biomedical parameters showed that Sodium, Potassium, Creatinine clearance, and Albumin were in the normal range in both male and female patients. In contrast, a study conducted for Dyselectrolytemia in COPD patients found sodium and potassium to decrease [26]. Another study explained that COPD patients' creatinine level was usually high due to the disease pathophysiology [27]. The Hematological parameters, that include WBC showed elevation and the Platelets were in normal ranges. Fattouh and Alkady [28] in a similar study showed WBC to elevate, while Gulfidan [29] found platelets to increase in COPD patients.

Table 6. Pre- and post-managerial changes in diagnostic parameters

Parameter ABG	Mean ± SD		Value	Test statistic	p value
	Pre-management	Post-management			
pH	7.31 ± 0.34	7.37 ± 0.08	7.35-.45	Z = -5.71	0.001*
Pco_2 (mmHg)	62.74 ± 14.67	59.24 ± 13.46	35-45	Z = -3.95	0.001*
Po_2 (mmHg)	61.84 ± 19.35	66.32 ± 18.37	80-100	Z = -3.29	0.001*
Hco_3 (mEq\L)	32.85 ± 6.44	33.22 ± 7.75	22-26	Z = -0.18	0.856
Vital signs					
HR (Beats\min)	91.84 ± 15.76	88.26 ± 16.68	60-100	Z = -2.77	0.006*
RR (Breaths\min)	25.06 ± 5.13	23.26 ± 4.69	12-18	Z = -3.29	0.001*
Spo_2 (%)	82.56 ± 18.76	92.57 ± 3.04	>90	Z = -7.36	0.001*
Systolic BP (mmHg)	129.10 ± 23.59	126.36 ± 19.99	90-140	Z = -0.95	0.341
Diastolic BP (mmHg)	69.90 ± 18.70	68.53 ± 19.67	60-90	Z = -1.04	0.299
Temperature (^{0}C)	38.69 ± 10.47	36.85 ± 0.36	36.6-37	Z = -2.95	0.003*

**Significant at 5%*

Table 7. Pre- and post-managerial changes in biomedical parameters

Biomedical parameters	Mean ± SD		Reference values	Test statistic	p value
	Pre- management	Post- management			
Sodium (mEq/L)	136.84±6.55	135.24 ± 7.77	135-145	Z = -0.25	0.806
Potassium (mEq/L)	4.51 ± 0.77	4.23±0.62	3.5-5.0	Z = -3.17	0.002*
Creatinine (mL/min)	**Males:** 124.57±67.99	**Males:** 112.52 ± 55.76;	**Males:** 97 - 137;	Z = -0.72	0.474
	Females: 113.31±84.78 All:117.66±78.67	**Females:** 101.97 ± 76.35	**Females:** 88-128	Z = -0.99	0.318
Albumin (g/liter)	36.37±13.75	51.13 ± 33.75	35-55	Z = -1.53	0.125
Hematological variables					
WBC (x10^9/L)	12.25±33.10	18.34 ± 42.53	4.00-11.00	Z = -0.71	0.480
Platelet (x10^9/L)	258.03±98.15	243.21 ± 101.48	150 - 400	Z = -2.09	0.037*

