ORIGINAL ARTICLE

ECHOCARDIOGRAPHIC FINDINGS IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) PATIENTS

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ABSTRACT

OBJECTIVE: To highlight the echocardiographic findings in all types of COPD patients.

METHODOLOGY: This prospective study was conducted in pulmonology and cardiology departments of Khalifa Gulnawaz Teaching Hospital Bannu from 1st June 2012 to 15th December 2012. This study included 52 clinically stable COPD male and female patients. This was a prospective descriptive study using non probability convenient sampling technique. Results were analyzed by SPSS version 17.

RESULTS: A total of 52 patients were included in the study. The age range was 40-100 years. The mean age was 60.18 years with Std deviation ±11.677 years. There were 61.5% male and 38.5% females in the study. Pulmonary arterial hypertension (PAH) was present in 65.4% patients with sub classification of mild PAH 10 (29.4%), moderate PAH 15(44.1%) and severe PAH 9(26.4%).Corpulmonale was found in 17 (32.7%) patients .Tricuspid regurgitation (TR) was recorded in 34 patients. All female patients had PAH.

CONCLUSION: This study shows high prevalence of COPD in this area with high frequency of female patients and also all females developed PAH. This issue needs more research whether this is due to domestic smoke or some other factors like snuff addiction in females.

KEYWORDS: Chronic obstructive pulmonary disease, Echocardiography, pulmonary arterial hypertension, Corpulmonale

INTRODUCTION:

Chronic obstructive pulmonary disease (COPD) is an important cause of death and disability worldwide and is expected to be the 3rd and 5th leading cause of mortality and morbidity respectively in 2020[1].COPD being defined by GOLD Guidelines is a preventable and treatable disease with some significant extra pulmonary effects[2]. Among the extra pulmonary effects heart is very commonly affected by COPD leading to about 50% admissions in hospitals if FEV_1 is less than 50%[3].COPD can affect pulmonary blood vessels, right side of the heart and may be left side of the heart leading to pulmonary hypertension, corpulmonale tricuspid regurgitation and left ventricular dysfunction respectively. Echocardiography is the easiest way to evaluate the functions of different parts of the heart like ventricles and valves[4]. Some of the studies have shown normal echocardiography in COPD but others have shown pulmonary hypertension and corpulmonale in most of the studies both of which are associated with decreased survival[5, 6]. Our study is also an effort to look for the heart changes in COPD patients presenting to our Teaching hospital in a southern remote area of Pakistan.

METHODOLOGY:

This prospective study was conducted in pulmonology and cardiology departments of Khalifa Gulnawaz Teaching Hospital Bannu from 1st June 2012 to 15th December 2012 with the approval of local ethical committee of the hospital. This study included 52 cases and was a prospective descriptive study using non probability convenience sampling technique.

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Inclusion Criteria:

1. All diagnosed male and female COPD patients.
2. Clinically stable patients.

Exclusion Criteria:

1. COPD patients with other co morbidities of respiratory system like chest wall deformity, broncheiactasis, bronchial asthma, pulmonary fibrosis, left ventricular failure and lung cancer, sleep apnea and obesity (BMI more than 35) were excluded.
2. Those patients whose echo study was suboptimal because of any reason.

Data Collection Procedure: After taking written informed consent data were collected from in-patients and out-patients departments of Pulmonology and Medicine of the same hospital. Patients were diagnosed on the basis of detailed clinical evaluation and spirometry (FEV_1/FVC less than 70% and FEV_1 less than 80% predicted). They were sent for echocardiography to cardiology department.

All echocardiographies were done by the same expert cardiologist using Toshiba echocardiography machine and utilizing a 2MHz probe. The gradient between the right ventricular peak systolic pressure and right atrial pressure was measured by Doppler echo at rest in cases with tricuspid regurgitation. The modified Bernoulli's equation was used to calculate pulmonary artery pressure (PAP). Systolic PAP (mmHg) =4x tricuspid systolic jet+ right atrial mean pressure. Right atrial pressure is estimated to be 5 mmHg when the diameter of inferior vena cava is < 1.7 cm and a 50% decrease in the diameter with inspiration, 10mmHg when IVC is > 1.7 cm with a normal inspiratory collapse > 50%, and 15 mmHg when IVC is > 1.7 cm and inspiratory collapse is < 50%)[7.] When systolic PAP is more than 35mmHg then pulmonary hypertension (PH) is established according to 4th world symposium on pulmonary hypertension, Right ventricular free wall thickness and cavity dilatation were measured using 2D echo. Patients were categorized into mild, moderate and severe PAH having 35-39mmHg, 40-59mmHg and more than 59 mmHg pressure respectively[8]. Mild left ventricular disturbances were present but were not mentioned in the study.

