

Assessment Of Jugular Vein Pressure In COPD Patients

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Abstract

Patients COPD and heart failure have a combined obstructive and restrictive type of pulmonary dysfunction .COPD is characterized by obstructed airflow, destruction of pulmonary tissue in emphysema and respiratory muscles weakness. In turns progressive heart enlargement taking thoracic space , venous congestion interstitial fibrosis pleural effusion all contribute to the pulmonary compression in heart failure . In COPD decrease in oxygen arterial pressure and an increase in carbon dioxide arterial pressure there will be alteration of lung diffusion capacity due to thickening of alveolar septa, reduction in alveolar- capillary membrane conductance which may lead to heart failure. COPD is commonly associated with heart failure in clinical practice. Heart failure is prevalent in more than 20% of patients with COPD. Both condition has significant morbidity and mortality. The jugular vein pressure is a very useful clinical marker in many situation . External jugular vein is superficial and easy to palpate. It is the easiest method for diagnosing right side heart failure. Hence to evaluate jugular vein pressure as early diagnostic sign of heart failure in COPD patients. Total 50 patients above the age of 30 years, both male & female suffering from COPD (GOLD criteria I, II, III, IV) were taken for the study, patients with other cardiorespiratory conditions were excluded. GOLD criterion with peak flow meter and JVP was measured. It was found that That jugular vein pressure was raised than the normal reference range, in patients with severe grade of GOLDS criteria.

Keywords: COPD, GOLD Criterion, JVP, Right side Heart failure.

Introduction

Chronic obstructive pulmonary disease (COPD) is a chronic inflammatory lung disease that causes obstructed airflow from the lungs. Symptoms include breathing difficulty, cough, mucus (sputum) production and wheezing. It is caused by long-term exposure to irritating gases or particulate matter, most often from cigarette smoke. People with COPD are at increased risk of developing heart disease, lung cancer and a variety of other conditions. Emphysema and chronic bronchitis are the two most common conditions that contribute to COPD. Chronic bronchitis is inflammation of the lining of the bronchial tubes, which carry air to and from the air sacs (alveoli) of the lungs. It is characterized by daily cough and mucus (sputum) production¹.

Emphysema is a condition in which the alveoli at the end of the smallest air passages (bronchioles) of the lungs are destroyed as a result of damaging exposure to cigarette smoke and other irritating gases and particulate matter

The prevalence of COPD is hard to estimate due to differences in definitions, and is highly dependent on the population studied, age groups included, smoking status of the study sample, and also how and where they were recruited

Airflow obstruction has profound effect on cardiac function and gas exchange with systemic consequences. As COPD results from inflammation, the inflammatory mediators into the circulation may result in systemic manifestation of disease , such as skeletal muscle wasting , worsen comorbid

disease such as ischemic heart disease , heart failure , osteoporosis , lung cancer , depression and diabetes.²

The goals of Global initiative for chronic obstructive lung disease (GOLD) criteria is to increase awareness and decrease morbidity and mortality of COPD..³

The jugular veins are veins that take deoxygenated blood from the head back to the heart via the superior vena cava.

There are two sets of jugular veins: external and internal. The left and right external jugular veins drain into the subclavian veins. The internal jugular veins join with the subclavian veins more medially to form the brachiocephalic veins. The left and right brachiocephalic veins join to form the superior vena cava, which delivers deoxygenated blood to the right atrium of the heart.

The internal jugular runs with the common carotid artery and vagus nerve inside the carotid sheath. It provides venous drainage for the contents of the skull. The external jugular vein runs superficially to sternocleidomastoid. There is also another minor jugular vein, the anterior jugular vein, draining the sub maxillary region.