**Significant at 5%*

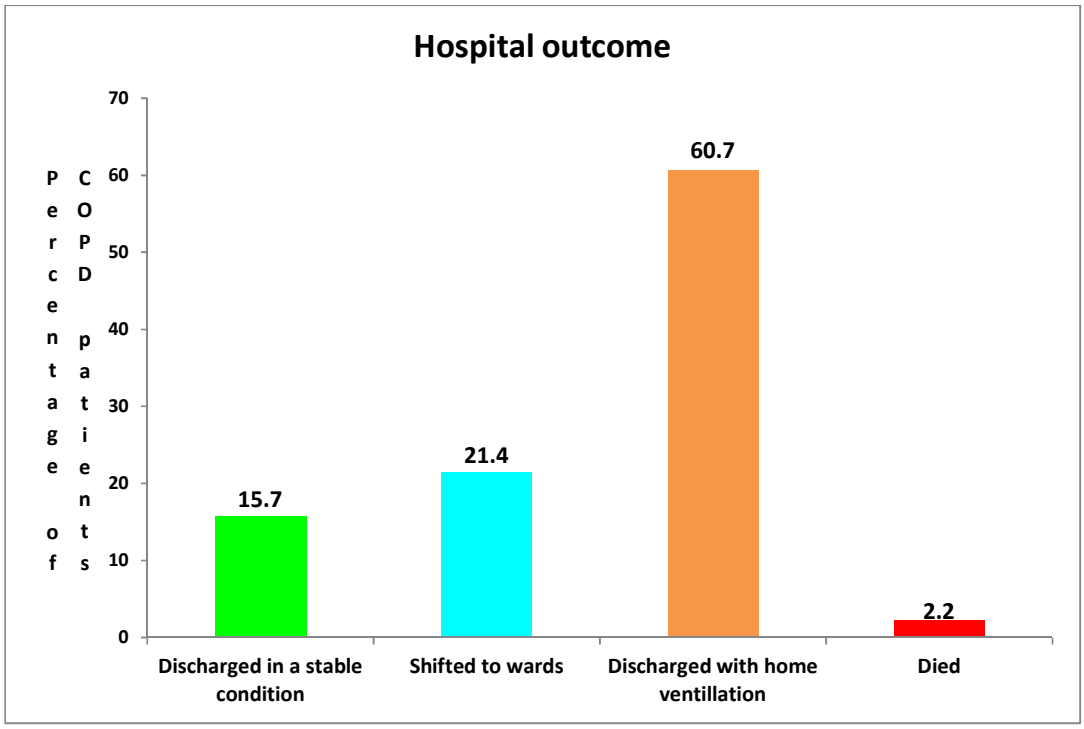

Fig. 1. Bar diagram showing the hospital outcome of COPD patients

Table 8. COPD patients' outcome

Hospital outcome	Number of subjects*
Discharged in a stable condition	22 (15.7)
Shifted to other wards	30 (21.4)
Discharged with home ventilation	85 (60.7)
Died during the hospital stay	3 (2.2)
Total	140 (100)

** Numbers between parentheses indicate percentage*

4.5 Microbiological Analysis at Admission

Majority of the subjects in this study indicated negative microbiological results. Ten (7.3%) of the patients positively had *Pseudomonas aeruginosa*. In contrast, Hunter and King [30] showed most of the COPD exacerbation cases were caused by Streptococcus pneumonia, *Haemophilus* influenza and *Moraxella catarrhalis*.

4.6 Management of COPD in Hospital

The findings of the study showed that 133 (95%) of the patients were prescribed with bronchodilators and 118 (84.3%) with steroids, this observation is supported by WHO on the pharmacological treatment of COPD. Bronchodilators and steroids are medications which relieve the abstraction of the airway and were proved to be a significantly effective treatment [31]. One hundred and thirty three (95%) patients were on oxygen therapy and 120(85.7%) of the subjects received non-invasive ventilation. Previous studies showed that noninvasive ventilation improves gas exchange and respiratory muscle use in these patients [32]. COPD management by intubation was found in 22 (15.7%) patients which is considered low in comparison to previous studies with 57.6 per cent intubated patients [33]. The reason behind low percentage in this study was the good management of COPD patients by skilled respiratory therapists: oxygen therapy, non-invasive ventilation, and pharmacological managements. Nine (6.4%) patients were managed with tracheostomy. Twenty six (18.6%) subjects were under pulmonary rehabilitation, and there were studies that supported the pulmonary rehabilitation programs to increase daily physical activate and improve the quality of life [34].

4.7 Pre-and Post-managerial Changes in Diagnostic Parameters

Our study compared the pre-medical management with the post managerial parameters which showed the following changes: With post-medical management, the pH mean was within normal range. The HCO_3 mean increased above the normal range. PO_2 mean increased below the normal range. On the other hand, Pco_2 showed a decrease in the mean which was not within the normal range. The Vital Signs displayed the following changes after the medical management: HR, Systolic blood pressure, Diastolic blood pressure, and Temperature were found to decrease within the normal ranges. RR mean decreased above the normal range. SPO_2 showed elevation and the mean was within normal ranges. A comparison with other studies could not be made as there is no study similar to pre-and post-managerial changes in diagnostic parameters.