Statistical analysis: Analysis was done using statistical package for social sciences (SPSS) version 17.Variables like gender, PAH, corpulmonale were presented as frequencies and were expressed as percentages. Results were shown in the form of tables and graphs.

RESULTS:

A total of 52 patients were included in the study. The age range was 40-100 years. The mean age was 60.18 years with Standard deviation ±11.677 years (Chart-I and table I). There were 32(61.5%) male and 20(38.5%) females in the study. Pulmonary arterial hypertension (PAH) was present in 34 (65.4%) patients (graph-II) out of these 34 cases with mild PAH patients were 10 (29.4%), moderate PAH 15(44.1%) and severe PAH 9(26.4%) (Table II). Cor pulmonale was found in 17(32.7%) patients and was more in male patients (graph III). Tricuspid regurgitation (TR) was recorded in 34 patients which was classified into mild TR in 20(58.8%) moderate TR 4(11.7%) and severe TR in 10(29.4%) patients. It correlates with the PAH so it does not need separate detail. PAH was more in male (21) as compared to females (13) patients. Maximum number of PAH and cor pulmonale patients were in the age range of between 50 and 65 years.

GRAPH I: Total Age Distribution Of All Patients (No:52)

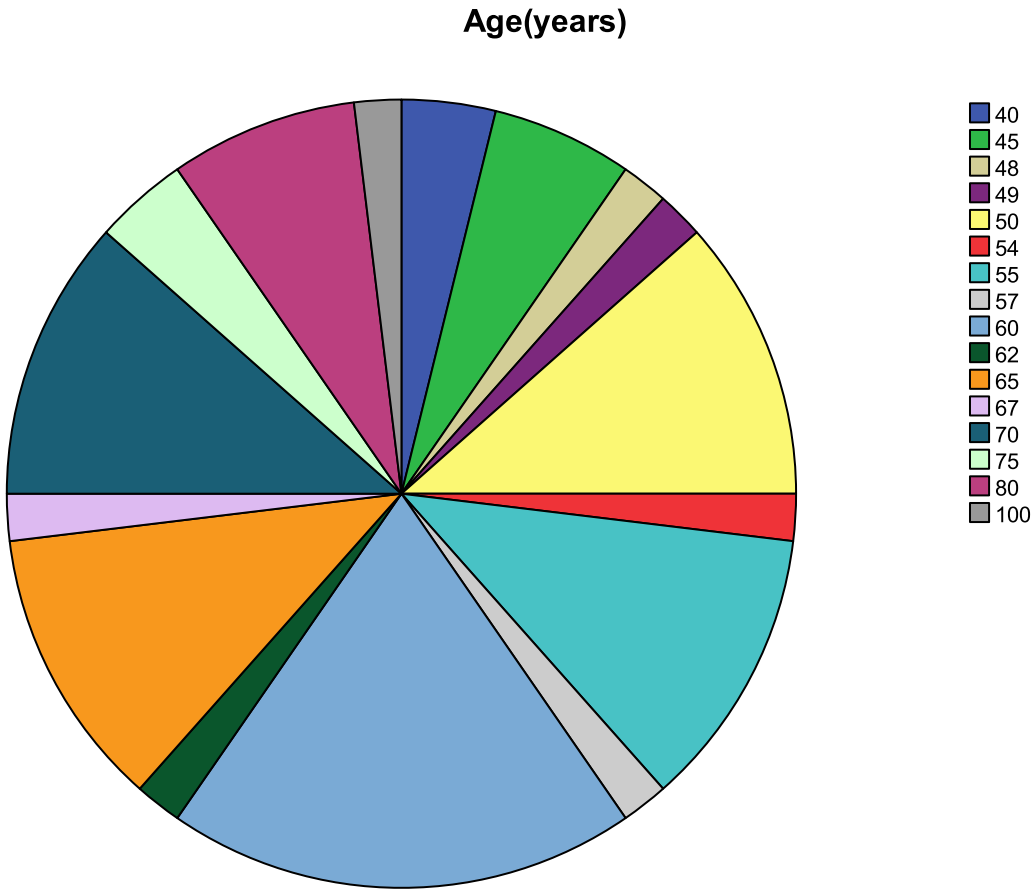


TABLE I: Age Wise Distribution of PAH and Cor pulmonale

Age	Below 60 years	Above 60 years	Total
PAH	21 (61.7%)	13 (38.2%)	34 (100%)
Cor pulmonale	9 (52.9%)	8 (47.05%)	17 (100%)