The jugular venous pressure (JVP, sometimes referred to as jugular venous pulse) is the indirectly observed pressure over the venous system via visualization of the internal jugular vein. It can be useful in the differentiation of different forms of heart and lung disease. Although technology has a high profile clinical examination remain a central tool especially for the generalist. The JVP is easiest to observe as it is superficial if one looks along the surface of the sternocleidomastoid muscle.⁴

Intact jugular vein valves efficiently prevent retrograde venous flow during intrathoracic pressure increase. Chronically elevated central venous pressure found in patients with chronic obstructive pulmonary disease (COPD) and primary pulmonary hypertension (PPH) might lead to jugular vein valve incompetence.⁴

The JVP is easiest to observe it is superficial if one looks along the surface of the sternocleidomastoid muscle. Jugular vein direct connect with superior vena cava and right atrium. Hence it reflect pressure change in the right atrium.⁴

The risk of underlying ischemic heart disease is greater in patients with moderate or severe airflow obstruction.²

Jugular venous pressure (JVP) provides an indirect measure of central venous pressure. The internal jugular vein connects to the right atrium without any intervening valves - thus acting as a column for the blood in the right atrium. The JVP consists of certain waveforms and abnormalities of these can help to diagnose certain conditions.¹

Patients COPD and heart failure have a combined obstructive and restrictive type of pulmonary dysfunction .COPD is characterized by obstructed airflow, destruction of pulmonary tissue in emphysema and respiratory muscles weakness. In turn progressive heart enlargement taking thoracic space , venous congestion interstitial fibrosis pleural effusion all contribute to the pulmonary compression in heart failure . In COPD decrease in oxygen arterial pressure and an increase in carbon dioxide arterial pressure there will be alteration of lung diffusion capacity due to thickening of alveolar septa, reduction in alveolar- capillary membrane conductance which may lead to heart failure.⁴

Both condition heart failure and chronic obstructive pulmonary disease have morbidity and mortality worldwide. If the patient do not approach to the condition may get worsen in the severe stage .

Hence Assessment of jugular vein pressure study is conducted.

Methodology

Ethical clearance was obtained from the Ethics Approval Committee of the Institution. 50 participants both male and female above the age of 30 suffering from COPD (GOLD criteria I, II, III, IV) were recruited for the study, patients diagnosed with other cardiorespiratory conditions were excluded. The patient were given questionnaire format which include name, age, gender, chronic obstructive pulmonary disease since. American thoracic society criteria was noted. Global initiative for chronic

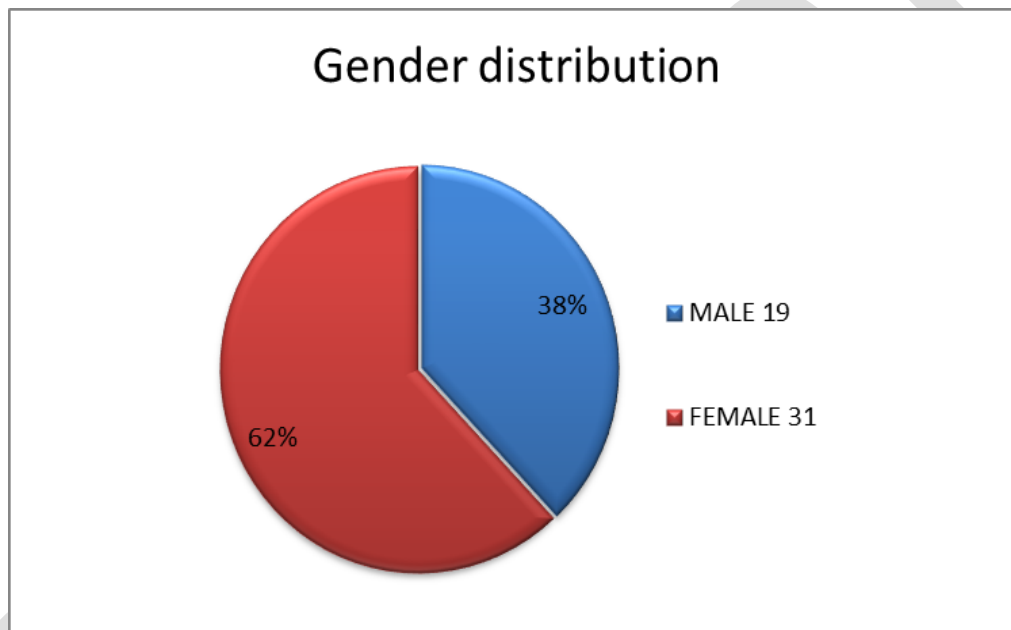
obstructive pulmonary disease was taken with the help of peak flow meter. The measurement was taken after a full inhalation. Force vital capacity was noted and force expiratory volume was noted. GOLD criteria was noted. Jugular vein pressure measurement was assessed, Patient was given semi folwer position in 45 degree elevated. Head rotation to left side. In this position normally the internal jugular vein is just seen above the clavicle. The upper level of the vein is noted and a ruler is kept at that level, parallel to the ground. Another rule is put perpendicular to the first ruler up to the angle of louis to the first ruler gives the jugular pressure. Jugular vein pressure was noted in cm H₂O. The results obtained of jugular vein pressure were correlated with mild, moderate and severe. The data was collected and analyzed.