4.8 Pre-and Post-managerial Changes in Biomedical Parameters

The study on the pre- and post-managerial changes in biomedical parameters showed, increase of Albumin within the normal range and decrease in the sodium, potassium and creatinine clearance levels (in males and females) which was also within the normal range. For the hematological parameters, the WBC elevated but not in the normal range, on other hand, the platelets decreased within the normal range. A comparison with other work was not possible because there has been no study similar to pre-and post-managerial changes in biomedical parameters.

4.9 COPD Patients Outcomes

The majority of the subjects required home ventilation (noninvasive ventilation provided at home) [35]. A study on Impact of noninvasive home ventilation on long-term survival in chronic hypercapnia COPD proved that noninvasive ventilation was associated with improved survival and decreased hospitalizations in patients with COPD [36]. The per cent mortality during the hospital stay was 2.2. This is very less as compared to the percentage of mortality (33.1 per cent) that occurred in another study carried out in the Osmangazi University, Medical Faculty, Department of Chest Diseases [33]. COPD patients who were discharge in a stable condition accounts for 15.7 per cent after they were managed by oxygen therapy, bronchodilators, and systemic corticosteroids which is supported by other studies as an intervention [35]. Some of the patients (21.4 per cent) were shifted to Wards in the hospital this means that COPD is required more medical care which is increase the cost for patients. It is estimated that on an average each adult with COPD paid USD 6000 more in medical care than an adult without COPD [22].

5. LIMITATIONS

The major limitations of the study were the small sample size and limited time allowed for collecting the data. Lack of similar studies in KSA set a constraint while discussing the findings of the study. Also, the researchers found that the patient's files did not include the contributing factors that lead to COPD which was the major constraint during the conduct of the study.

6. CONCLUSION

Chronic Obstructive Pulmonary Disease is described as an airway obstruction that leads to airflow limitation and accumulation of secretions resulting from loss of lung elasticity by dust exposure and inflammatory mediator's response. COPD is one of the causes of high morbidity and mortality in the world. According to GOLD, COPD can be diagnosed by pulmonary function test, which is performed by spirometry. Patients who were confirmed COPD before the start of the study were screened out to assess the pervasiveness of COPD. Patients who were diagnosed newly with COPD as per PFT (<0.70) selected and monitored for the occurrence and consequences of COPD. In this study, the pervasiveness of COPD was 66.66 per cent, while the occurrence was 1.9 per cent among Saudi population. The diagnostic parameters used in this study were PFT, ABG, and vital signs. The consequences of COPD were: 85 (60.7%) of COPD patients were requiring home ventilation, 30 (21.4%) were shifted from ICU to general ward requiring continuance medical care, 22(15.7%) were discharged from hospital in a stable condition, and 3 (2.2%) died during hospital stay. The result of the study can be used in making policies with respect to the facilities to be premeditated for COPD patients.

7. RECOMMENDATIONS

Activate an awareness day of COPD in Saudi Arabia, so people will have general idea about the disease and how to prevent it. Also, emphasize the important role of PFT in diagnosing COPD in early stage.

CONSENT

It is not applicable.

