TRENDS OF PLATELET INDICES IN ACUTE EXACERBATIONS OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE- A LONGITUDINAL FOLLOW UP STUDY

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DECLARATION

I solemnly declare that this dissertation **"TRENDS OF PLATELET INDICES IN ACUTE EXACERBATIONS OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE- A LONGITUDINAL FOLLOW UP STUDY "** was prepared by me at Government Kilpauk Medical College and Hospital, Chennai, under the guidance of **Prof.Dr.P.PARANTHAMAN M.D ,** Professor and HOD of General Medicine, Department of General Medicine, Government Kilpauk Medical College and Hospital, Chennai. This dissertation is submitted to **The Tamil Nadu Dr. M.G.R. Medical University, Chennai** in partial fulfillment to the University regulations for the award of the degree of M.D. Branch I (General Medicine).

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CERTIFICATE OF APPROVAL

The Institutional Ethics Committee of Govt. Kilpauk Medical College, Chennai reviewed and discussed the application for "TRENDS OF PLATELET INDICES IN ACUTE EXACERBATIONS OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE-LONGITUDINAL FOLLOW UP STUDY" Submitted Dr. M.SIVASUBRAMANIAN II Year Post Graduate in General Medicine,Government Kilpauk Medical College, Chennai - 10.

Proposal is APPROVED.

The Institutional Ethics Committee expects to be informed about the progress of the study any Adverse Drug Reaction Occurring in the Course of the study any change in the protocol and patient information /informed consent and asks to be provided a copy of the final report.

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CONTENTS

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is estimated to affect greater than 5% of the adults and with a progressively rising rate of morbidity and mortality. As it is estimated, COPD will be the third leading cause of death worldwide by 2023,. COPD is a great financial burden upon health systems, primarily because of its acute exacerbations which require hospitalization. COPD is mainly characterized by restricted airflow, which is a result of inflammation as well as the remodeling of the airways COPD is characterized by both systemic as well as pulmonary inflammation. During an acute exacerbation, the inflammatory pathways are unregulated to a greater extent and may also precipitate acute cardiovascular events. COPD is also associated with low-grade systemic inflammation as obvious from increased total leukocyte count, acute phase proteins like C-reactive protein (CRP), and inflammatory cytokines. Platelet parameters like platelet count, Mean platelet volume (MPV) and platelet distribution width (PDW) are markers of platelet activation. Increased MPV is associated with many vascular diseases, like peripheral, cerebrovascular disease, and coronary artery disease. Studies have reported elevated platelet count and decreased MPV in COPD patients. In contrast, other stated that a high MPV predicts impaired pulmonary and cardiac function in elderly COPD patients. However, only a few studies have been done showing the relationship between MPV and the severity of COPD. Hence our study aimed to establish the role of platelet parameters in patients of COPD and to find the co-relation of various platelet parameters

with the severity of COPD, need for mechanical ventilation and need recurrent hospital admissions.

AIMS AND OBJECTIVES

1. To Determine Whether Platelet Indices Can Help Predict The Need For Mechanical Ventilation In Acute Exacerbation Of Copd.

2. To Determine The Corelation Between Persistant Elevation Of Platelet Indices And Recurrant Hospital Admissions.

REVIEW OF LITERATURE

Chronic obstructive pulmonary disease (COPD) is currently defined as “a preventable and treatable disease with some significant extra pulmonary effects that may contribute to the severity in individual patients. Its pulmonary component is characterized by airflow limitation that is not fully reversible. The airflow limitation is usually progressive and associated with an abnormal inflammatory response of the lung to noxious particles or gases”.Prevalence surveys suggest that up to almost a quarter of adults aged 40 years and older have mild airflow obstruction. COPD is presently the fourth leading cause of death, but WHO predicts that it will become the third leading cause by 2030;Chronic obstructive pulmonary disease (COPD) was the third leading cause of mortality in 2016 and was responsible for an estimated 3 million deaths worldwide that year, representing a vast global problem.

Definition

The definitions for COPD exacerbations vary, but the most com- monthly used definitions are either symptom-based or event-driven. The Global Initiative for Chronic Obstructive Lung Disease (GOLD) 2020 report defines COPD exacerbations as acute worsening of respiratory symptoms that require additional treatment, with dyspnea recognized as the key symptom. Other characteristics may include increased airway inflammation, mucus production, gas trapping, sputum purulence and volume, cough and wheeze. Since no diagnostic test is available in routine clinical practice, a COPD exacerbation is diagnosed when other causes of symptom changes in patients with COPD

have been excluded. The severity of COPD exacerbations can be defined as mild, moderate, or severe based on the treatment required and on whether hospitalization is needed. A mild COPD exacerbation is a worsening of symptoms that can be managed by treatment with short-acting bronchodilators only, although some definitions do not include a requirement for treatment. Moderate COPD exacerbations require treatment with antibiotics and/or oral corticosteroids. Severe COPD exacerbations require hospitalization or emergency room visits, and patients may also have acute respiratory failure, which can be life- threatening. The definition of COPD exacerbation severity should not be confused with the definition of COPD severity, which is classed as mild-to-very severe based on airflow limitation.

Triggers

respiratory infections

Bacteria

Fungi

Viruses

outdoor temperature

air pollution

Additional independent risk factors for patients experiencing frequent exacerbations (≥2 per year) have been reported;

(i) demographic characteristics (such as being female);

(ii) disease characteristics (increased dyspnea, reduced lung function, poorer quality of life, and prior exacerbations [strongest association]);

(iii) comorbidities (such as cardiovascular events, depression, and a history of gastroesophageal reflux or heartburn);

(iv) potential biomarkers such as an elevated white blood cell count

high blood eosinophil counts are an independent risk factor for the occurrence of future exacerbations.

pulmonary artery enlargement (i.e., a ratio of the diameter of the pulmonary artery to the diameter of the aorta of > 1, a marker of pulmonary hypertension) has been significantly associated with an increased risk of future severe exacerbations.

patient's exacerbation frequency can vary from year to year .

The incidence of exacerbations is ~2-fold higher in the winter versus the summer,potentially due to an increased prevalence of respiratory viral infections .

However, no plasma or serum protein bio- marker has been shown to be independently predictive of the occurrence of COPD exacerbations across different patient cohorts .

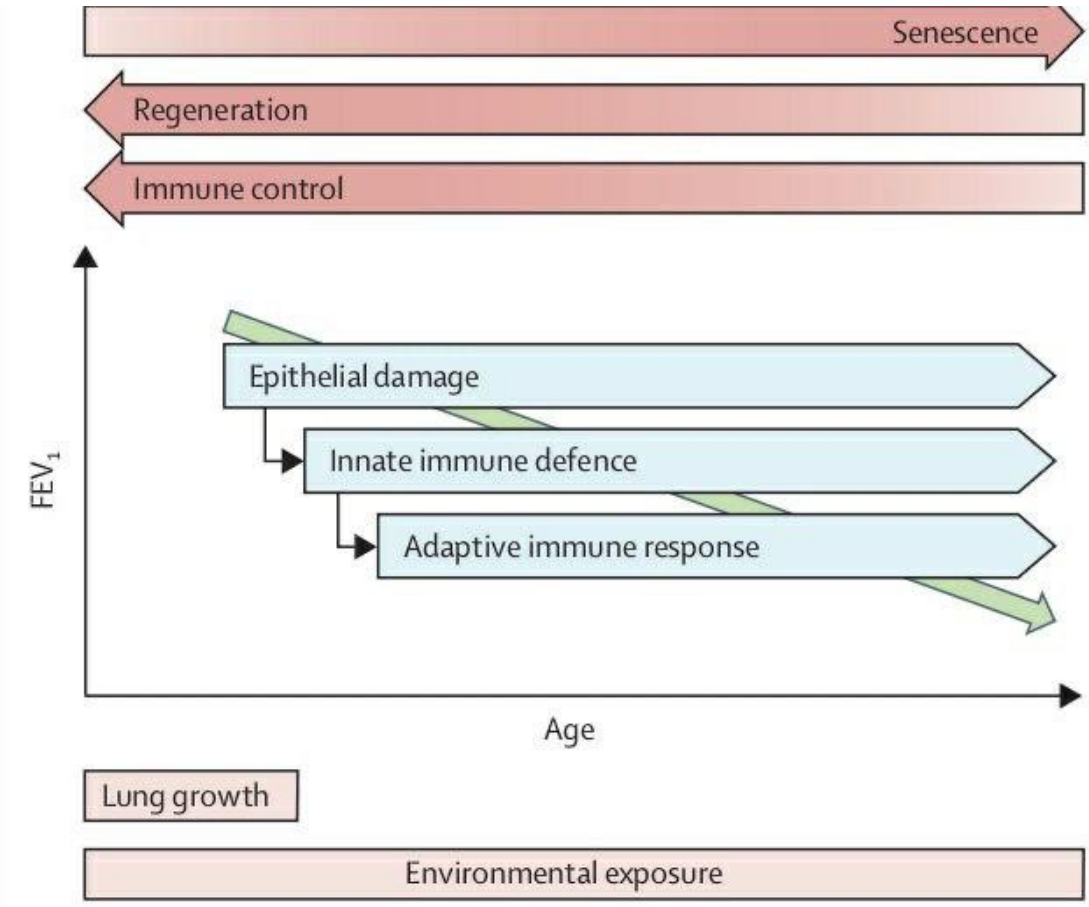
Pathophysiology

The principal feature of COPD is limitation of airflow that is not fully reversible. Remodelling of the small- airway compartment and loss of elastic recoil by emphysematous destruction of parenchyma result in progressive decline of FEV1,

inadequate lung emptying on expiration, and subsequent static and dynamic hyperinflation. At the pathological level, exposure to smoke leads to infiltration of the mucosa, submucosa, and glandular tissue by inflammatory cells. Increased mucus content, epithelial-cell hyperplasia, and disturbedtissue repair with wall thickening in the small conducting airways are cardinal features of COPD This progressive narrowing, obliteration, and even removal of the terminal bronchioles is accompanied by emphysema, which typically starts in the respiratory bronchioles.The mechanisms that lead to thickening of the small-airway walls and destruction of lung tissue are far from understood,23 but they are likely to be multifactorial pathobiological processes that are interacting on a complex background of genetic determinants, lung growth,14 and environmental stimuli Within this framework we discuss the pathogenesis of COPD as a progressive immunological disorder.

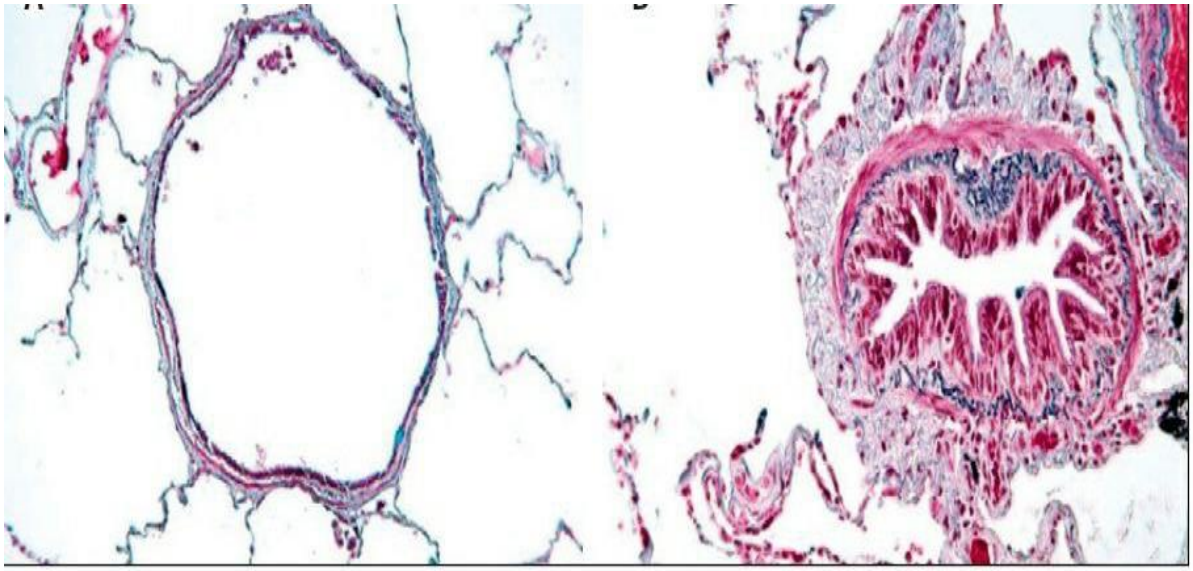
Cigarette smoke causes direct injury of airway epithelial cells, which leads to the release of endogenous intracellular molecules or danger-associated molecular patterns. These signals are identified by pattern-recognition receptors, such as Toll-like receptors 4 and 2 on epithelial cells, and a non-specific inflammatory response is triggered. Upon the release of early cytokines (tumour necrosis factor α and interleukins 1 and 8), macrophages, neutrophils, and dendritic cells are recruited to the site of inflammation to orchestrate the innate immune response. Proteolytic enzymes and reactive oxygen species are released and, if not sufficiently counterbalanced by antiproteases and antioxidant factors, further damage will occur. Immature dendritic cells pick up self-antigens released

from damaged tissue and foreign antigens from incoming pathogens and present them to naive T cells in the draining lymph nodes.Once activated into T-helper-1 cells, these antigen-specific CD4 and CD8 cells and antibody-producing B cells are drawn to the lungs to neutralise the antigens. As the disease progresses, tertiary lymphoid aggregates, including an oligoclonal selection oftheBandTcellsinvolved,developaroundthesmall airways.Although the exact nature and function of these aggregates needs to be elucidated, adaptive or autoimmune responses are thought to perpetuate the inflammation years after smoking cessation.



Apart from these basic immunological processes, several other mechanisms might contribute to the inflammatory cascade. Tapering of the immune response by regulatory T cells protects against uncontrolled inflammation, and reduced populations of these cells have been seen in the lungs of patients with COPD.By contrast, the numbers of proinflammatory T-helper-17 cells rise,which suggests impaired immune regulation in COPD. Pulmonary emphysema and cellular ageing share some features: senescence leads to cells becoming non-proliferative but metabolically active, which predisposes individuals to increased inflammation, reduced cell regeneration, and carcinogenesis. Cigarette smoke and oxidative stress promote senescence. As such, COPD can be interpreted as accelerated ageing of the lung, and hence age will increase susceptibility to COPD.Finally, cellular apoptosis and matrix destruction are continuously compensated for by cellular renewal and matrix repair to maintain lunghomoeostasis.Resident stem cells within the lung are activated by epithelial damage43 but cigarette smoke limits alveolar repair and dysregulates repair processes involving transforming growth factor β, which leads to fibrosis.The underlying molecular signals are poorly understood, but in COPD repair mechanisms eventually fail.

The complexity of the pathogenesis of COPD is reflected in the broad variation of clinical phenotypes. Further research is needed to clarify to what extent mechanisms offer potential for new targeted interventions.



igure 1: Comparison of airway features in a healthy individual and in a patient with chronic obstructive ɔulmonary disease

A) Normal airway. (B) In chronic obstructive pulmonary disease airways are narrowed by infiltration of

Exacerbations

The chronic and progressive course of COPD is frequently aggravated by exacerbations—short periods (at least 48 h) of increased cough, dyspnoea, and production of sputum that can become purulent. Mild exacerbations require increased doses of bronchodilators, moderate exacer- bations need treatment with systemic corticosteroids, antibiotics, or both, and severe exacerbations frequently necessitate admission to hospital. Some patients have no or few exacerbations, whereas others have frequent exacerbations. Frequency may increase with increasing severity of COPD.

Exacerbations reduce quality of life,speed disease progression, and increase the risk of death.Because of their impact on the natural history of the disease, a primary goal of treatment is to reduce the number of exacerbations. They are diagnosed on the basis of

clinical symptoms. No clear biological markers have been identified.The most promising biomarker so far is amyloid A in serum.