Results

Table no: 1

Gender	Total
Male	19
Female	31

Graph no: 1

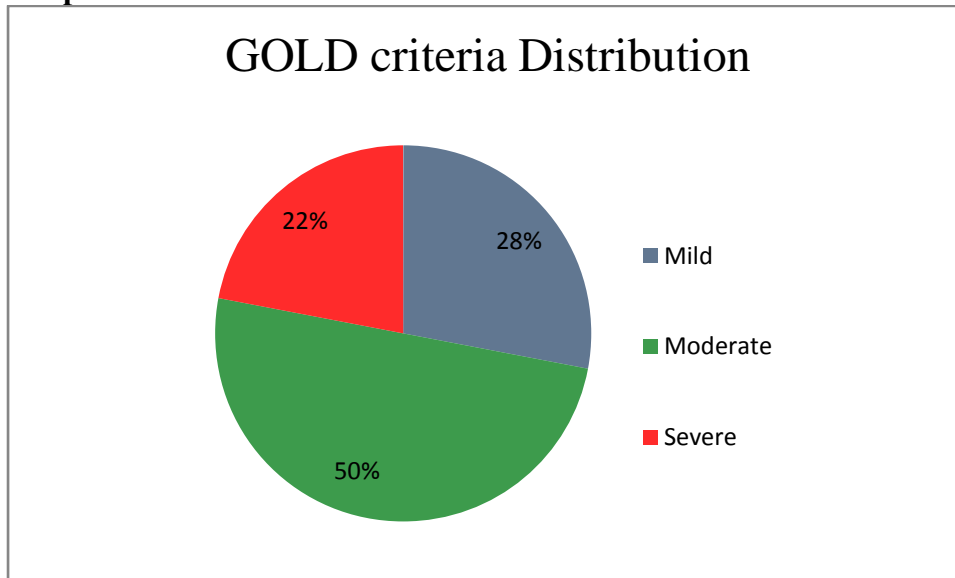


Interpretation : Table no :1 and graph no 1 shows gender distribution of the subjects included in the study , the total no of subjects were 50, out of which 31 were female (62% female) and 19 were male (38% male) .