ETHICAL APPROVAL

As per international standard or university standard, written approval of Ethics committee has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Moreno D, Barroso J, Garcia A. Vaccines for patients with COPD. Recent Pat Inflamm Allergy Drug Discov. 2015;9:23-30.
2. Lee SM, Seo JB, Hwang HJ, Kim EY, Oh SY, Kim JE. Thoracic magnetic resonance imaging for the evaluation of pulmonary emphysema. J Thorac Imaging. 2013;28: 160-70.
3. Tashkin DP. Smoking cessation in chronic obstructive pulmonary disease. Semin Respir Crit Care Med. 2015;36:491-507.
4. Bang KM. Chronic obstructive pulmonary disease in nonsmokers by occupation and exposure: A brief review. Curr Opin Pulm Med. 2015;21:149-54.
5. Corvol H, Hodges CA, Drumm ML, Guillot L. Moving beyond genetics: Is FAM13A a major biological contributor in lung physiology and chronic lung diseases? J Med Genet. 2014;51:646-9.
6. Uzaslan E, Mahboub B, Beji M, Nejjari C, Tageldin MA, Khan JA, Nafti S, Obeidat NM, Sayiner A, Wali S, Rashid N, El Hasnaoui A, BREATHE Study Group. The burden of chronic obstructive pulmonary disease in the Middle East and North Africa: results of the BREATHE study. Respir Med. 2012;106(Suppl 2):S45-59.
7. Washko GR, Parraga G, Coxson HO. Quantitative pulmonary imaging using computed tomography and magnetic resonance imaging. Respirology. 2012;17: 432-44.
8. Hogg JC. A brief review of chronic obstructive pulmonary disease. Can Respir J. 2012;19:381-4.
9. Edwards RM, Kicska G, Schmidt R, Pipavath SN. Imaging of small airways and emphysema. Clin Chest Med. 2015;36: 335-47.
10. Koblizek V, Chlumsky J, Zindr V, Neumannova K, Zatloukal J, Sedlak V, Kocianova J, Zatloukal J, Novotna B. Chronic obstructive pulmonary disease in the light of new guidelines – brief summary of phenotypically oriented guidelines for nonpulmonary physicians. VnitrLek. 2013; 59:505-14.
11. Dasgupta A, Nair P. When are biomarkers useful in the management of airway diseases? Pol Arch Med Wewn. 2013; 123:183-8.
12. Salvi S, Gogtay J, Aggarwal B. Use of breath-actuated inhalersin patients with asthma and COPD – an advance in inhalational therapy: A systematic review. Expert Rev Respir Med. 2014;8:89-99.
13. Hall M. Chronic obstructive pulmonary disease and asthma. Home Healthc Nurse. 2012;30:603-12.
14. Polatli M, Ben Kheder A, Wali S, Javed A, Khattab A, Mahboub B, Iraqi G, Nejjari C, Tarigh S, Koniski ML, Rashid N, El Hasnaoui A, BREATHE Sudy Group. Chronic obstructive pulmonary disease and associated healthcare resource consumption in the Middle East and North Afriuca: The Breathe study. Respir Med, 2012;106(Suppl 2):S75-85.
15. Al Ghobain M. The prevalence of chronic obstructive pulmonary disease in Saudi Arabia: Where do we stand? Ann Thorac Med. 2011;6:185-6.
16. Izabella Uchmanowicz, Beata Jankowska-Polanska, Urszula Motowidlo, Bartosz Uchmanowicz, Mariusz Chabowski. Assessment of illness acceptance by patients with COPD and the prevalence of depression and anxiety in COPD. International Journal of COPD. 2016;11: 963–970.
17. Beretta L, Santaniello A, Lemos A, Masciocchi M, Scorza R. Validity of the

saint George's respiratory questionnaire in the evaluation of the health-related quality of life in patients with interstitial lung disease secondary to systemic sclerosis. Rheumatology. 2007;46:296-301.