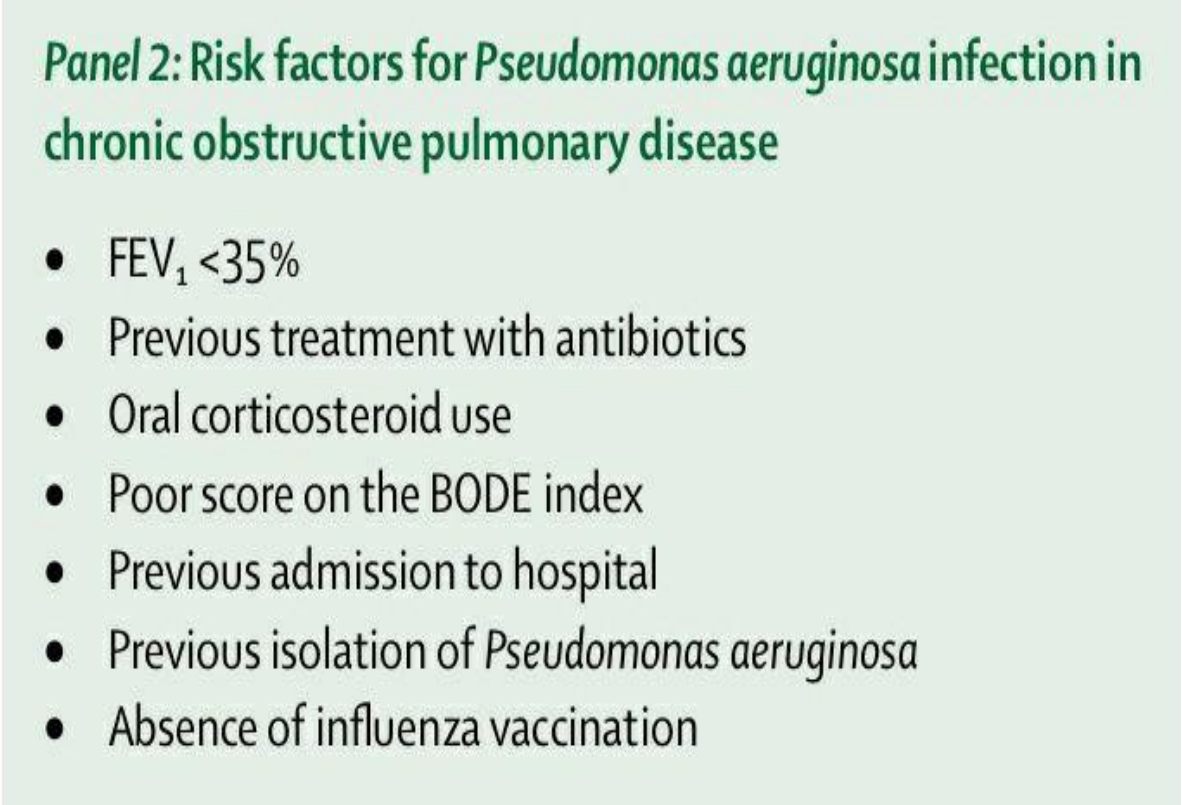
Several causes of exacerbations are suggested for patients with COPD, such as heart failure, pneumonia, pulmonary embolism, non-adherence to inhaled medication, or inhalation of irritants, such as tobacco smoke or particles .the most frequent cause is viral or bacterial infection. In patients admitted to hospital for COPD exacerbations, viral infections, bacterial infections, or both, were detected in 78% of cases and, more importantly, the exacerbations were more severe than those in patients with non-infectious causes, shown by more marked impairment in lung function and longer times in hospital.

The accepted gold standard for the diagnosis of bacterial causes is the isolation of a potentially pathogenicmicro-organism in sputum culture. This method, however, is neither sensitive nor specific enough to be accurate. Clinical criteria must, therefore, also be taken into account to aid in the decision of whether or not to use antibiotics. The presence of green (purulent) as opposed to white (mucoid)sputumisoneofthebestandeasiestmethodsof predicting the need for antibiotic therapy.Measurement of procalcitonin concentrations in serum has shown promise as a guide of whether to use antibiotics,although C-reactive protein has shown better results in the pre- diction of response to antibiotic therapy

An additional difficulty in the identification of microbial causes for COPD exacerbations is that a substantial proportion of patients with stable disease have bacterial colonisation

in the lower airways. Various species colonise the airways, but Haemophilus influenzae is most frequently seen.57 The production of purulent sputum when patients are in a stable state indicates colonisation by potentially pathogenic micro-organisms.Colonising bacteria pro- mote bronchial and systemic inflammation and release antigens that result in bronchial epithelial injury and facilitate the acquisition of new microbial strains, which is associated with an increased risk of developing an exacerbation.Strain changes for H influenzae, Streptococcus pneumoniae, and Moraxella catarrhalis are associated with increased bronchial and systemic inflammation and the development of exacerbations.Colonising bacteria can, therefore, accelerate the progression of COPD through an increase in the frequency of exacerbations and also through direct injury to the lung tissue.

The type of infecting species depends partly on the severity of the underlying COPD. In mild disease,S pneumoniae is predominant, whereas in patients with low FEV1, H influenzae and M catarrhalis are more frequently seen. Pseudomonas aeruginosa might be seen in patients with severe obstruction, and acquisition of a new strain is associated with the development of an exacerbation and colonisation of bronchial epithelium.Disease evolution can be worsened without prompt appropriate antibiotic therapyor if a multidrug-resistant strain is present. Some of the risk factors associated with P aeruginosa infection are summarised



Viruses are thought to account for 15–25% of all infective exacerbations, particularly human rhinovirus, influenza and parainfluenza viruses, and adenoviruses. Concomitant infection with viruses and bacteria are seen in 25% of patients with exacerbations who are admitted to hospital.Viral exacerbations are strongly correlated with colds at presentation, high frequency of exacerbations, and severe respiratory symptoms during exacerbations. Mallia and co-workersused experimental rhinovirus infection in individuals with COPD and noted the development of lower-airway respiratory symptoms, airflow obstruction, systemic inflammation, and inflammation of the airways. A significant correlation was also seen between viral load and concentrations of

inflammatory markers. These findings strongly support a causal relation between rhinovirus infection and COPD exacerbations. No diagnostic test is available for viral exacerbations of COPD. Increased concentrations of interferon-γ-inducible protein 10 in serum was useful in one study to identify rhinovirus infection in patients with COPD. The presence of fever has also been associated with virus detection during exacerbations.Viral infections might facilitate subsequent bacterial infection or increases in the numbers of bacteria already colonising the lower airways. Although viral infection could be self-limiting, secondary bacterial infection might prolong exacerbations.

***Panel 1:* Causes of acute exacerbations of chronic obstructive pulmonary disease[52]**

Infectious (60–80% of all exacerbations)

Frequent (70–85% of all infectious exacerbations)

- *Haemophilus influenzae*
- *Streptococcus pneumoniae*
- *Moraxella catarrhalis*
- Viruses (influenza and parainfluenza viruses, rhinoviruses, coronaviruses)

Infrequent (15–30% of all infectious exacerbations)

- *Pseudomonas aeruginosa**
- Opportunistic gram-negative species
- *Staphylococcus aureus*
- *Chlamydophila pneumoniae*
- *Mycoplasma pneumoniae*

Non-infectious (20–40% of all exacerbations)

- Heart failure
- Pulmonary embolism
- Non-pulmonary infections
- Pneumothorax
- Pneumonia

Precipitating and environmental factors

- Cold air
- Air pollution
- Allergens
- Tobacco smoking
- Non-adherence to respiratory medication

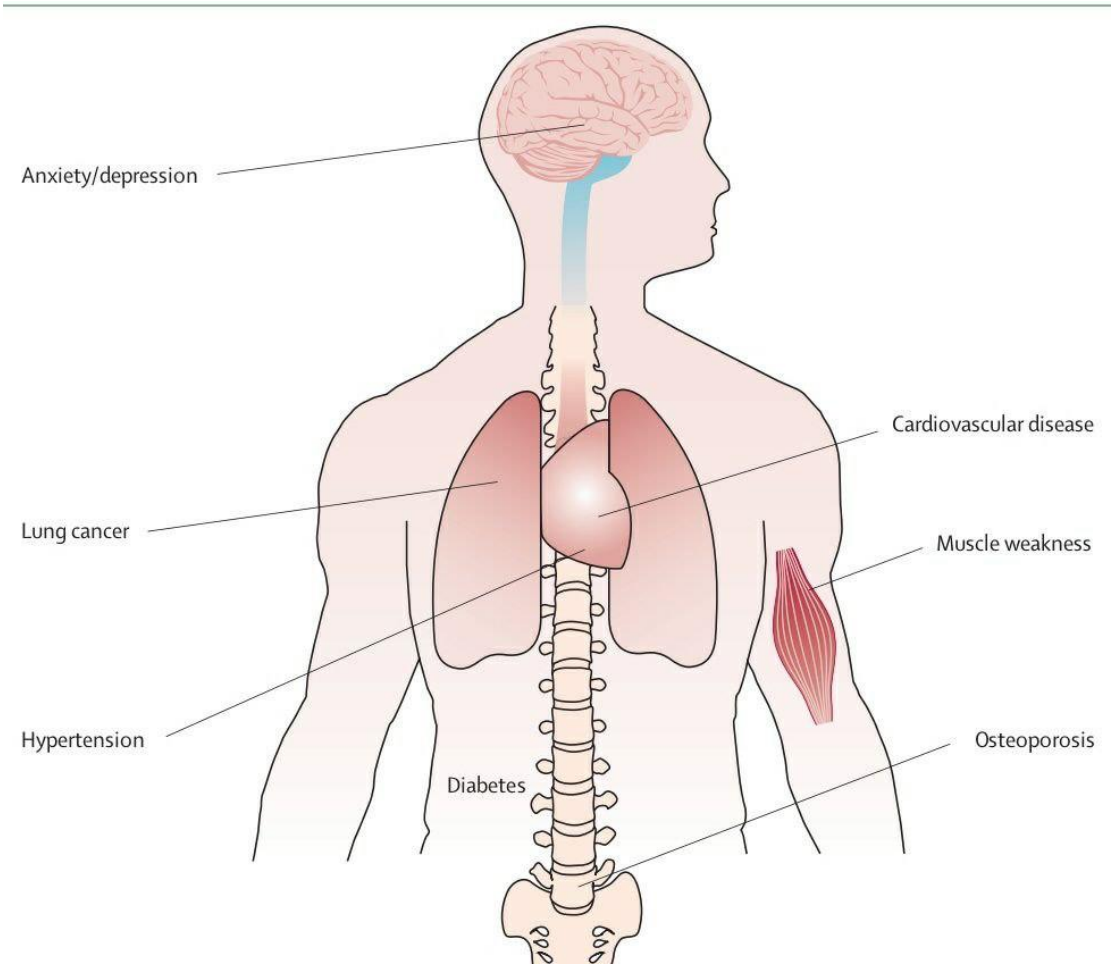
*In patients with severe impairment of forced expiratory volume in 1 s and other known risk factors.[52]

Systemic manifestations and comorbidities

Although COPD is a lung disease, it is associated with systemic manifestations and comorbid conditions. The most common comorbidities are ischaemic heart disease, diabetes, skeletal muscle wasting, cachexia, osteoporosis, depression, and lung cancer .These comorbidities affect health outcomes, increase the risks of admission to hospital and death, and account for more than 50% of use of health-care resources for COPD. They also explain why clinical features in patients with COPD do not correlate well with FEV1.These chronic diseases can develop in patients with or without COPD, but their frequent association with the disorder—certainly with severe disease—suggests common risk factors and mechanistic pathways. For instance, cigarette smoking is a major risk for COPD and cardiovascular disease, osteoporosis, and lung cancer.Abundant evidence shows that physical inactivity, which is frequently observed in people who develop COPD, is linked to the major comorbidities.Finally, ageing is a major risk factor forchronic diseases. Almost half of all people aged 65 years or more have at least three chronic medical disorders,and for COPD in particular a cluster analysis indicated that age rather than FEV1 accounted for most of the comorbidities and symptoms.

One common denominator across comorbidities is systemic inflammation. Increased concentrations of circulating cytokines (tumour necrosis factor α and interleukins 6 and 8), adipokines (leptin, ghrelin), and acute-phase proteins (C-reactive protein, fibrinogen) are seen in most of the diseases. Furthermore, all described risk factors have been directly linked to the presence of systemic inflammation.In several studies biomarkers of systemic

inflammation have been seen in patients with COPD, particularly when disease is severe and during acute exacerbations.Whether these systemic markers spill over from the lungs into the systemic circulation or merely reflect the proinflammatory state is unclear.



Under-recognition and under-reporting

Exacerbation recognition and reporting by patients is generally poor. Almost three-quarters of patients have difficulties with under- standing the term ‘exacerbation’ , and ~40% of patients do not immediately take action (e.g., contacting their healthcare provider; increasing their medication dose, or taking a different medication; resting; or

reducing or stopping smoking) when they experience an exacerbation. Factors that have the potential to influence exacerbation reporting include access to healthcare, distance from the clinic, availability of personal and public transport, the ability to travel to a clinic (for ex- ample, if the patient is on oxygen therapy), and limited resources that may prevent general practitioners from making home visits. Unreported COPD exacerbations are associated with slower recovery ,and prompt recognition, reporting, and treatment of COPD exacerbations reduces the duration of symptoms .Patients who do not report COPD exacerbations remain untreated with maintenance or preventive therapies, highlighting the fact that defining exacerbations based on the treatment provided may not provide a complete picture. Furthermore, exacerbations may not be recognized in patients with undiagnosed COPD; for example, a smoker who receives antibiotics or oral corticosteroids for the treatment of bronchitis may be experiencing a COPD exacerbation.

Effect on symptom duration

Even a single COPD exacerbation has the potential to result in a significant decrease in lung function and an increase in the risk of further exacerbations . Data collected during a randomized con- trolled trial showed that patients who had experienced ≥1 exacerbation of any severity since their last study visit had a significantly reduced quality of life, compared with those who had not experienced an exacerbation . Additionally, in the 2–3 months following a severe exacerbation, patients were at their greatest risk of suffering from an- other exacerbation . Each exacerbation further increased the risk of experiencing another event; compared with a first severe exacerbation, the risk of a subsequent severe

exacerbation was increased 3-fold following a second severe exacerbation and 24-fold following a tenth severe exacerbation . The duration of an exacerbation is also linked to an increased risk of further exacerbations and poorer health status in patients with COPD exacerbations. Exacerbations in which lung function did not recover were associated with viral infection symptoms and an accelerated lung function decline . Together, these findings show that even one exacerbation can have harmful effects on the patient and highlight the importance of recognizing COPD exacerbations, as prompt treatment may decrease symptoms and lung function decline. A key aim in clinical practice should be to minimize the rate of exacerbations experienced by patients with COPD.

Effect on lung function

COPD exacerbations are associated with accelerated lung function loss, particularly in patients with mild airflow limitation and severe exacerbations . Additionally, patients who have frequent COPD exacerbations are generally the most symptomatic and have the largest decline in lung function .

Recovery of lung function following an exacerbation can be pro- longed, with findings showing that for 25% of exacerbations, lung function does not return to the patients' pre-exacerbation levels 5 weeks after the event, and that for 7% of exacerbations, lung function does not return to the patients' pre-exacerbation levels after 3 months . Therefore, patients should be monitored until they have fully recoveredfrom their COPD exacerbation . While a long symptom duration during a COPD exacerbation was associated with an increased risk of further exacerbations , a fast recovery in lung

function following treatment has been shown to be significantly associated with a lower risk for COPD exacerbations.

Effect on quality of life and physical activity

COPD exacerbations affect many different factors relating to patient quality of life. As expected, patients who experienced frequent exacerbations (≥3/year) had a significantly reduced quality of life compared with patients who experienced less frequent exacerbations (< 3/year) . Furthermore, the severity of a COPD exacerbation has been shown to correlate with quality of life. Patients who had a recent severe COPD exacerbation had higher levels of activity impairment and reduced health-related quality of life when compared with those who had a recent moderate COPD exacerbation . However, even a mild COPD exacerbation can adversely impact patient health-related quality of life. Conversely, a better health-related quality of life has been associated with a lower risk for COPD exacerbations .