Table no: 2

GOLDS CRITERIA	TOTAL
Mild	14
Moderate	25
Severe	11

Graph no: 2

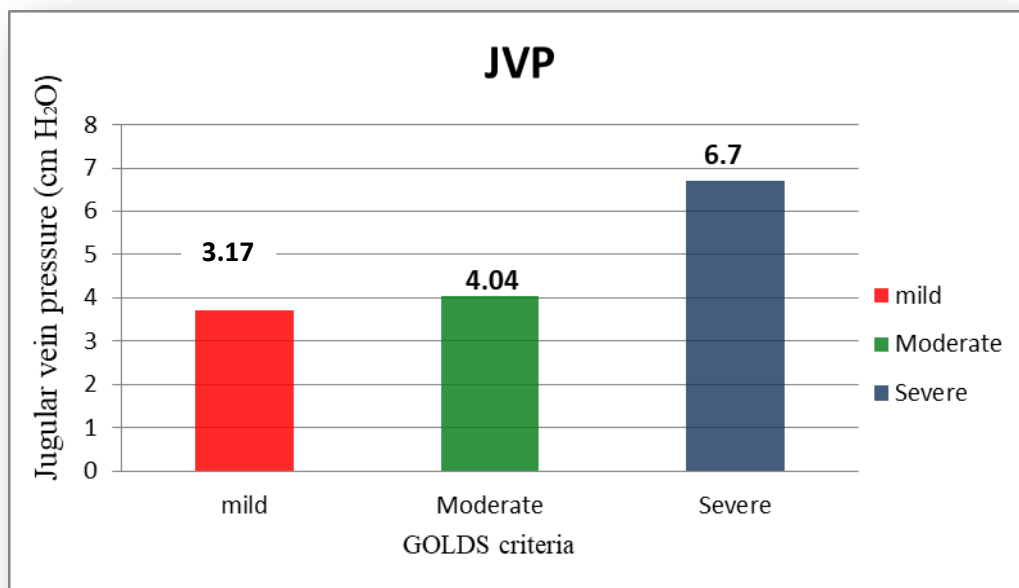


Interpretation : Table no :2 and Graph no : 2 shows frequency distribution of COPD patients according to GOLDS criteria where mild grade for 22 %, Moderate grade for 50 % and severe grade for 28 %

Table no: 3

GOLDS CRITERIA	JVP ±
Mild	3.71 ± 0.82
Moderate	4.04 ± 0.73
Severe	6.7 ± 0.60

Graph no :3



Interpretation: Table no :3 and graph no :3 shows The mean value of JVP according to the GOLDS criteria, in which mild is 3.71, Moderate is 4.04 , and Severe is 6.7.

Discussion

Chronic obstructive pulmonary disease is a preventable and treatable disease characterized by chronic airflow limitation that is not fully reversible. The airflow limitation does not change over several months and is usually progressive in the long term. It is associated with an abnormal inflammatory response of the lungs to the noxious stimuli, predominantly smoking. Other factors, particularly occupational exposure, may also contribute to the development of chronic obstructive pulmonary disease. Exacerbation often occurs, where there is rapid sustained worsening of symptoms beyond normal day to day variations 2.

Exposure to noxious particles, such as cigarette smoke and air pollution over a period can lead to lung inflammation with an associated increased number of neutrophils in the airway lumen and macrophages in the respiratory epithelium and parenchyma. After the years of exposure to the noxious particles the lumen becomes narrower. The function of the cilia is impaired and the elasticity of the smooth muscle is reduced, and fibrosis occurs. Physiological changes of chronic obstructive pulmonary disease are characterized by mucus hypersecretion, airflow limitation and air trapping. The mucus hypersecretion will lead to chronic productive cough, a feature of chronic bronchitis, not necessarily associated with airflow limitation. The pathological changes are seen in the proximal airways, peripheral airways, lung parenchyma and the pulmonary vasculature. The small airways will become fibrotic, and lose their elastic recoil. The alveoli will be distorted in structure in COPD 6.

The jugular venous pressure (JVP, sometimes referred to as jugular venous pulse) is the indirectly observed pressure over the venous system via visualization of the external jugular vein. It can be useful in the differentiation of different forms of heart and lung disease 6.

Jugular vein pressure is valuable for differentiation between dyspnea of cardiac or pulmonary origin. Jugular vein pressure assessment is very useful for evaluation of right ventricular failure. Correlation between jugular vein pressure determined via the external jugular vein and central venous pressure is good when the outcomes are categorized into low, normal and elevated pressure. Measurement configuration includes extended expiration 11.

Under the physiological condition jugular vein valve efficiently prevents retrograde venous flow during intrathoracic pressure increase. Chronically elevated central venous pressure found in the patient with chronic obstructive pulmonary disease might lead to jugular vein valve incompetence 1.

Chronic obstructive pulmonary disease and heart failure, both the conditions when co-exist, they incur higher morbidity and mortality. In both these pathologies, majority of symptoms and physical signs, such as dyspnea, orthopnea, cough, exercise tolerance, muscle weakness coexist. Therefore, if heart failure is diagnosed at an early stage the burden of morbidity and mortality because of co-existence of these conditions can decrease thus affecting the overall quality of life of patients suffering from COPD 4.

The aim of the study was to assess jugular vein pressure in chronic obstructive pulmonary disease. The study was carried out in which there were 50 chronic obstructive pulmonary disease patients taken. The mean age of the chronic obstructive pulmonary disease patients included in this study was 57.2 ± 17.3 . Out of 50 chronic obstructive pulmonary disease patients 19 were Male (38%) and 31 were Female (62%). The participants were selected from Hospitals in and around Pune City 5.