GRAPH II: Gender Wise Distribution Of Cor pulmonale

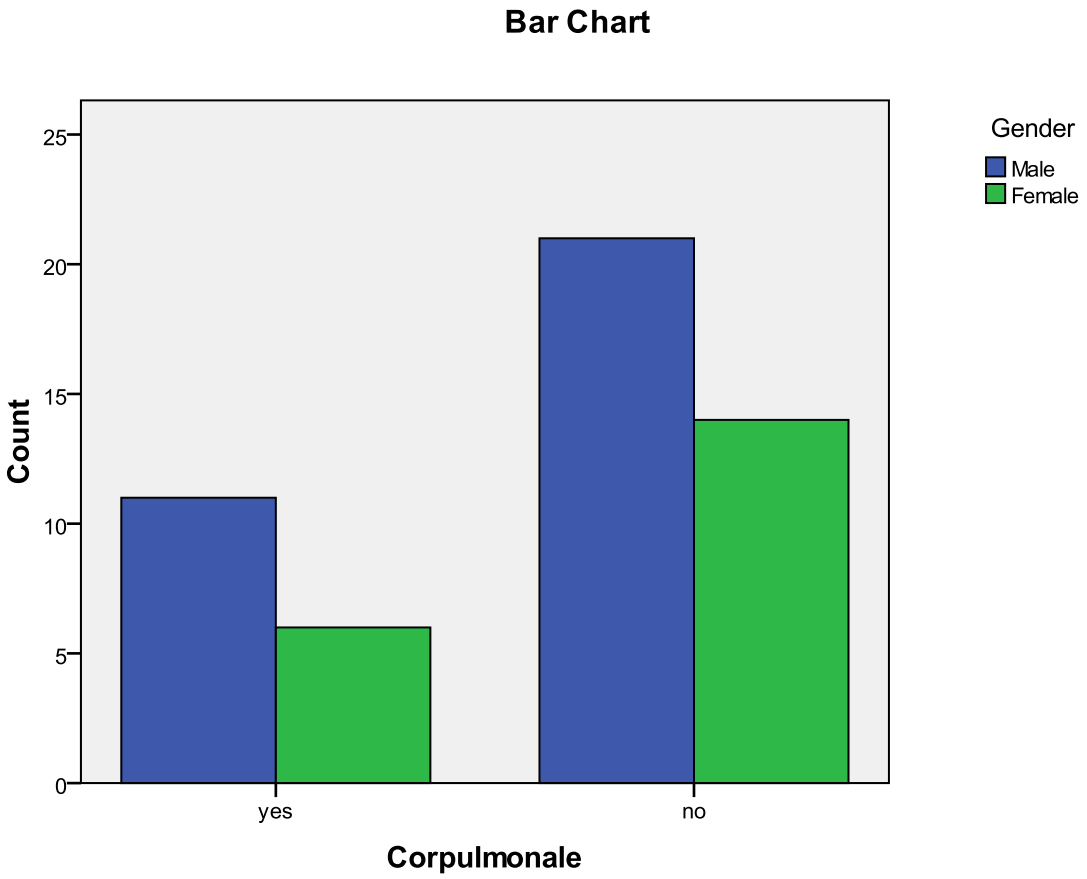
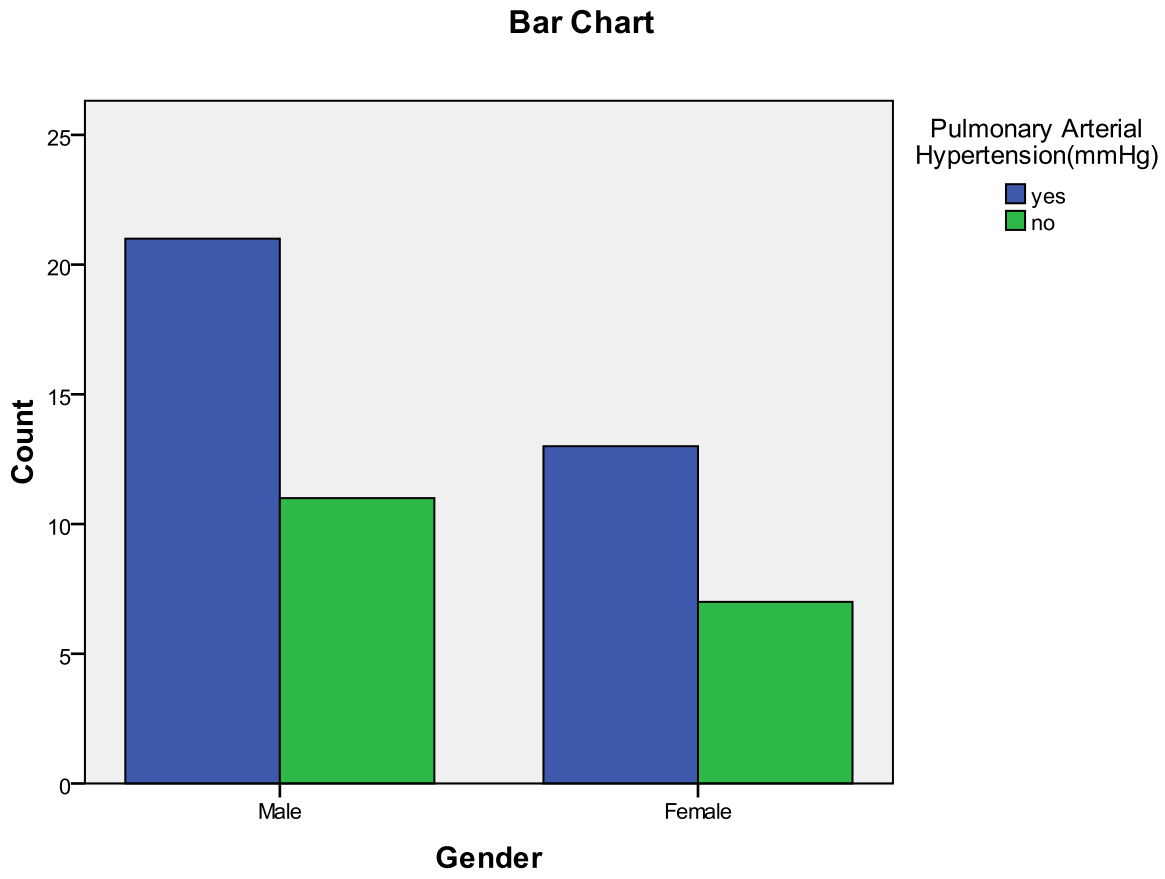