A global patient survey revealed that the majority of patients with COPD felt that exacerbations prevented them from making plans for the future and impacted daily activities such as walking, sleeping, and speaking . Consistent with this, increased daytime sleepiness, de- creased total sleep time, decreased sleep efficiency, and levels of fatigue have been reported during an exacerbation . In addition, COPD has previously been associated with sexual dysfunction in males, particularly erectile dysfunction, with most patients dissatisfied with their current and expected sexual function . How COPD exacerbations affect sexual functioning has not yet been fully elucidated, but sex

hormone levels have been shown to be markedly altered during a COPD exacerbation , which may have resulted in sexual dysfunction.

Hospitalization due to a COPD exacerbation has been shown to result in physical and functional impairment in patients, which deteriorates further between discharge from hospital and 1 month following the exacerbation . Exercise capacity and muscle strength were found to decrease when patients suffered even a moderate COPD exacerbation and reduced physical activity levels were associated with an increased risk of further exacerbations and mortality . Additionally, patients with COPD exacerbations may have balance impairments that are associated with increased dyspnea and reduced muscle strength, which may contribute to the high incidence of falls experienced by these patients following hospitalization .

Hence, a decrease in physical activity levels following a COPD exacerbation can lead to reduced muscle strength, resulting in further physical impairment in patients.

Mortality

COPD exacerbations have a major impact on mortality . Mortality after a severe exacerbation has been found to peak in the first week following hospitalization , and a UK national audit in 2014 determined an inpatient mortality rate of 4.3% in patients hospitalized for a COPD exacerbation . Furthermore, a meta-analysis of studies that followed patients for at least 1.5 years after hospital admission reported a predicted case fatality rate of 16%, defined as the ‘excess mortality that results from a COPD

exacerbation' .In patients with COPD hospitalized for an exacerbation for the first time, more than one in five died within 1 year of discharge . and only one-half of patients were alive within 3.6 years . Moderate and severe exacerbations were associated with an increased mortality risk, which increased with exacerbation frequency.

Impact on mental health

In one study, COPD exacerbations were associated with moderate- to-severe depression in nearly half of patients who had experienced exacerbation episodes in the previous year, moderate-to-severe anxiety in more than two-thirds of patients, and post-traumatic stress symptoms in one-third of patients . Symptoms of anxiety, depression, and post-traumatic stress have been more commonly reported in patients with frequent COPD exacerbations (≥2) versus patients with ≤1 COPD exacerbation in the previous year .

Depression and anxiety are also associated with a decrease in physical activity and worsening health-related quality of life, and with increased respiratory symptoms and risk of hospitalization, mortality, and further exacerbations . Decreases in physical activity have also been associated with higher levels of depression in patients with a moderate COPD exacerbation . These findings suggest that, for some patients, decreased physical activity after a COPD exacerbation may result in them becoming housebound, which may, in turn, increase patient depression, thereby creating a vicious cycle, which could lead to further impairments in physical activity for the patient.

that time-limited anxiety and depression symptoms that occur during COPD exacerbations do not require treatment , since the exacerbation may be resolved by the time these treatments exert their effects.

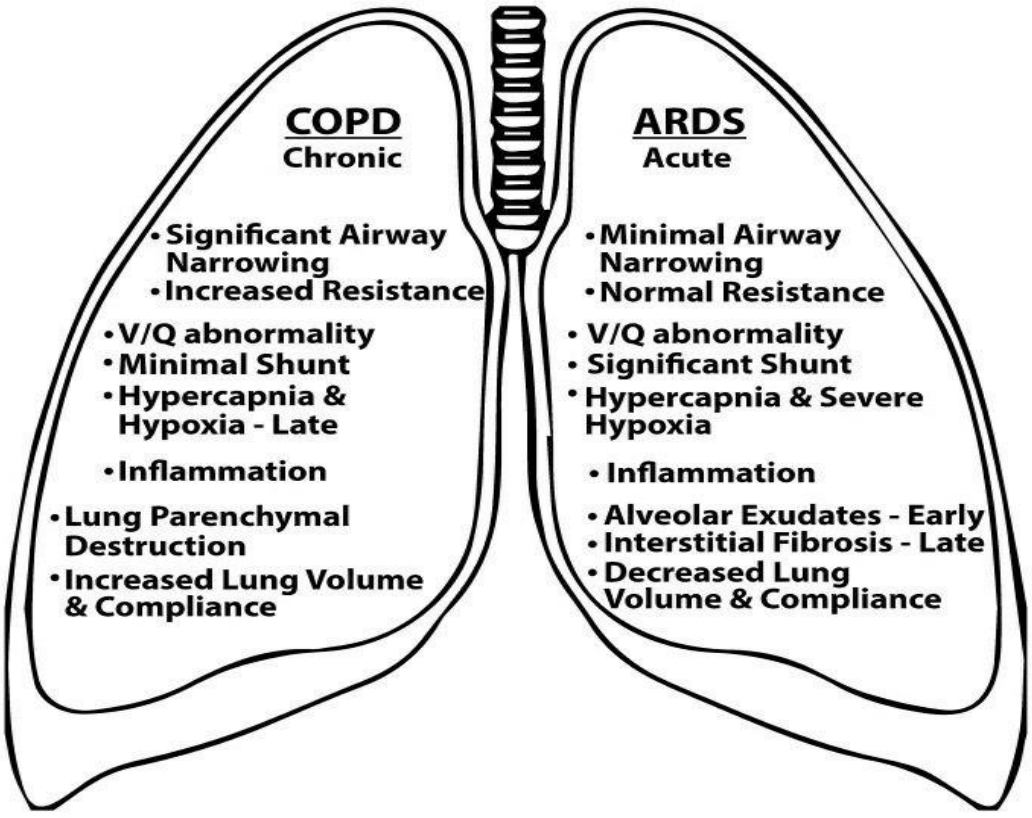
COPD not only affects the mental health of patients with COPD; almost two-thirds of people caring for patients with COPD reported anxiety symptoms and approximately one-third reported depressionsymptoms.Perceived caregiver burden and patient activity limitation were identified as predictors of anxiety and depression symptoms in caregivers

Control of ventilation in COPD and lung injury

Chronic obstructive pulmonary disease (COPD) is characterized by progressive airflow limitation that is not fully reversible (Global Initiative for Chronic Obstructive Lung Disease, 2013). It is a very common disorder, affecting more than 5 percent of the population. COPD is associated with significant morbidity, and is the third- ranked cause of death in the United States (Centers for Disease and Prevention, 2012). Emphysema and chronic bronchitis are clinical entities which represent opposing ends of the COPD spectrum of disease. Hypersecretion and bronchial mucus obstruction are char- acteristic of bronchitis. In contrast, pulmonary tissue destruction is primarily responsible for emphysema. In general, COPD is associated with an enhanced chronic inflammatory response in the airways and the lung to noxious particles or gasses (Global Initiative for Chronic Obstructive Lung Disease, 2013). While genetic factors (e.g., alpha-1 antitrypsin deficiency) modify the development of COPD in individual patients, the most frequent

cause of COPD is cigarette smoking. Despite this, COPD remains a major cause of morbidity and mortality worldwide.

Ventilatory control is not significantly altered in mild COPD, but changes in breathing patterns may be observed during maximal exercise . As COPD progresses, the ventilatory control system is initially able to compensate so that most patients do not develop significant changes in carbon dioxide blood gas tensions; however, the work of breathing required to maintain ventilation will be increased, as will oxygen utilization by the muscles of respiration. In particular, greater neural activity is needed to increase the muscular contractions required to generate an adequate breath. This increase in efferent drive to these muscles may contribute to the development of dyspnea



A number of functional changes affect ventilatory control in the COPD patient:

1. Destruction of pulmonary connective tissue leads to changes in the mechanical properties of the lungs. Tethering of the airways to the pulmonary interstitium is reduced leading to greater likelihood of airway collapse. Increases in airway resistance are not equally distributed throughout the lung, and an abnormal distribution of ventilation impairs the efficiency of oxygen and carbon dioxide transfer between the pulmonary capillary blood and the alveolar gas. Ventilation–perfusion (V/Q) abnormalities are thought to be the major mechanism responsible for impaired gas exchange leading to arterial hypoxemia , but alveolar hypoventilation also contributes. Shunt physiology and diffusion limitation are not significant causes of hypoxemia.

2. The typical site of fixed airway narrowing in most COPD patients is the peripheral airways that are <2–3mm. Cigarette smoking initiates inflammation and repeated cycles of injury and repair in the peripheral airways, resulting in mucus hypersecretion and ultimately fibrosis of the walls of the small airways. Intrinsic injury and inflammation, in addition to loss of lung recoil, act synergistically to increase resistance to airflow during both inspiration and expiration. Thus, efforts to maintain normal ventilation will necessarily require increases in respiratory frequency or augmented muscle force per breath. Some patients will augment nerve/muscle activation in an effort to overcome their lung pathology and maintain an adequate level of ventilation (“pink puffer”), while others will not (“blue bloater”). Enhanced pressure changes and static airway narrowing worsen expiratory dynamic compression and flow limitation develops at lower expiratory flows.

Patients will often adopt pursed-lip breathing, a behavioral strategy to prevent airway collapse and maintain airflow.

3. The impact of the pathophysiologic changes in COPD will be more prominent during exercise, where a greater exercise ventilatory response will be required in an attempt to achieve arterial blood gas regulation. Spinal serotonergic modulation of descending drive has been shown to be an important mechanism for long-term modulation of exercise hyperpnea). This adaptive control strategy (i.e., plasticity) may help the system adjust as COPD-related changes in respiratory mechanics and pulmonary gas exchange develop over time.

4. Increases in lung compliance and decreases in airway resistance ultimately produce hyperinflation of the lungs and chest wall, manifested as an increase in functional residual capacity. Hyperinflation increases the anterior-posterior diameter of the lower rib cage , depresses and shortens the diaphragm, reduces the diaphragmatic zone of apposition, and misaligns the other muscles of respiration (e.g., intercostals and scalenes). This loss of curvature of the diaphragm makes contraction less mechanically advantageousby altering the vector of forces that the muscle can generate, and may result in paradoxical inward movement of the lower rib cage during inspiration (Hoover's sign) . Furthermore, the length of the diaphragm is reduced and, like all skeletal muscles, it produces less force operating at a length below its optimal length. In an attempt to compensate for these changes, shortening of the diaphragm occurs through loss of sarcomeres. This adaptation improves the length-tension characteristics of the diaphragm

. There is also an increase in the proportion of fatigue-resistant Type I fibers in the diaphragms of patients with COPD, as com- pared to control subjects. This change in fiber type is associated with a loss of Type II (fast-twitch) fibers, suggesting a training effect adaptation.

5. The above noted alterations in musculo-skeletal configuration increase the work of breathing. The respiratory muscles, because of their increased energy requirements, will extract more oxygen from the blood and produce more carbon dioxide. When faced with progressive arterial hypoxemia and increased ventilatory demands during an acute exacerbation (e.g., with a respiratory infection), respiratory muscle fatigue may result as increases in cardiac output to these tissues may not be able to meet oxygen delivery needs . In this setting, the ventilatory control system will adapt a breathing pattern that minimizes the work of breath- ing, even at the expense of increased arterial PCO2 .

6. Hyperinflation of the respiratory system is also associated with the development of intrinsic positive end expiratory pressure (PEEP; also called auto-PEEP) , which will worsen with increased breathing frequencies or larger tidal volumes (e.g., as with mechanical ventilation).

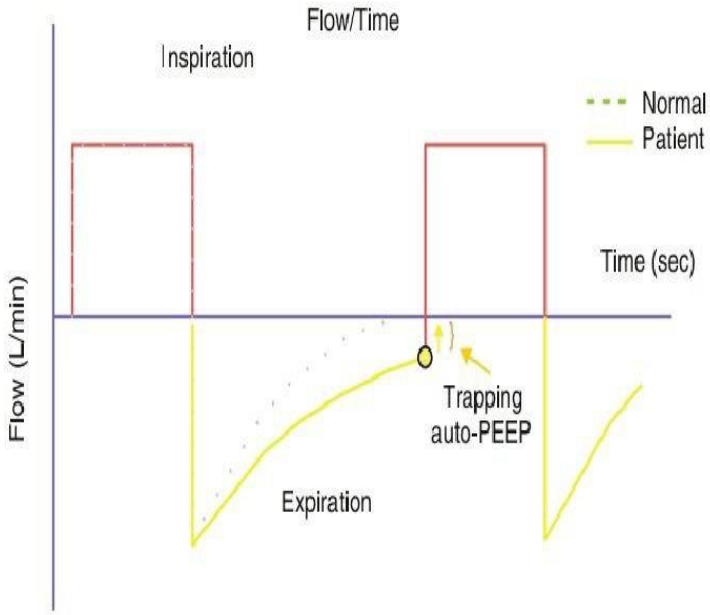


Figure 2 Auto-PEEP.

7. Reversible causes of airflow limitation also contribute to altered breathing patterns in COPD. Inflammatory cells and mucus accumulate in the bronchial walls and lumens, especially during exacerbations induced by viral or bacterial infections. Smooth muscle contraction in response to noxious agents occurs in the peripheral and central airways. Dynamic hyperinflation (beyond that present at baseline) will occur with exertion or exercise . Furthermore, inflammation plays an essential role in the cardiorespiratory alterations following exposure to chronic intermittent hypoxia , but the potential importance of cytokine-induced alterations in the hypoxic ventilatory reflex arc in COPD remains unknown.

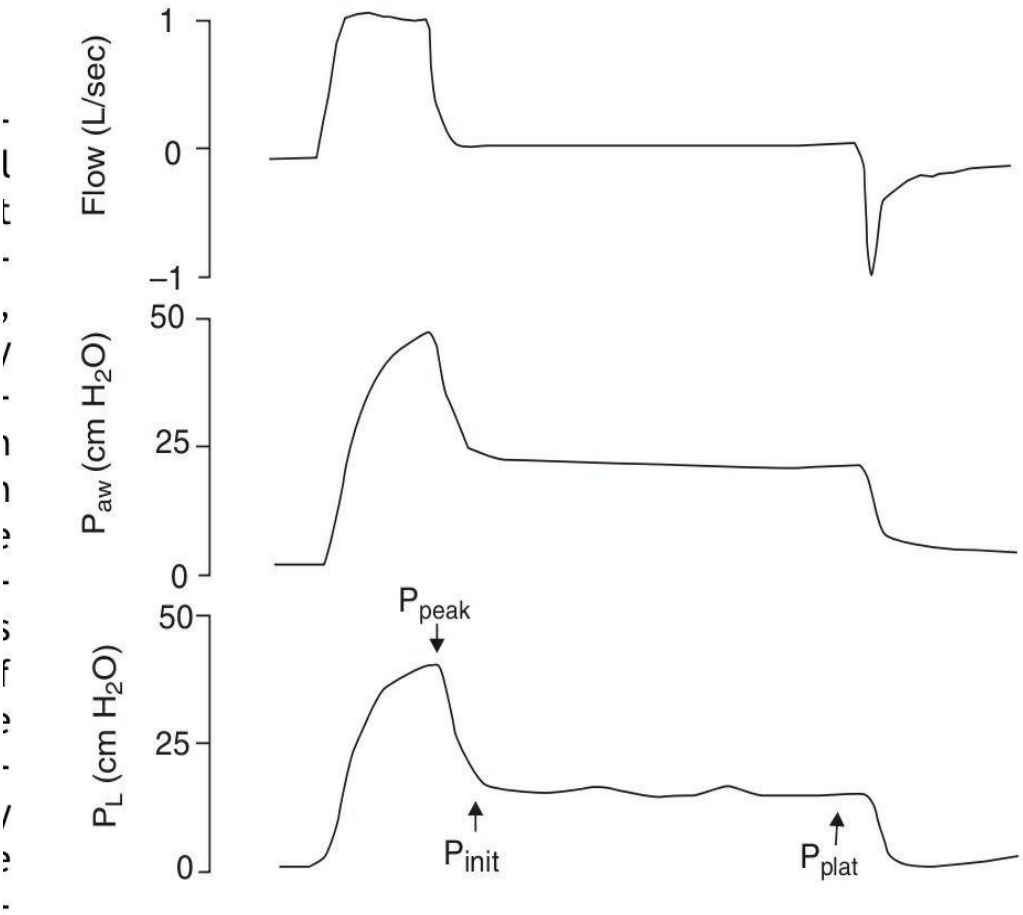


Figure 1 Occlusion of the expiratory valve.