The participants were selected according to the inclusion criteria. All components of outcome measure were explained and performed under guidance and supervision. Assessment of jugular vein pressure of 50 chronic obstructive pulmonary disease patients was taken.

From our study Table no :2 and Graph no : 2 shows frequency distribution of COPD patients according to GOLD criteria where mild grade for 22 %, Moderate grade for 50 % and severe grade for 28 % .

As shown in Table no :3 and graph no :3 shows The mean value of JVP according to the GOLD criteria, in which mild is 3.71 ± 0.82 , Moderate is 4.04 ± 0.73 , and Severe is 6.7 ± 0.60 .

The previous study of Doeep F. on jugular vein valve incompetence in chronic obstructive pulmonary disease and primary pulmonary hypertension : concluded that comparison with healthy

controls, and COPD demonstrated there is greater prevalence of jugular vein valve incompetence in chronic obstructive pulmonary disease which seem to be caused by the elevated central venous pressure.

Javier de Miguel Diez reported that chronic obstructive pulmonary disease is commonly associated with Heart failure in clinical practice since they have same pathogenic mechanism. The prognosis of Chronic obstructive pulmonary disease and heart failure combined is poorer than for either disease alone. An active search for each condition using clinical examination and additional test including plasma natriuretic peptide, lung function testing and echocardiography should be obtained. Selective β_1 blocker should not be denied in stable patient who have heart failure and co-existing chronic obstructive pulmonary disease. Angiotensin –converting enzyme inhibitor, and angiotensin-receptor blocker may reduce the morbidity and mortality of Chronic obstructive pulmonary disease patient 4.

The pathological change in patient with chronic obstructive pulmonary disease are complex and occur in the following four different compartments of the lung : the central , the large airway , the small peripheral airway , the lung parenchyma , and the pulmonary vasculature the clinical pathological picture is complicated by the fact that pathological change occur including pulmonary arteries and any combination of these three pathological abnormalities may exist in an individual patient. these pathological changes give rise to the clinical and physiological abnormalities in chronic obstructive pulmonary disease. Which are : mucus hyper secretion and cilia dysfunction , airflow limitation and hyperinflation : gas exchange abnormalities ; and pulmonary hypertension and systemic effects 5.

Pulmonary arterial hypertension (PAH) develops late in the course of history of patient with chronic obstructive pulmonary disease and is associated with the development of severe hypoxaemia. It is a major cardiovascular complication of chronic obstructive pulmonary disease and is associated with the development of right ventricular hypertrophy and has a poor prognosis. Pulmonary hypertension is a common complication of chronic obstructive pulmonary disease . the increase in the pulmonary artery pressure is often mild to moderate. 5-10% of the patient with advance chronic obstructive pulmonary disease may suffer from severe pulmonary hypertension and present with a progressively downhill clinical course because of right heart failure .the prevalence of clinically significant severe pulmonary hypertension in chronic obstructive pulmonary disease is roughly estimated to be of 1-2/ 1000. The cause of pulmonary hypertension in chronic obstructive pulmonary disease is generally assumed to be hypoxic pulmonary vasoconstriction leading to permanent medial hypertrophy . Pathological studies point, at extensive remodelling of all layers of the pulmonary arterial wall 5.

W. Matsuyama, reported on usefulness of transcutaneous doppler jugular venous echo to predict pulmonary hypertension in chronic obstructive pulmonary disease patients. Echocardiography is a noninvasive and useful beside method for measurement of pulmonary artery pressure. This method is sometime difficult because of overinflated lung on COPD patients the study was done to estimate pulmonary hypertension in chronic obstructive pulmonary disease using transcutaneous Doppler jugular vein flow velocity recording .transcutaneous jugular vein flow velocity measurement may be applicable for prediction of pulmonary hypertension in chronic obstructive pulmonary disease 1.

Hamer JP ,et al (2016) underwent study on estimation of jugular vein pressure is valuable for differentiation between dyspnea of cardiac or pulmonary origin and for determining the cause of oedema.

Conclusion

That jugular vein pressure was raised than the normal reference range, in patients with severe grade of GOLD criteria.

Reference

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