TABLE II: Severity Wise Distribution of PAH

SEVERITY	MILD	MODERATE	SEVERE	TOTAL
DISTRIBUTION	10(29.4%)	15(44.1%)	9(26.4%)	100%

GRAPH III: Gender Wise Distribution Of PAH



DISCUSSION:

Pulmonary arterial hypertension (PAH) and cor-pulmonale are important complications in the natural history of chronic obstructive pulmonary disease(COPD). Its presence is associated with decreased survival and increased use of health personnel and economic resources[9]. The two major factors implicated in the mortality due to COPD are severity of pulmonary hypertension and development of corpulmonale[10,11]. Cor pulmonale is the most negative prognostic factor in COPD patients and it reduces their survival by 30%[12] .The first finding in our study is a wide age range up to 100 years not correlating to many studies which may be due to the simple and hardworking life style of people in the most southern areas of Pakistan which may prolong life. The prevalence of PAH in our study was 65.4% and 61% were below 60 years which closely resembles with the international research as shown by Chaouat A et al and Chatila WM et al in their research work[13,14]. The true prevalence of PAH and Cor pulmonale in COPD patients is not

known because of the absence of large scale epidemiological studies and non-availability of right heart catheterization in many centers[15]. The prevalence of PAH and Cor pulmonale shown by Naeiji R et al was less than 10% in severe COPD patients and in our study only cor pulmonale was 32%[16]. This is very low prevalence as compared to our study which may be due to the inclusion of all COPD patients regardless of severity in our study. In contrast to our data Rashke K et al has shown total prevalence of PAH and cor pulmonale as 80% but he has included other diseases with COPD in his list of causes while we have only COPD as a causative factor[17]. The most interesting observation in our data was the presence of COPD in 38% females and again all 38% were having PAH.

These findings were not seen in any national and international study. The reason may be the long standing use of biomass and wood smoke exposure for cooking and tandoor(local oven) work in their homes in this area. The other contributing factor may be the use of snuff (naswar) in this area by females. These issues need more research in this remote area of Pakistan.

CONCLUSION: This study shows high prevalence of COPD in this area with high frequency of female patients and also all females developed PAH. This issue needs more research whether this is due to domestic smoke or some other factors like snuff addiction in females.

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