Chemical control of ventilation in COPD

In general, the ventilatory responses to hypercapnia are reduced in patients with COPD. This subnormal response (change in minute ventilation for a given change in arterial carbon dioxide, slope of VE /PCO2) is likely the result of the increased mechanical load imposed on the respiratory system by the disease. Two main lines of evidence support this conclusion. First, normal subjects breathing against an external inspiratory resistance have a reduced VE/PCO2 which is similar to that observed in COPD subjects . Second,

responses in COPD and normal subjects are similar when the output of the ventilatory system to increased PCO2 is expressed as a percentage of the maximum voluntary ventilation (calculated from the FEV1) Taken together, these data support the idea that the mechanical load explains the observed reduction in chemosensitivity. Direct measurements of phrenic nerve activity in COPD patients were greater than in normal subjects, supporting a higher level of central drive to breathe .Thus, in most patients, changes in mechanical factors related to COPD disease progression account for the reduction in ventilatory responsiveness to elevations in carbondioxide. Furthermore, this reduction occurs despite an increase in the percentage of inspiratory muscle pressure-generating capacity. However, it remains possibility that reduced chemosensitivity or blunted intrinsic ventilatory drive may be present in certain patients.

In most COPD patients, respiratory system performance deteriorates over time as a result of structural changes in the lung parenchyma, as well as in both the large and small airways. Destruction of lung tissue, inflammation and injury of airways and alveoli, and inefficiency of respiratory muscles all contribute to impaired performance of the pump and gas exchange functions of the respiratory apparatus. In response, compensatory responses occur to help preserve ventilation and arterial oxygenation. Key compensatory mechanisms include

(a) intrinsic properties of respiratory muscles which augment force generation;

(b) signaling from central and peripheral chemoreceptors primarily sensitive to changes in arterial carbon dioxide and oxygen, respectively; and.

(c) behavioral modifications of central respiratory drive which increase motor output to the respiratory muscles. Changes in breathing patterns in COPD are the result of both primary abnormalities related to disease progression, as well as adaptive changes in central control of breathing.

Response to supplemental oxygen

1. A reduction in ventilation associated with removal of a hypoxic stimulus. In patients with severe hypoxemia and baseline hypercapnia, peripheral chemoreceptor activity accounts for a significant proportion of the drive to breath. Inspiring high concentration of oxygen will reduce carotid body activation, leading to ventilatory depression. Several studies in the literature support this effect.

2. Increasing V/Q inequality resulting from the release of hypoxic vasoconstriction. Specifically, supplemental oxygen alters intrapulmonary control of ventilation–perfusion matching by increasing the dispersion of blood flow, without altering the dispersion of alveolar ventilation. This potential importance of this mechanism is also supported by evidence.

3. Decreased binding affinity of hemoglobin for carbon dioxide. That is, increased levels of oxygen will alter the CO2 dissociation curve, enhancing the release of CO2 from hemoglobin molecules. However, the Haldane effect is not considered to play a significant role in oxygen-induced hypercapnia.

It is likely that each of the three mechanisms contributes to

the observed changes in arterial PCO2 in COPD, with the greatest contribution from depression of ventilation and redistribution of blood flow caused by release of hypoxic vasoconstriction. At the same time, increases in alveolar carbon dioxide will improve the efficiency of CO2 elimination at a given level of minute ventilation, which may be an adaptive mechanism in some patients with severe disease.

Management of COPD

CLASSIFICATION OF AIRFLOW LIMITATION SEVERITY IN COPD (BASED ON POST-BRONCHODILATOR FEV_1)		
In patients with FEV1/FVC < 0.70:		
GOLD 1:	Mild	$FEV_1 \geq 80\%$ predicted
GOLD 2:	Moderate	$50\% \leq FEV_1 < 80\%$ predicted
GOLD 3:	Severe	$30\% \leq FEV_1 < 50\%$ predicted
GOLD 4:	Very Severe	$FEV_1 < 30\%$ predicted

THE REFINED ABCD ASSESSMENT TOOL

Spirometrically Confirmed Diagnosis → Assessment of airflow limitation → Assessment of symptoms/risk of exacerbations

Post-bronchodilator $FEV_1/FVC < 0.7$

Grade	FEV_1 (% predicted)
GOLD 1	≥ 80
GOLD 2	50-79
GOLD 3	30-49
GOLD 4	< 30

Moderate or Severe Exacerbation History

- ≥2 or ≥ 1 leading to hospital admission
- 0 or 1 (not leading to hospital admission)

C	D
A	B
mMRC 0-1 CAT < 10	mMRC ≥ 2 CAT ≥ 10

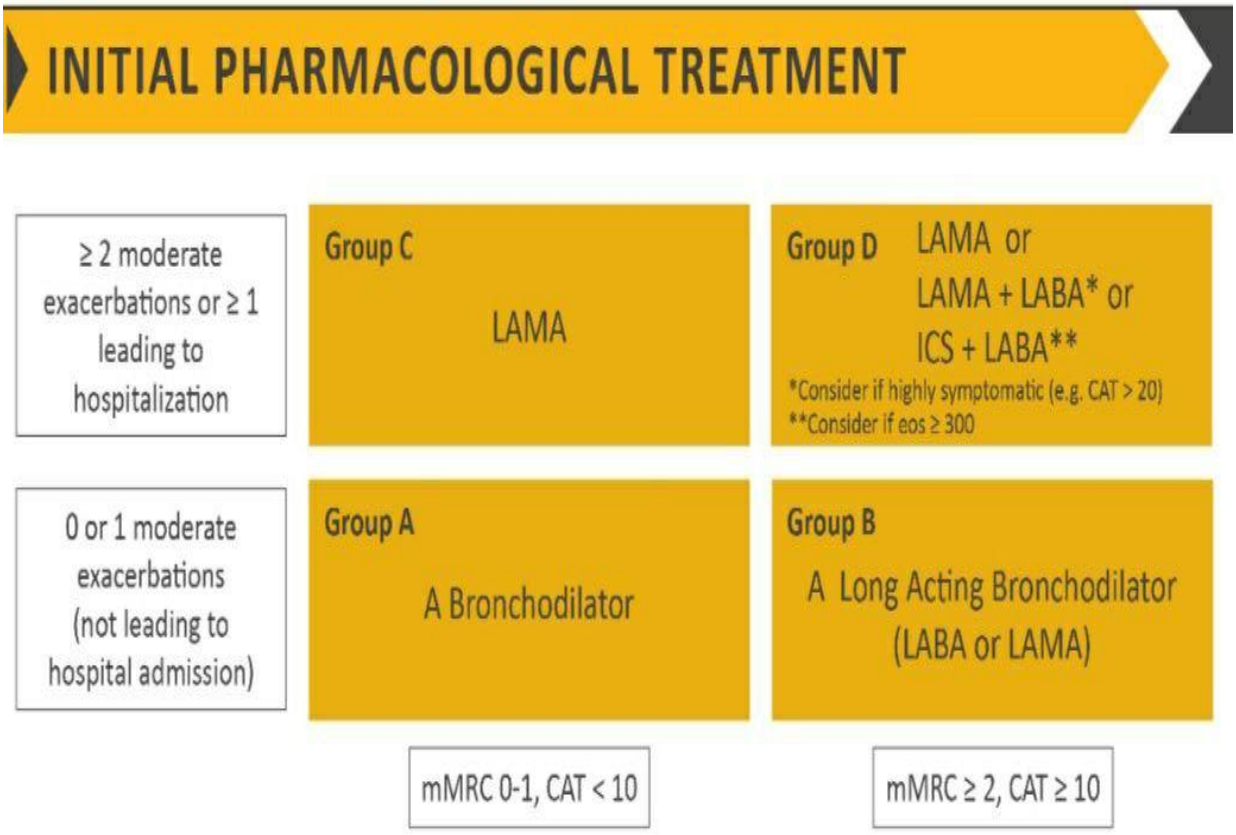
Symptoms

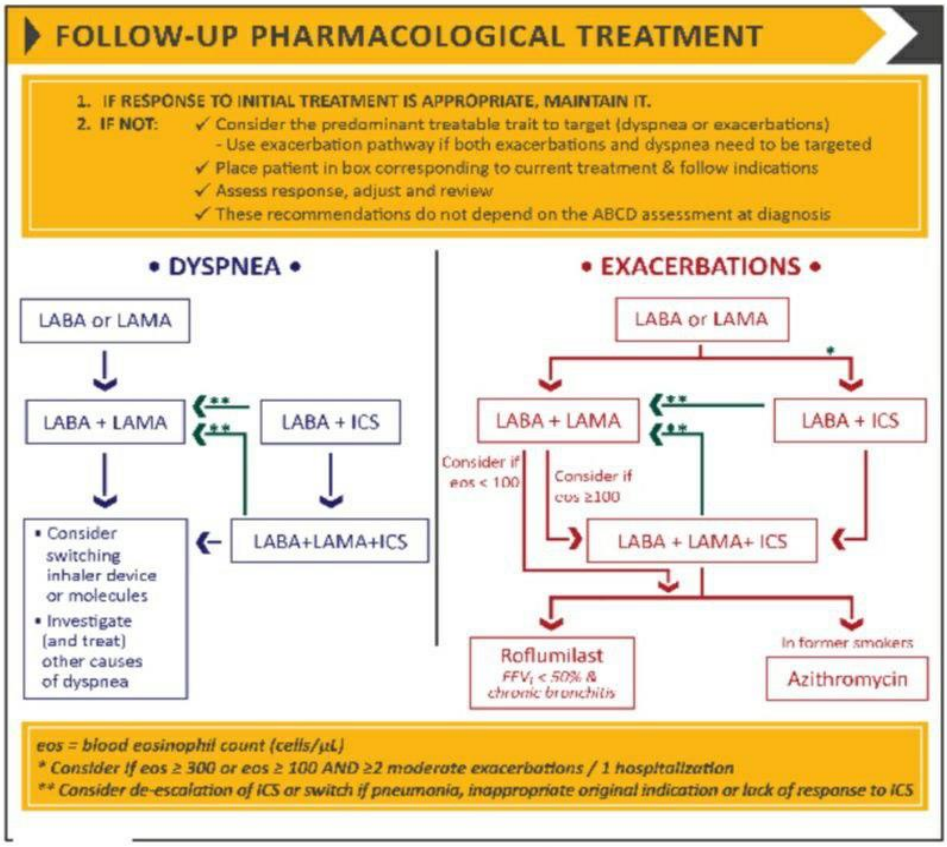
NON-PHARMACOLOGIC MANAGEMENT OF COPD*

PATIENT GROUP	ESSENTIAL	RECOMMENDED	DEPENDING ON LOCAL GUIDELINES
A	Smoking Cessation (can include pharmacologic treatment)	Physical Activity	Flu Vaccination Pneumococcal Vaccination Pertussis Vaccination
B, C and D	Smoking Cessation (can include pharmacologic treatment) Pulmonary Rehabilitation	Physical Activity	Flu Vaccination Pneumococcal Vaccination Pertussis Vaccination

*Can include pharmacologic treatment.

TABLE 4.8


INITIAL PHARMACOLOGICAL TREATMENT
≥ 2 moderate exacerbations or ≥ 1 leading to hospitalization
Group C
LAMA
Group D
LAMA or
LAMA + LABA* or
ICS + LABA**
*Consider if highly symptomatic (e.g. CAT > 20)
**Consider if eos ≥ 300
0 or 1 moderate exacerbations (not leading to hospital admission)
Group A
A Bronchodilator
Group B
A Long Acting Bronchodilator (LABA or LAMA)
mMRC 0-1, CAT < 10
mMRC ≥ 2, CAT ≥ 10



OXYGEN THERAPY AND VENTILATORY SUPPORT IN STABLE COPD

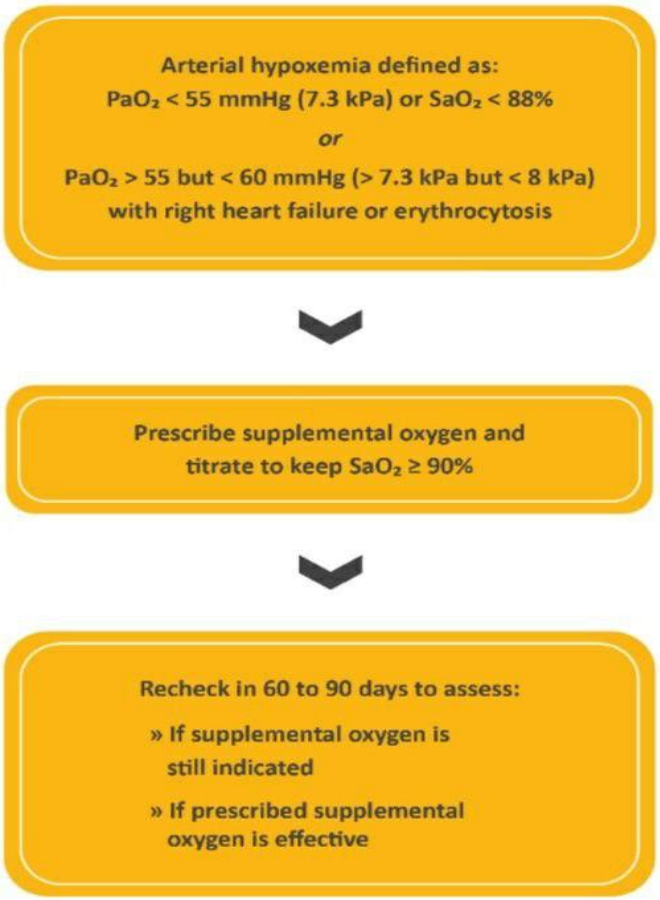
OXYGEN THERAPY

- The long-term administration of oxygen increases survival in patients with severe chronic resting arterial hypoxemia **(Evidence A)**.
- In patients with stable COPD and moderate resting or exercise-induced arterial desaturation, prescription of long-term oxygen does not lengthen time to death or first hospitalization or provide sustained benefit in health status, lung function and 6-minute walk distance **(Evidence A)**.
- Resting oxygenation at sea level does not exclude the development of severe hypoxemia when traveling by air **(Evidence C)**.

VENTILATORY SUPPORT

- NPPV may improve hospitalization-free survival in selected patients after recent hospitalization, particularly in those with pronounced daytime persistent hypercapnia ($PaCO_2 \geq 52$ mmHg) **(Evidence B)**.

PRESCRIPTION OF SUPPLEMENTAL OXYGEN TO COPD PATIENTS



MATERIALS & METHODS

STUDY DESIGN: Longitudinal follow up study

STUDY LOCATION: General Medicine ward and Intensive medical care unit Govt. Kilpauk Medical College and Hospital.

STUDY PARTICIPANTS:

Inclusion Criteria

1. All patients admitted with a primary admitting diagnosis of acute exacerbation of COPD.
2. All patients must have a Prior confirmed diagnosis of COPD on the basis of FEV1/FVC<0.702.

Exclusion Criteria:

1..Patients with Bronchial Asthma pneumothorax, pulmonary embolism, pulmonary edema , , Pulmonary tuberculosis , Lung malignancies , Bronchiactasis

2.Patients with underlying COPD admitted with another primary admitting diagnosis (eg. Stroke, Acute Myocardial Infarction) were excluded from the study.

3. Patients who died during the study were excluded.

SAMPLE SIZE - Sample size was calculated using formula

In a study titled A Study of Platelet Parameters as a Novel Marker of Severity of Inflammation in Patients with Chronic Obstructive Pulmonary Disease Dipti Mohapatra1, Ranita Sahana et al Platelet Distribution Width For Acute Exacerbation Of Copd ,Mean Sd Was Found To Be 11.8 ± 0.44

Sample size is calculated using the formula 4* σ2/ d2 With 95 % Confidence interval

σ=Standard deviation=0.44

d is absolute precision= 0.1

4*(0.44)2/(0.1)2

Sample size was calculated to be 77

e)PERIOD OF STUDY : 6 months.