18. Reda AA, Kotz D, Kocks JWH, Wesseling G, Schayck CPV. Reliability and validity of the clinical COPD questionnaire and chronic respiratory questionnaire. Respiratory Medicine. 2010;104:1675-1682
19. Schunemann HJ, Puhan M, Goldstein R, Jaeschke R, Guyatt GH. Measurement properties and interpretability of the chronic respiratory disease questionnaire (CRQ). COPD: J Chronic Obstructive Pulmonary Dis. 2005;2:81–89.
20. Eisner MD, Blanc PD, Yelin EH, Katz PP, Sanchez G, Iribarren C, Theodore A, Omachi TA. The influence of anxiety on health outcomes in COPD. Thorax. 2010; 65:229–234.
21. Han MK, Postma D, Mannino DM, Giardino ND, Buist S, Curtis JL, Martinez FJ. Gender and chronic obstructive pulmonary disease: Why it matters. American Journal of Respiratory and Critical Care Medicine. 2007;176:1179-1184.
22. Kotz D, Huibers MJ, West RJ, Wesseling G, van Schayck OC. What mediates the effect of confrontational counselling on smoking cessation in smokers with COPD? Patient Educ Couns. 2009;76:16-24.
23. Ana SA, Katia MV, Miriam CS, Guy GB. COPD in the general population: Prevalence, incidence and survival. Respiratory Medicine. 2011;105:1872–1884.
24. Julie Depiazzi J, Everard ML. Dysfunctional breathing and reaching one's physiological limit as causes of exercise-induced. Dyspnea. Breathe (Sheff). 2016;12:120–129.
25. Rogliani P, Ora J, Ciaprini C, Senis L, Stirpe E, Cazzola M. Effect of indacaterol on arterial blood gases in patients suffering from acute exacerbation of COPD. Respir Med. 2014;108:307-13.
26. Das P, Bandyopadhay M, Baral K, Paul R, Banerjee AK. Dyselectrolytemia in chronic obstructive pulmonary diseases with acute exacerbation. Niger J Physiol Sci. 2010;25: 25-7.
27. Mohan A, Premanand R, Reddy LN, Rao MH, Sharma SK, Kamity R, Bollineni S. Clinical presentation and predictors of outcome in patients with severe acute exacerbation of chronic obstructive pulmonary disease requiring admission to intensive care unit. BMC Pulm Med. 2006; 6:27.
28. Fattouh M, Alkjady O. Inflammatory biomarkers in chronic obstructive pulmonary disease. Egyptian Journal of Chest Diseases and Tuberculosis. 2014; 63:799-804.
29. Gulfidan Cakmak, Zuhal Aydan Saglam, Tayyibe Saler, Mustafa Yenigun, Esra Ataoglu, Levent Umit Temiz, Tuncalp Demir. Platelets: Indicator of inflammation in COPD. International Journal of Medicine and Medical Sciences. 2009;1: 227-229.

    Available:http://www.academicjournals.org/ijmms 2009 Academic Journals Short Communication
30. Hunter MH, King DE. COPD: Management of acute exacerbations and chronic stable disease. Am Fam Physician. 2001;64:603-613.
31. Celli BR, MacNee W; ATS/ERS Task Force. Standards for the diagnosis and treatment of patients with COPD: A summary of the ATS/ERS position paper. Eur Respir J. 2004;23:932-46.
32. Joe MMN, Joan BS, Santiago JC, Ana B, Celli BR. Outcomes in patients with chronic obstructive pulmonary disease and obstructive sleep apnea. American Journal of Respiratory and Critical Care Medicine. 2010;182:325-31.
33. Irfan U, Muzaffer M, Hale M, Fusun A, Huseyin Y, Sinan Erginel. Predictors of hospital outcome and intubation in COPD patients admitted to the respiratory ICU for acute hypercapnic respiratory failure. Respiratory Medicine. 2006;100: 66–74.
34. Bettoncelli G, Blasi F, Brusasco V, Centanni S, Corrado A, Benedetto FD, et al. The clinical and integrated management of COPD. An official document of AIMAR (Interdisciplinary Association for Research in Lung Disease), AIPO (Italian Association of Hospital Pulmonologists), SIMER (Italian Society of Respiratory Medicine), SIMG (Italian Society of General Medicine).

Multidisciplinary Respiratory Medicine, 2014;9:25.

35. Budweiser S, Hitzl AP, Jörres RA, Heinemann F, Arzt M, Schroll S, Pfeifer M. Impact of noninvasive home ventilation on long-term survival in chronic hypercapnic COPD: A prospective observational study. Int J Clin Pract. 2007;61:1516-22.

36. Talag AA, Road J. Non-pharmacological management of chronic obstructive pulmonary disease. BCMJ. 2008;50: 90-96.

© 2017 Al Qahtani et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:
The peer review history for this paper can be accessed here:
http://sciencedomain.org/review-history/19766