STUDY METHODOLOGY: N= 4PQ

1. In patients admitted with a primary diagnosis of acute exacerbation of COPD who meet the criteria for the study will be explained about the study and the patients who are willing to participate will be included in the study.

For each patient written informed consent will be obtained.

History regarding symptoms of COPD, smoking, occupation, acute exacerbation episodes, medications used by the patient, previous hospitalizations will be documented.

Pack years will be calculated based on number of cigarettes per day and duration of smoking in years.

Under strict aseptic precautions blood will be drawn from patients to estimate PLATELET INDICES.

Mean platelet volume, platelet distribution width and platelet count will be measured using automated hematology analyzer,

Patients will promptly be intubated if NIV is contraindicated or not responding to NIV, if they have severe dyspnea and increased work of breathing, acute respiratory acidosis with pH <7.25 and PaCO2> 60 mmHg is present, if respiratory rate is >35 or if PaO2 was <40mmHg

Patients will be monitored and whether they required supplemental Oxygen, Non invasive positive pressure ventilation or MECHANICAL VENTILATION during their stay will be documented.

Patients will be followed up and platelet indices will be measured during admission, the 2nd and 4th week.

Patients are followed up for 6 months and number of hospital admissions will be noted.

OPERATIONAL DEFINITION

CHRONIC OBSTRUTIVE PULMONARY DISEASE-disease state characterized by persistent respiratory symptoms and airflow limitation that is not fully reversible. Airflow limitation determined by spirometry as FEV1/FEVC <0.7

COPD exacerbation is defined as increased dyspnea, often accompanied by increased cough, sputum production, sputum purulence, wheezing, chest tightness

Platelet distribution width- value 12% and above is high: less than 12% is low

Mean Platelet volume- value 9 femtoliters and above is high: less than 9 femtoliters is low

Platelet count- value 3 lakhs and above is high; below 3 lakhs is low

Recurrant hospital admissions- 2 and more hospital admissions in 6 months duration is considered recurrent hospital admissions.

Persistently high values of platelet indices – 2 or more elevated values of platelet indices measures on admission, 2weeks, 4 weeks is considered persistently high

8. DATA MANAGEMENT & STATISTICAL ANALYSIS:

The information collected regarding all the selected cases were recorded in a master chart. Data analysis will be done with the help of SPSS version 23.0

RESULTS AND OBSERVATIONS:

The collected data were analysed with IBM SPSS Statistics for Windows, Version 23.0.(Armonk, NY: IBM Corp).To describe about the data descriptive statistics frequency analysis, percentage analysis were used for categorical variables and the mean & S.D were used for continuous variables. To find the significant difference between the bivariate samples in Independent groups the Unpaired sample t-test was used. To find the significance in categorical data Chi-Square test was used similarly if the expected cell frequency is less than 5 in 2×2 tables then the Fisher's Exact was used. In all the above statistical tools the probability value .05 is considered as significant level.

Table 1: Age distribution

Age distribution		
	Frequency	Percent
21 - 40 yrs	4	5.2
41 - 60 yrs	45	58.4
61 - 80 yrs	28	36.4
Total	77	100.0

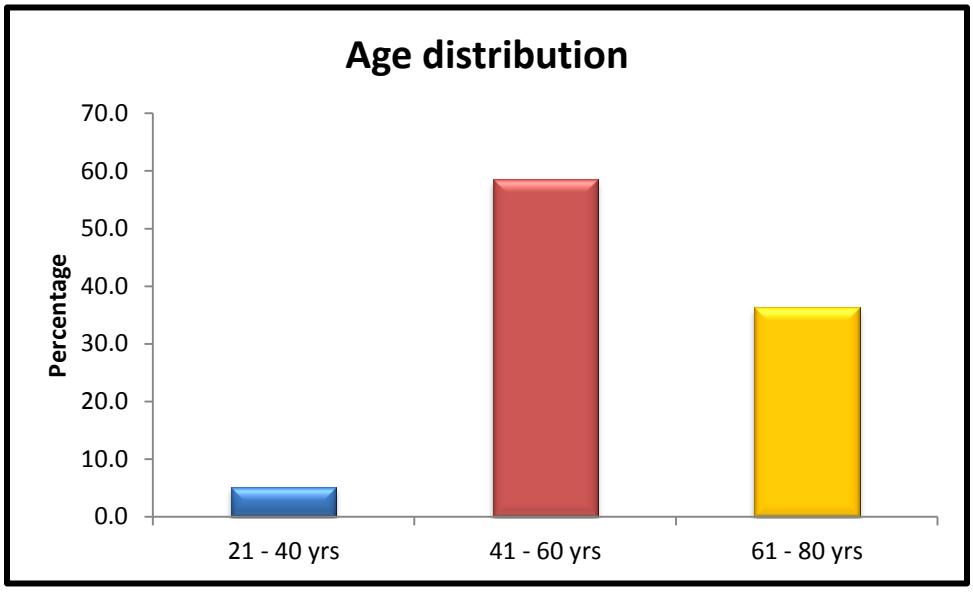


Figure 1

The above table shows Age distribution were 21-40 years is 5.2%, 41-60 years is 58.4%, 61-80 years is 36.4%.

Table 2: Gender distribution

Gender distribution		
	Frequency	Percent
Female	14	18.2
Male	63	81.8
Total	77	100.0

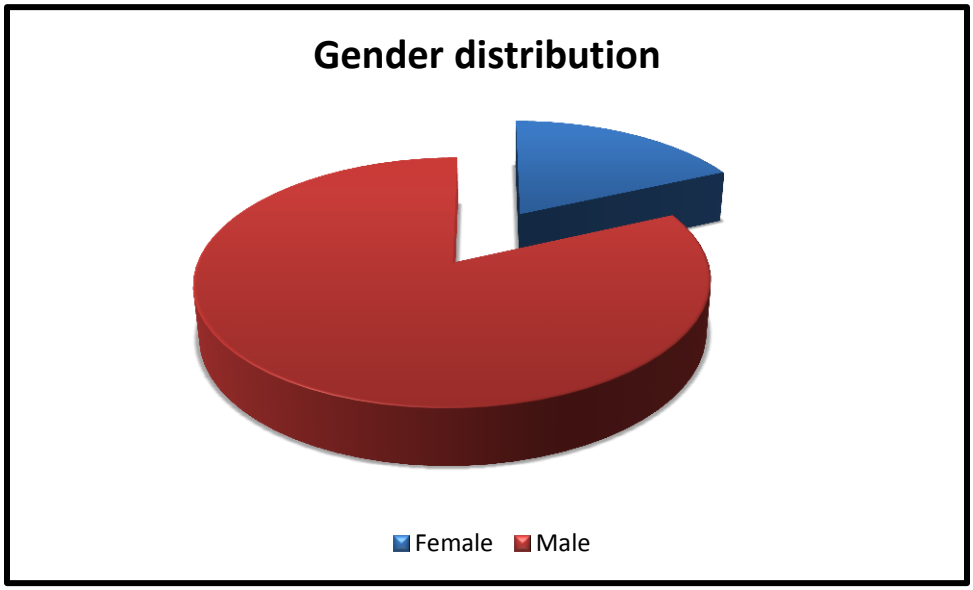


Figure 2

The above table shows Gender distribution were Female is 18.2%, Male is 81.8%.

Table 3: Comorbidity distribution

Comorbidity		
	Frequency	Percent
Absent	59	76.6
Present	18	23.4
Total	77	100.0

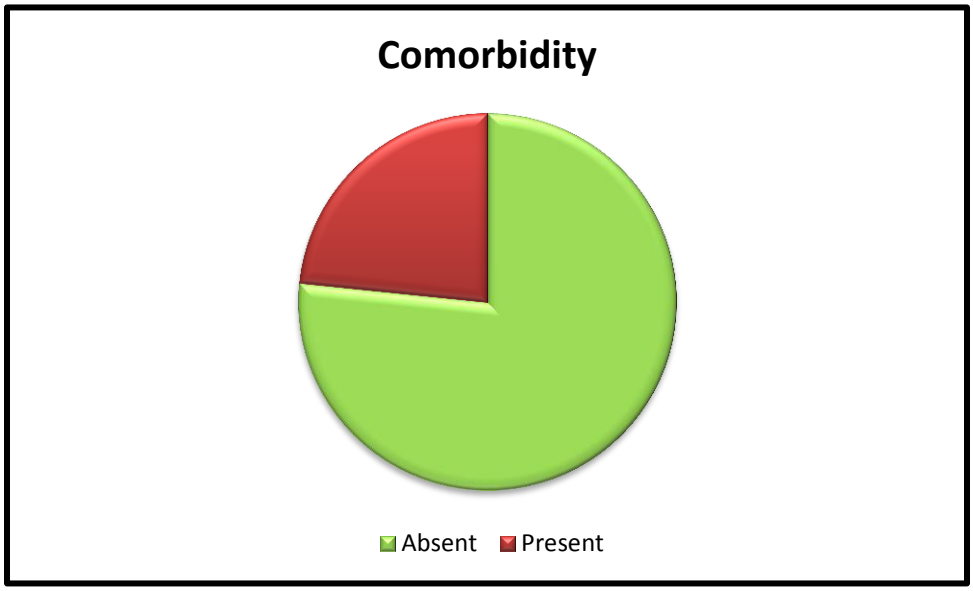


Figure 3

The above table shows Comorbidity distribution were Absent is 76.6%, Present is 23.4%.

Table 4: Platelet distribution width at admission

Platelet distribution width at admission		
	Frequency	Percent
Low	54	70.1
High	23	29.9
Total	77	100.0

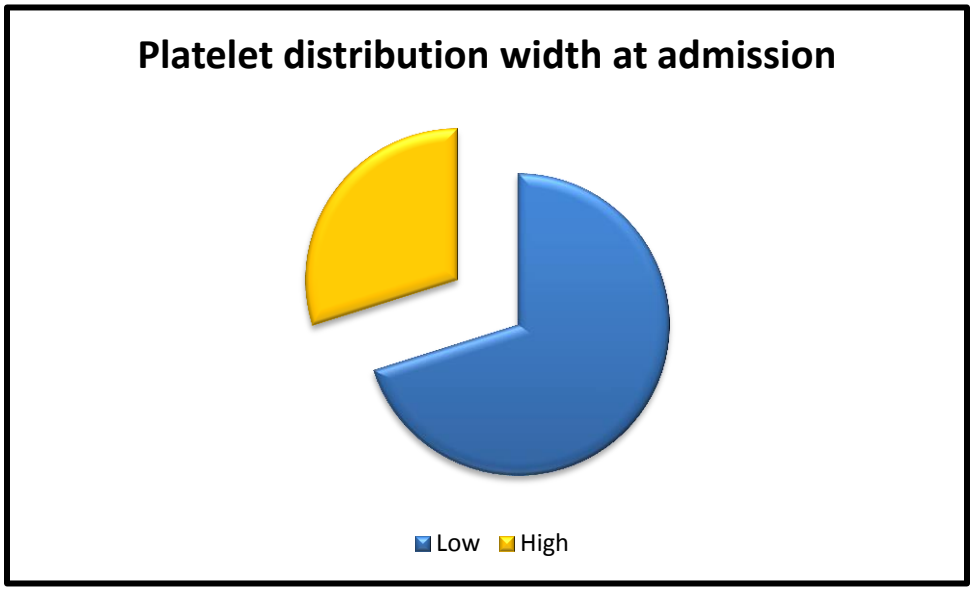


Figure 4

The above table shows Platelet distribution width at admission distribution were Low is 70.1%, High is 29.9%.

Table 5: Distribution of Mean platelet volume at admission

Mean platelet volume at admission		
	Frequency	Percent
Low	59	76.6
High	18	23.4
Total	77	100.0

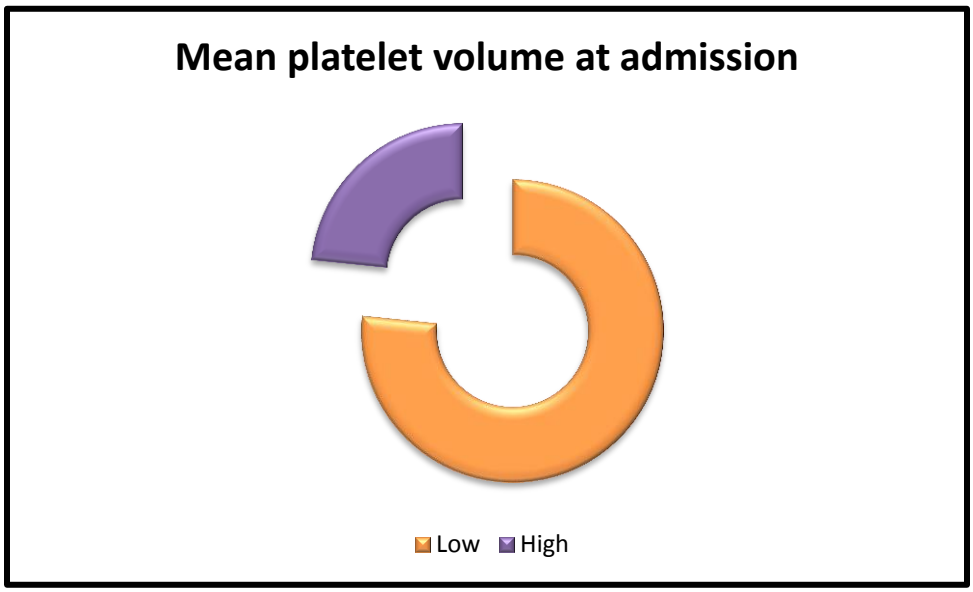


Figure 5

The above table shows Mean platelet volume at admission distribution were Low is 76.6%, High is 23.4%.

Table 6: Distribution of Platelet count at admission

Platelet count at admission		
	Frequency	Percent
Low	56	72.7
High	21	27.3
Total	77	100.0

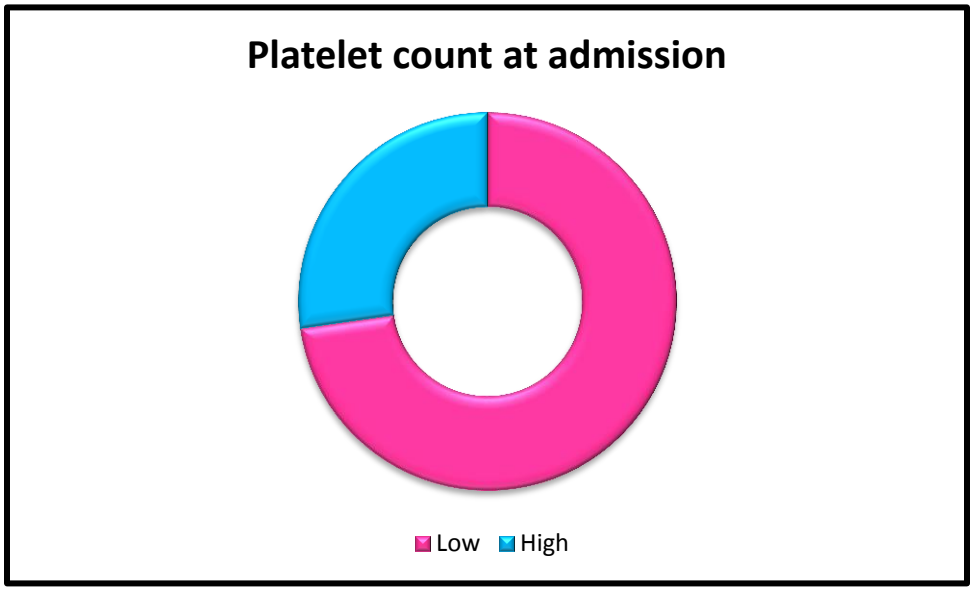


Figure 6

The above table shows Platelet count at admission distribution were Low is 72.7%, High is 27.3%.

Table 7: Platelet distribution width Persistantly high

Platelet distribution width Persistantly high		
	Frequency	Percent
Yes	21	27.3
No	56	72.7
Total	77	100.0

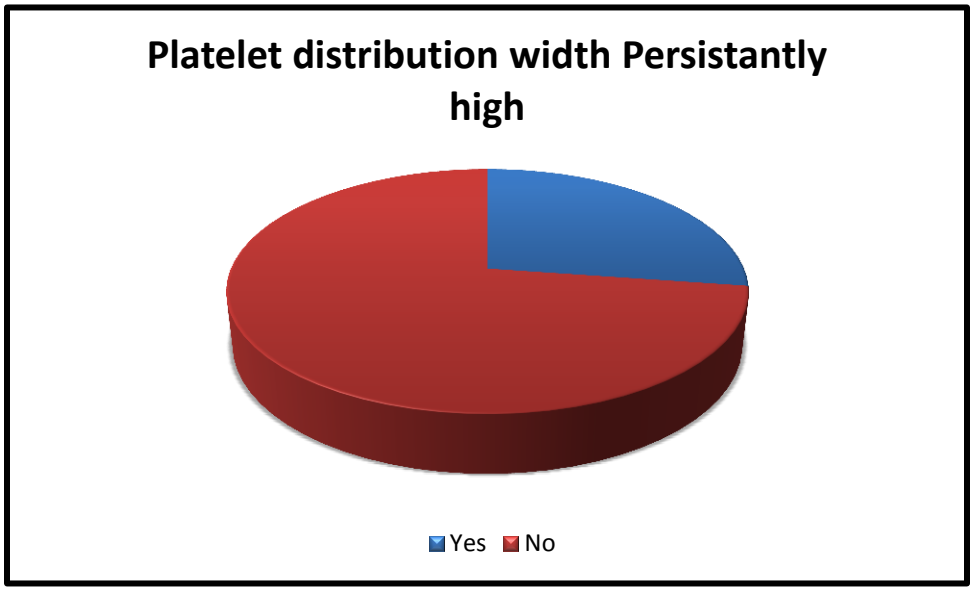


Figure 7

The above table shows Platelet distribution width Persistantly high distribution were Yes is 27.3%, No is 72.7%.

Table 8: Distribution of Mean platelet volume Persistantly high

Mean platelet volume Persistantly high		
	Frequency	Percent
Yes	19	24.7
No	58	75.3
Total	77	100.0

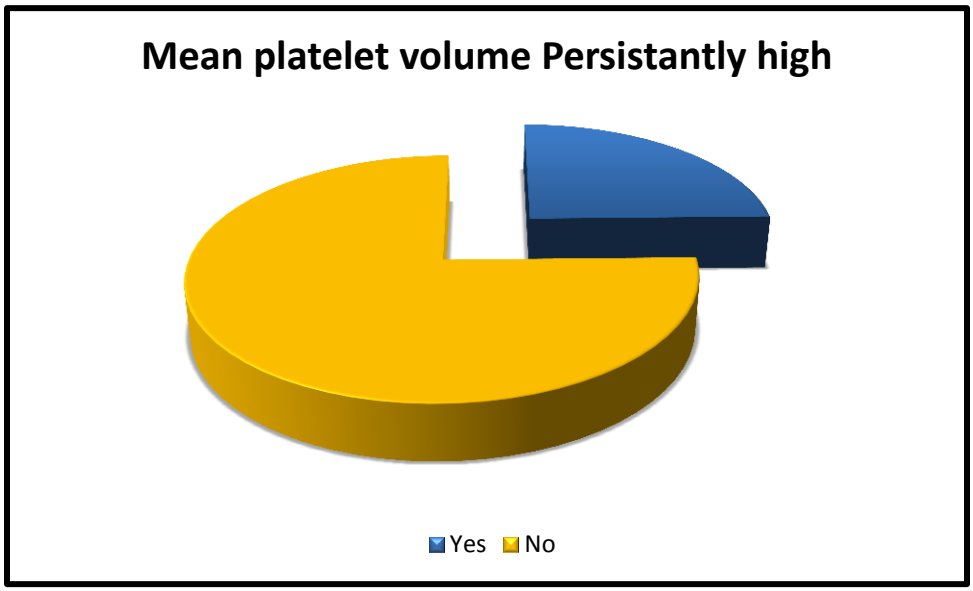


Figure 8

The above table shows Mean platelet volume Persistantly high distribution were Yes is 24.7%, No is 75.3%.

Table 9: Distribution of Platelet count Persistantly high

Platelet count Persistantly high		
	Frequency	Percent
Yes	21	27.3
No	56	72.7
Total	77	100.0

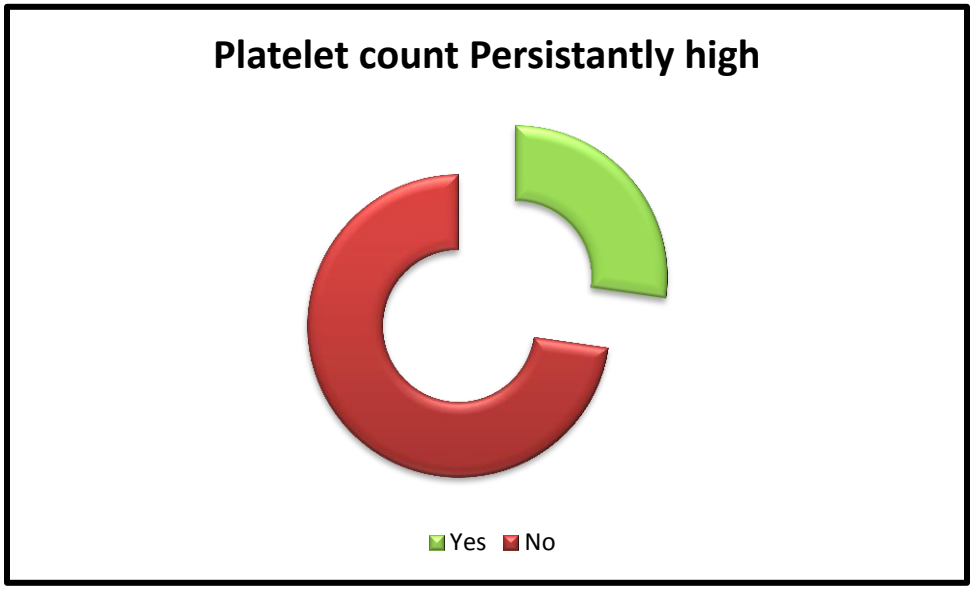


Figure 9

The above table shows Platelet count Persistantly high distribution were Yes is 27.3%, No is 72.7%.

Table 10: Distribution of Mechanical ventilation

Mechanical ventilation		
	Frequency	Percent
Yes	19	24.7
No	58	75.3
Total	77	100.0

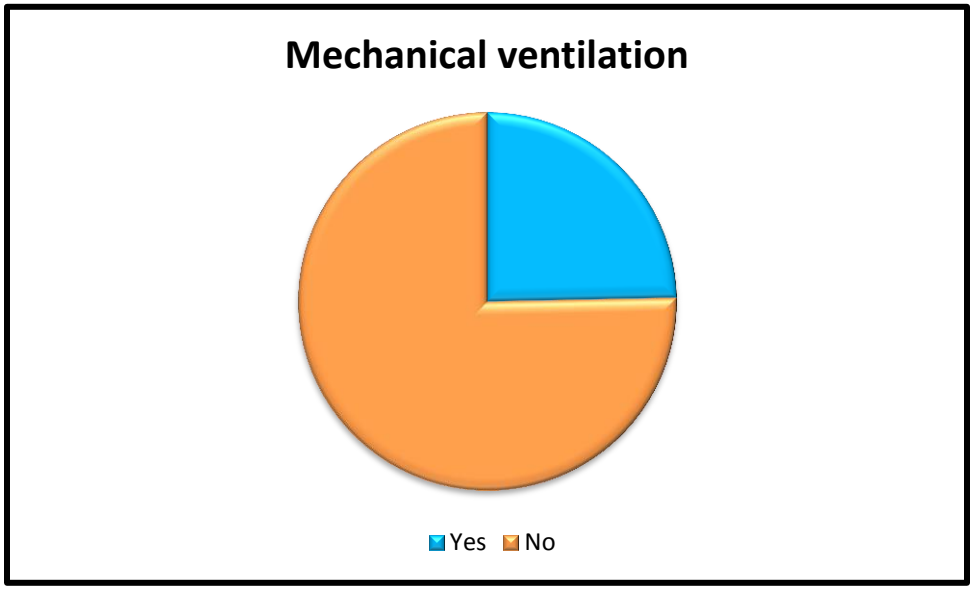


Figure 10

The above table shows Mechanical ventilation distribution were Yes is 24.7%, No is 75.3%.

Table 11: Distribution of Hospital admissions

Hospital admissions		
	Frequency	Percent
Yes	21	27.3
No	56	72.7
Total	77	100.0

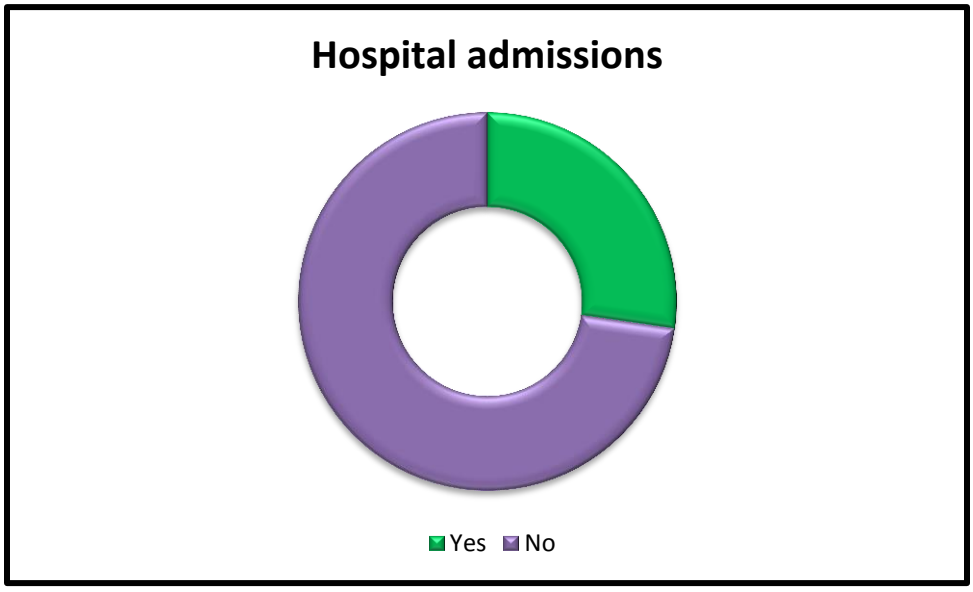


Figure 11

The above table shows Hospital admissions distribution were Yes is 27.3%, No is 72.7%.

Table 12: Comparison of Platelet distribution width with Mechanical ventilation at admission by Pearson's Chi-Square test

Platelet distribution width			Mechanical ventilation		Total	□ 2 - value	p-value
			Yes	No			
at admission	Low	Count	2	52	54	42.778	0.0005 **
		%	10.5%	89.7%	70.1%		
	High	Count	17	6	23		
		%	89.5%	10.3%	29.9%		
Total		Count	19	58	77		
		%	100.0%	100.0%	100.0%		
** Highly Statistical Significance at p < 0.01 level							

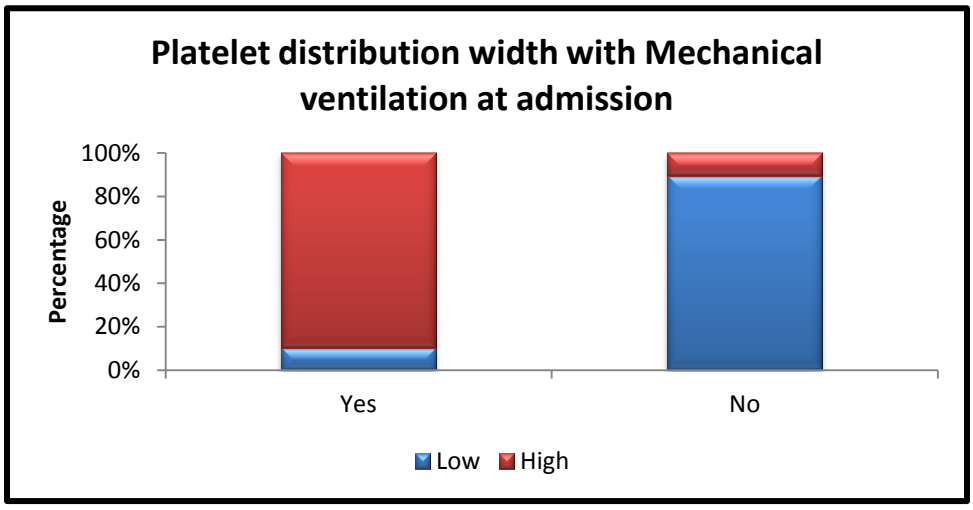


Figure 12

The above table shows comparison of Platelet distribution width with Mechanical ventilation at admission by Pearson's Chi-Square test were □ 2=42.778, p=0.0005<0.01 which shows highly statistical significance with Platelet distribution width with Mechanical ventilation at admission.

Table 13: Comparison of Mean platelet volume with Mechanical ventilation at admission by Pearson's Chi-Square test

Mean platelet volume			Mechanical ventilation		Total	□ 2 - value	p-value
			Yes	No			
at admission	Low	Count	7	52	59	22.286	0.0005 **
		%	36.8%	89.7%	76.6%		
	High	Count	12	6	18		
		%	63.2%	10.3%	23.4%		
Total		Count	19	58	77		
		%	100.0%	100.0%	100.0%		
** Highly Statistical Significance at p < 0.01 level							

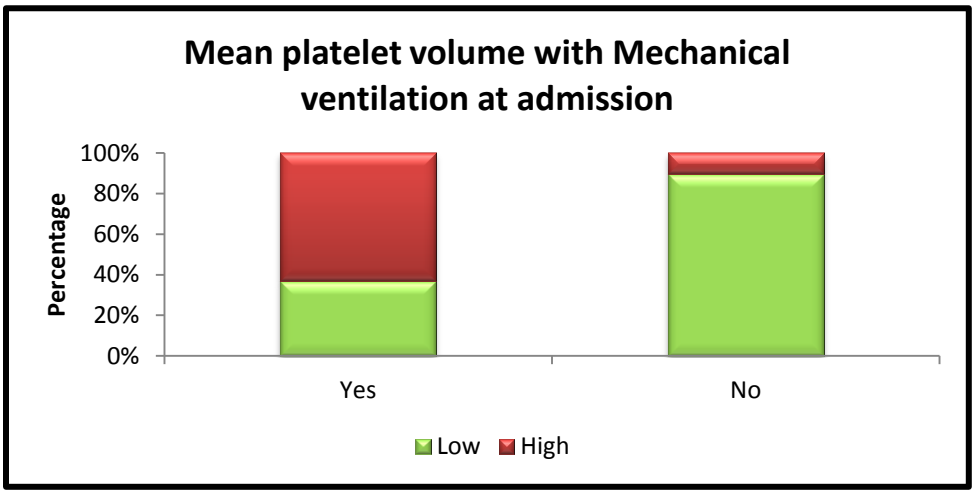


Figure 13

The above table shows comparison of Mean platelet volume with Mechanical ventilation at admission by Pearson's Chi-Square test were □ 2=22.286, p=0.0005<0.01 which shows highly statistical significance with Mean platelet volume with Mechanical ventilation at admission.

Table 14: Comparison of Platelet count with Mechanical ventilation at admission by Pearson's Chi-Square test

Platelet count			Mechanical ventilation		Total	□ 2 - value	p-value
			Yes	No			
at admission	Low	Count	5	51	56	27.393	0.0005 **
		%	26.3%	87.9%	72.7%		
	High	Count	14	7	21		
		%	73.7%	12.1%	27.3%		
Total		Count	19	58	77		
		%	100.0%	100.0%	100.0%		
** Highly Statistical Significance at p < 0.01 level							

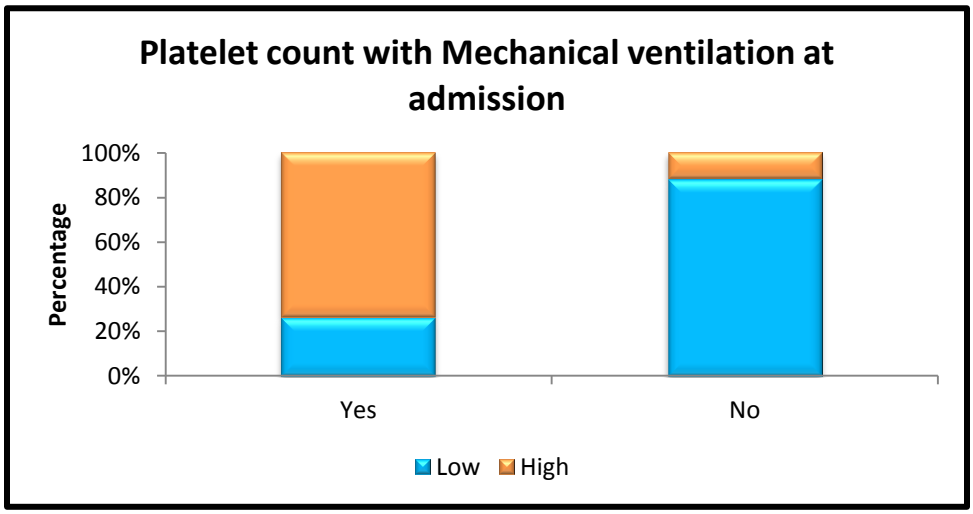


Figure 14

The above table shows comparison of Platelet count with Mechanical ventilation at admission by Pearson's Chi-Square test were □ 2=27.393, p=0.0005<0.01 which shows highly statistical significance with Platelet count with Mechanical ventilation at admission.

Table 15: Comparison of Platelet distribution width with Mechanical ventilation at Persistantly high by Pearson's Chi-Square test

Platelet distribution width			Mechanical ventilation		Total	□ 2 - value	p-value
			Yes	No			
Persistantly high	Yes	Count	14	7	21	27.393	0.0005 **
		%	73.7%	12.1%	27.3%		
	No	Count	5	51	56		
		%	26.3%	87.9%	72.7%		
Total		Count	19	58	77		
		%	100.0%	100.0%	100.0%		
** Highly Statistical Significance at p < 0.01 level							

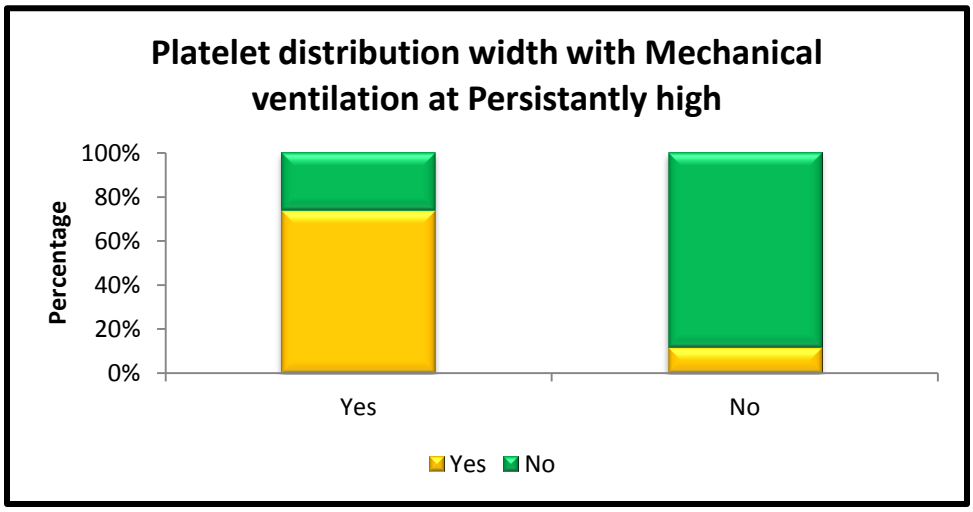


Figure 15

The above table shows comparison of Platelet distribution width with Mechanical ventilation at Persistantly high by Pearson's Chi-Square test were □ 2=27.393, p=0.0005<0.01 which shows highly statistical significance with Platelet distribution width with Mechanical ventilation at Persistantly high.

Table 16: Comparison of Mean platelet volume with Mechanical ventilation at Persistantly high by Pearson's Chi-Square test

Mean platelet volume			Mechanical ventilation		Total	□ 2 - value	p-value
			Yes	No			
Persistantly high	Yes	Count	12	7	19	20.098	0.0005 **
		%	63.2%	12.1%	24.7%		
	No	Count	7	51	58		
		%	36.8%	87.9%	75.3%		
Total		Count	19	58	77		
		%	100.0%	100.0%	100.0%		
** Highly Statistical Significance at p < 0.01 level							

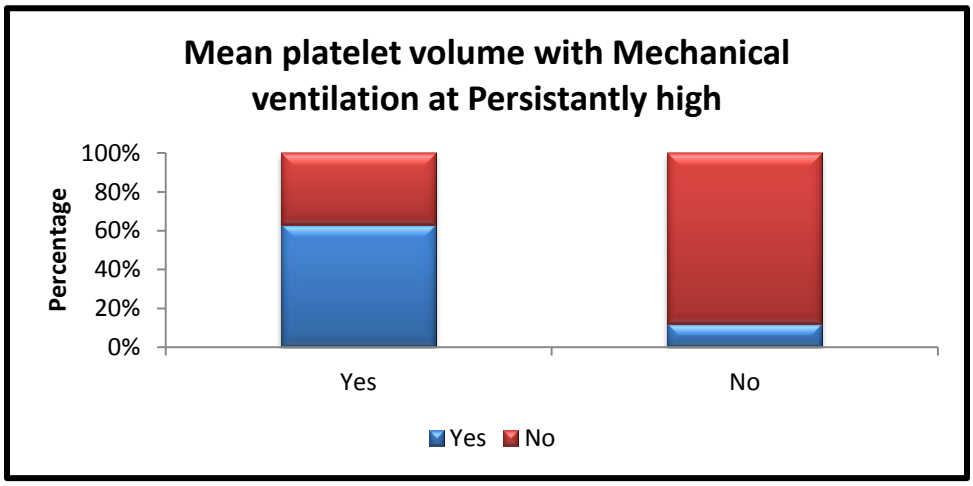


Figure 16

The above table shows comparison of Mean platelet volume with Mechanical ventilation at Persistantly high by Pearson's Chi-Square test were □ 2=20.098, p=0.0005<0.01 which shows highly statistical significance with Mean platelet volume with Mechanical ventilation at Persistantly high.

Table 17: Comparison of Platelet count with Mechanical ventilation at Persistantly high by Pearson's Chi-Square test

Platelet count			Mechanical ventilation		Total	□ 2 - value	p-value
			Yes	No			
Persistantly high	Yes	Count	14	7	21	27.393	0.0005 **
		%	73.7%	12.1%	27.3%		
	No	Count	5	51	56		
		%	26.3%	87.9%	72.7%		
Total		Count	19	58	77		
		%	100.0%	100.0%	100.0%		
** Highly Statistical Significance at p < 0.01 level							

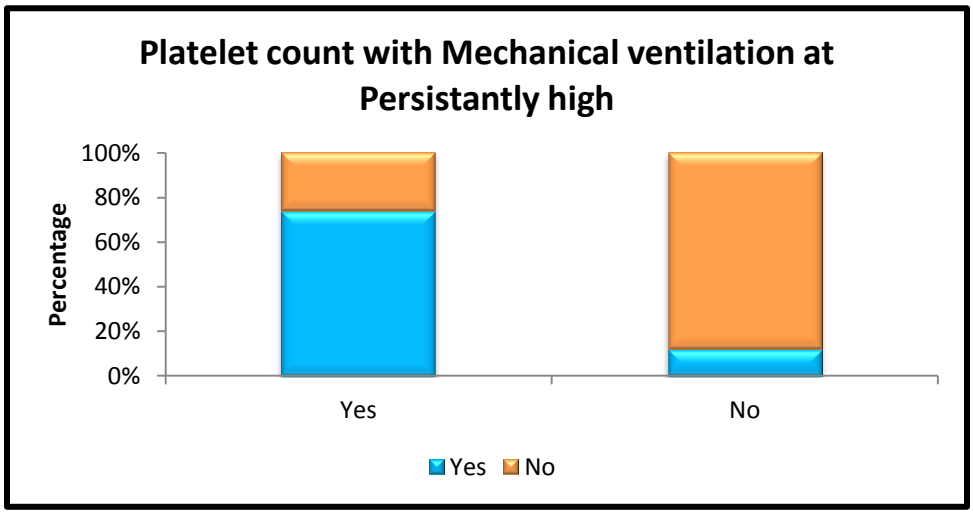


Figure 17

The above table shows comparison of Platelet count with Mechanical ventilation at Persistantly high by Pearson's Chi-Square test were □ 2=27.393, p=0.0005<0.01 which shows highly statistical significance with Platelet count with Mechanical ventilation at Persistantly high.

Table 18: Comparison of Platelet distribution width with Hospital admissions at admission by Pearson's Chi-Square test

Platelet distribution width			Hospital admissions		Total	□ 2 - value	p-value
			Yes	No			
at admission	Low	Count	5	49	54	29.575	0.0005 **
		%	23.8%	87.5%	70.1%		
	High	Count	16	7	23		
		%	76.2%	12.5%	29.9%		
Total		Count	21	56	77		
		%	100.0%	100.0%	100.0%		
** Highly Statistical Significance at p < 0.01 level							

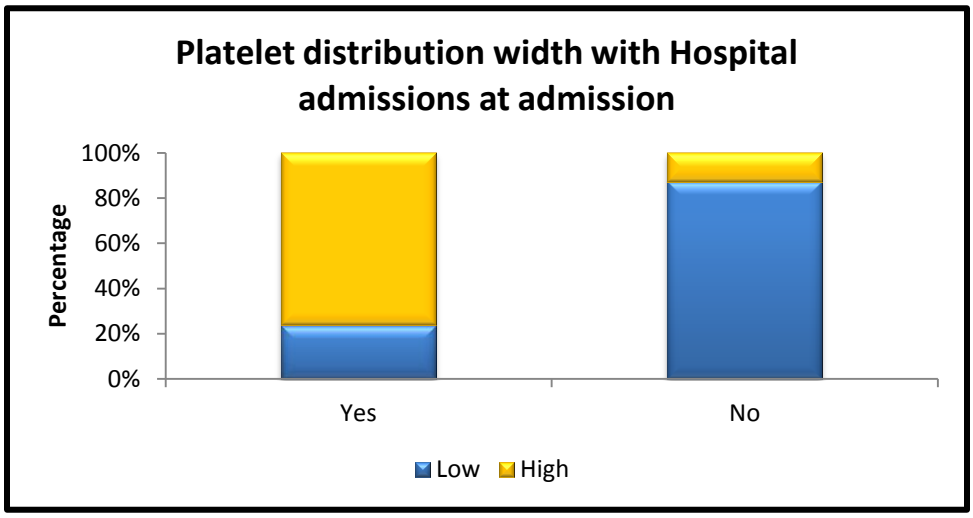


Figure 18

The above table shows comparison of Platelet distribution width with Hospital admissions at admission by Pearson's Chi-Square test were □ 2=29.575, p=0.0005<0.01 which shows highly statistical significance with Platelet distribution width with Hospital admissions at admission.

Table 19: Comparison of Mean platelet volume with Hospital admissions at admission by Pearson's Chi-Square test

Mean platelet volume			Hospital admissions		Total	□ 2 - value	p-value
			Yes	No			
at admission	Low	Count	7	52	59	30.210	0.0005 **
		%	33.3%	92.9%	76.6%		
	High	Count	14	4	18		
		%	66.7%	7.1%	23.4%		
Total		Count	21	56	77		
		%	100.0%	100.0%	100.0%		
** Highly Statistical Significance at p < 0.01 level							

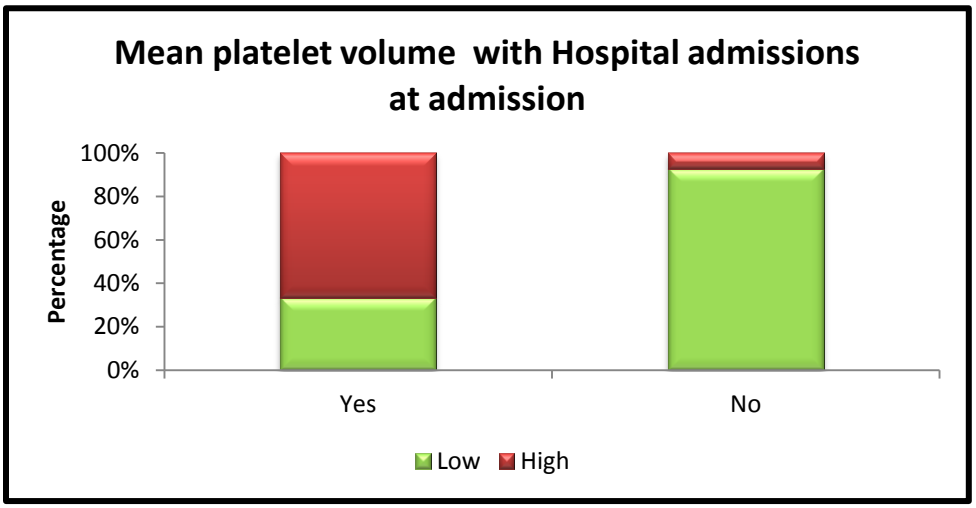


Figure 19

The above table shows comparison of Mean platelet volume with Hospital admissions at admission by Pearson's Chi-Square test were □ 2=30.210, p=0.0005<0.01 which shows highly statistical significance with Mean platelet volume with Hospital admissions at admission.

Table 20: Comparison of Platelet count with Hospital admissions at admission by Pearson's Chi-Square test

Platelet count			Hospital admissions		Total	□ 2 - value	p-value
			Yes	No			
at admission	Low	Count	5	51	56	34.836	0.0005 **
		%	23.8%	91.1%	72.7%		
	High	Count	16	5	21		
		%	76.2%	8.9%	27.3%		
Total		Count	21	56	77		
		%	100.0%	100.0%	100.0%		
** Highly Statistical Significance at p < 0.01 level							

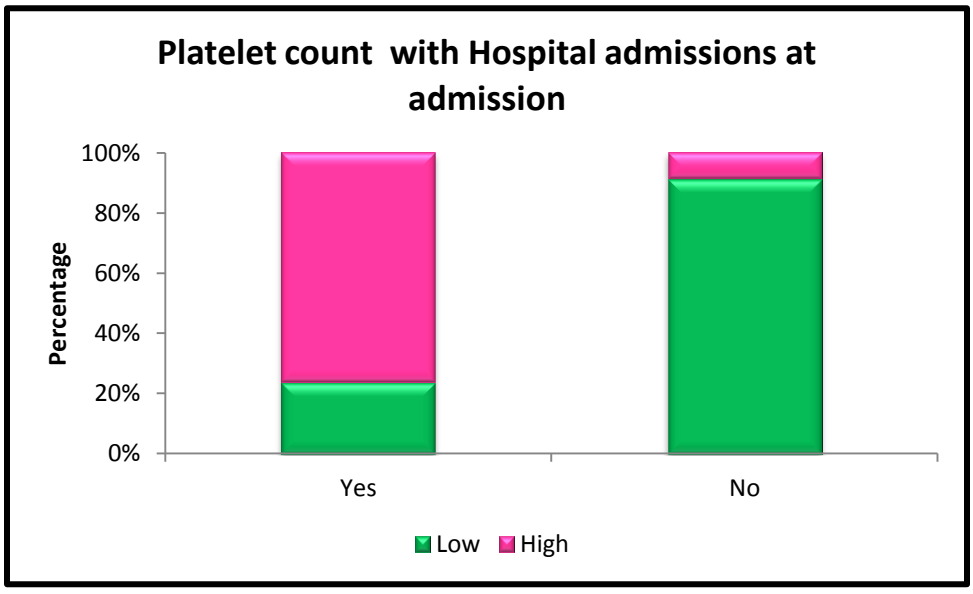


Figure 20

The above table shows comparison of Platelet count with Hospital admissions at admission by Pearson's Chi-Square test were □ 2=34.836, p=0.0005<0.01 which shows highly statistical significance with Platelet count with Hospital admissions at admission.

Table 21: Comparison of Platelet distribution width with Hospital admissions at Persistantly high by Pearson's Chi-Square test

Platelet distribution width			Hospital admissions		Total	□ 2 - value	p-value
			Yes	No			
Persistantly high	Yes	Count	16	5	21	34.836	0.0005 **
		%	76.2%	8.9%	27.3%		
	No	Count	5	51	56		
		%	23.8%	91.1%	72.7%		
Total		Count	21	56	77		
		%	100.0%	100.0%	100.0%		
** Highly Statistical Significance at p < 0.01 level							

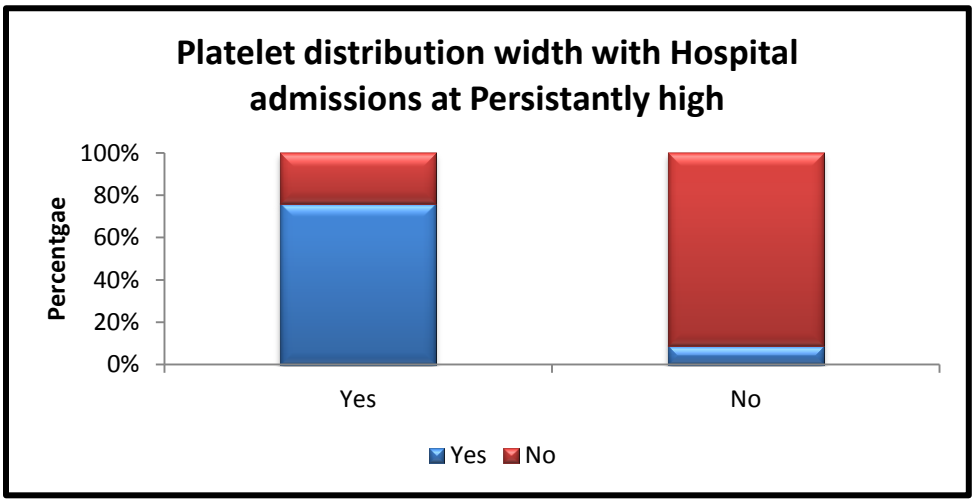


Figure 21

The above table shows comparison of Platelet distribution width with Hospital admissions Persistantly high by Pearson's Chi-Square test were □ 2=34.836, p=0.0005<0.01 which shows highly statistical significance with Platelet distribution width with Hospital admissions Persistantly high.

Table 22: Comparison of Mean platelet volume with Hospital admissions at Persistantly high by Pearson's Chi-Square test

Mean platelet volume			Hospital admissions		Total	□ 2 - value	p-value
			Yes	No			
Persistantly high	Yes	Count	18	1	19	57.881	0.0005 **
		%	85.7%	1.8%	24.7%		
	No	Count	3	55	58		
		%	14.3%	98.2%	75.3%		
Total		Count	21	56	77		
		%	100.0%	100.0%	100.0%		
** Highly Statistical Significance at p < 0.01 level							

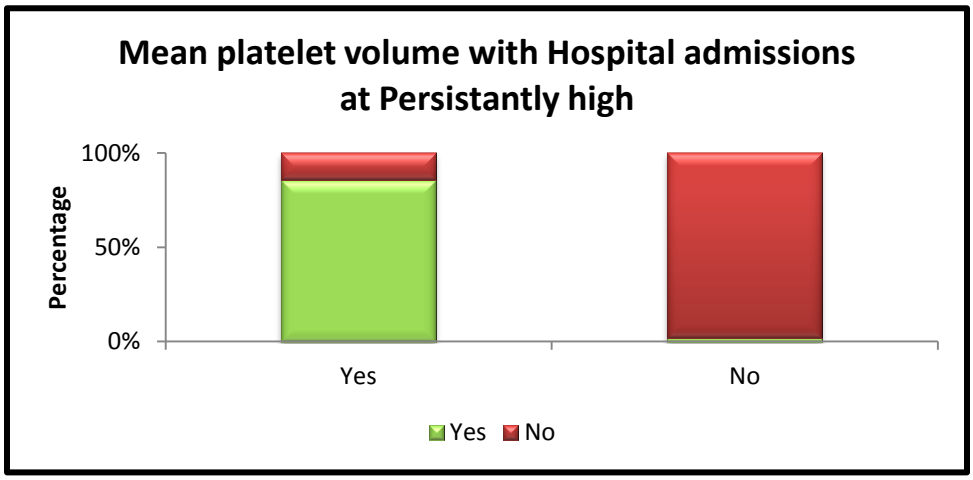


Figure 22

The above table shows comparison of Mean platelet volume with Hospital admissions at Persistantly high by Pearson's Chi-Square test were □ 2=57.881, p=0.0005<0.01 which shows highly statistical significance with Mean platelet volume with Hospital admissions at Persistantly high.

Table 23: Comparison of Platelet count with Hospital admissions at Persistantly high by Pearson's Chi-Square test

Platelet count			Hospital admissions		Total	□ 2 - value	p-value
			Yes	No			
Persistantly high	Yes	Count	18	3	21	49.721	0.0005 **
		%	85.7%	5.4%	27.3%		
	No	Count	3	53	56		
		%	14.3%	94.6%	72.7%		
Total		Count	21	56	77		
		%	100.0%	100.0%	100.0%		
** Highly Statistical Significance at p < 0.01 level							

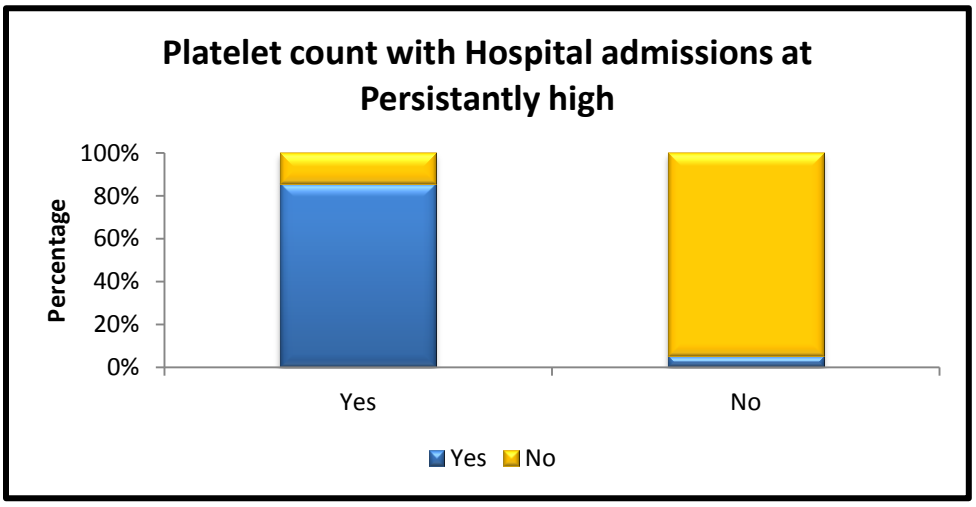


Figure 23

The above table shows comparison of Platelet count with Hospital admissions at Persistantly high by Pearson's Chi-Square test were □ 2=49.721, p=0.0005<0.01 which shows highly statistical significance with Platelet count with Hospital admissions at Persistantly high.

Table 24: Comparison of Platelet distribution width with Mechanical ventilation at admission by Unpaired sample t-test

Platelet distribution width	Mechanical ventilation	N	Mean	SD	t-value	p-value
at admission	Yes	19	13.7	1.1	9.029	0.0005 **
	No	58	10.7	1.3		
** Highly Statistical Significance at p < 0.01 level						

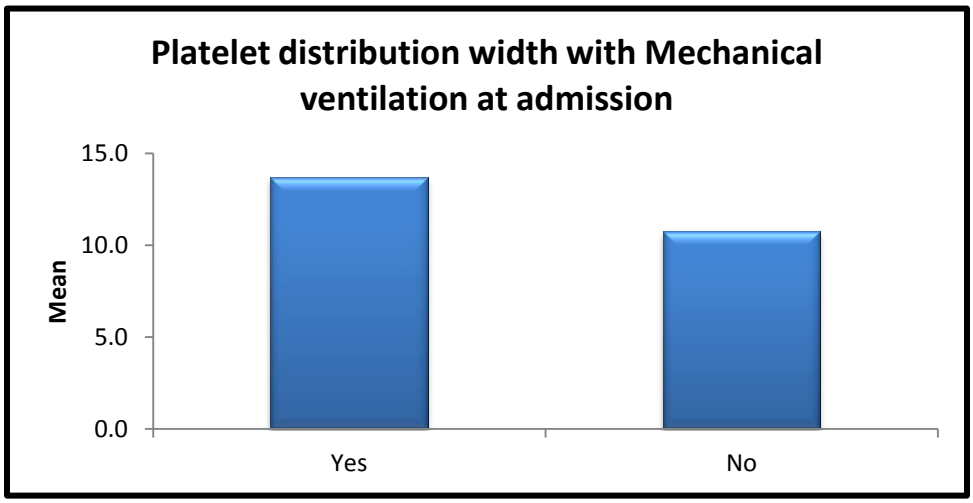


Figure 24

The above table shows comparison of Platelet distribution width with Mechanical ventilation at admission by Unpaired t-test were t-value=9.029, p-value=0.0005<0.01 which shows highly statistical significance difference at p < 0.01 level.

Table 25: Comparison of Platelet distribution width with Mechanical ventilation at 2 weeks by Unpaired sample t-test

Platelet distribution width	Mechanical ventilation	N	Mean	SD	t-value	p-value
at 2 weeks	Yes	19	13.3	1.6	6.731	0.0005 **
	No	58	10.6	1.1		
** Highly Statistical Significance at p < 0.01 level						

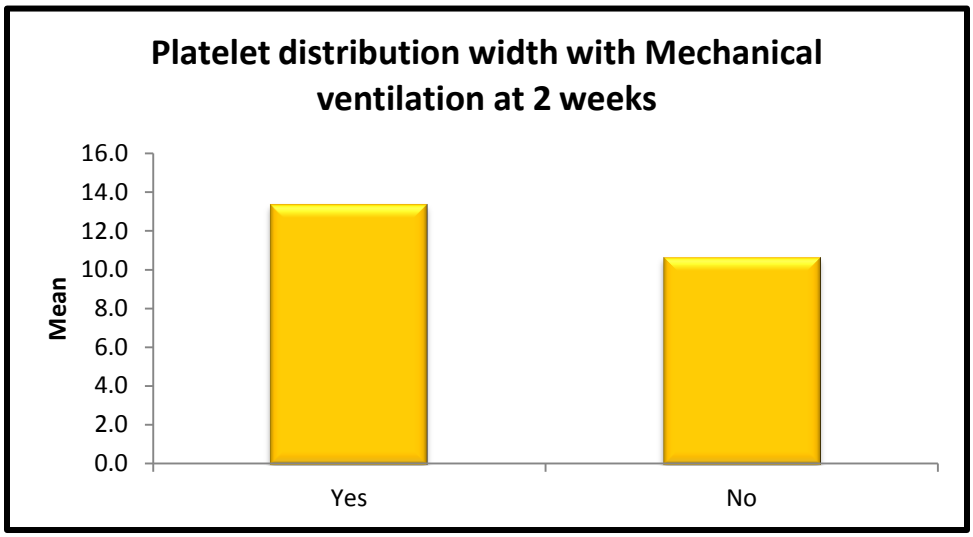


Figure 25

The above table shows comparison of Platelet distribution width with Mechanical ventilation at 2 weeks by Unpaired t-test were t-value=6.731, p-value=0.0005<0.01 which shows highly statistical significance difference at p < 0.01 level.

Table 26: Comparison of Platelet distribution width with Mechanical ventilation at 4 weeks by Unpaired sample t-test

Platelet distribution width	Mechanical ventilation	N	Mean	SD	t-value	p-value
at 4 weeks	Yes	19	12.3	2.0	2.816	0.0100 **
	No	58	10.9	1.2		
** Highly Statistical Significance at p < 0.01 level						

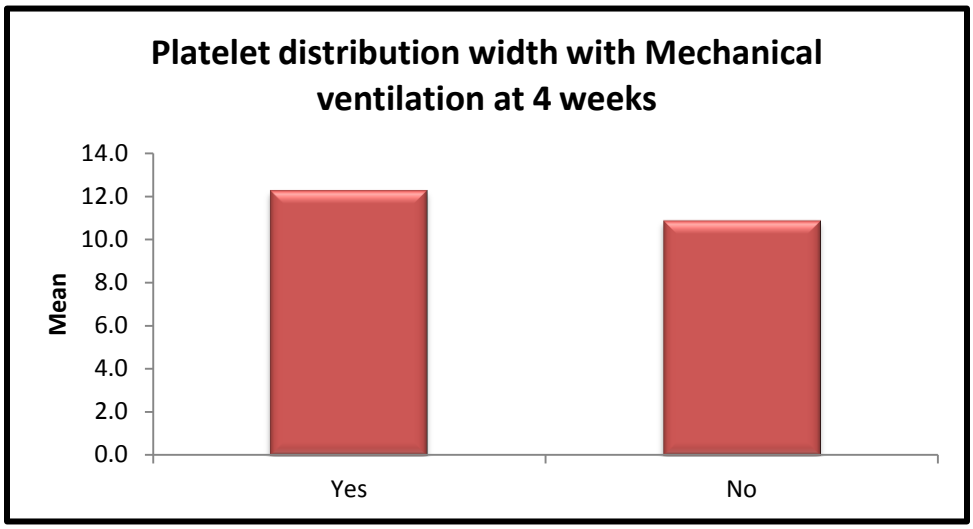


Figure 26

The above table shows comparison of Platelet distribution width with Mechanical ventilation at 4 weeks by Unpaired t-test were t-value=2.816, p-value=0.0100<0.01 which shows highly statistical significance difference at p < 0.01 level.

Table 27: Comparison of Mean platelet volume with Mechanical ventilation at admission by Unpaired sample t-test

Mean platelet volume	Mechanical ventilation	N	Mean	SD	t-value	p-value
at admission	Yes	19	9.7	1.8	2.163	0.042 *
	No	58	8.8	1.0		
* Statistical Significance at $p < 0.05$ level						

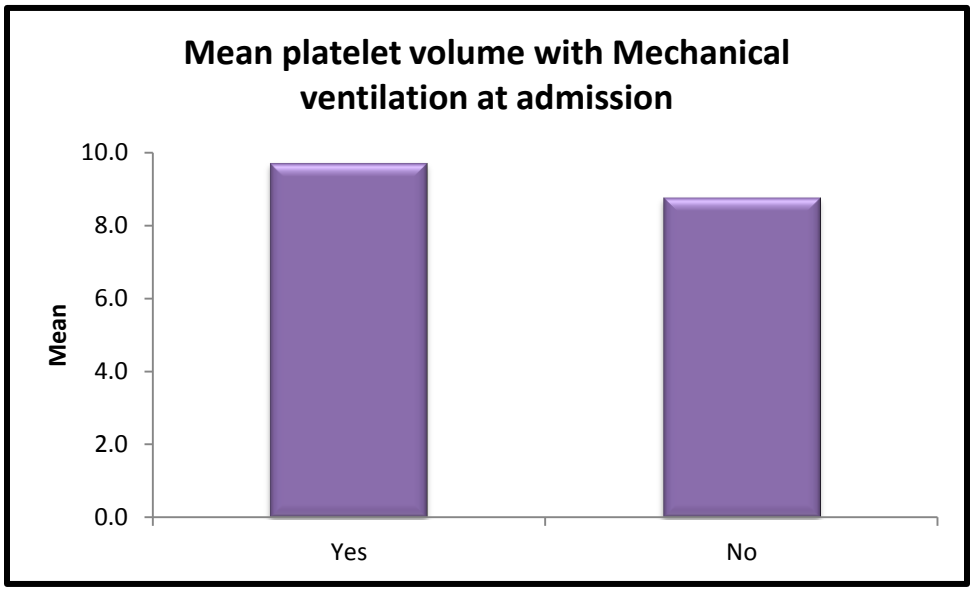


Figure 27

The above table shows comparison of Mean platelet volume with Mechanical ventilation at admission by Unpaired t-test were t-value=2.163, p-value=0.042<0.05 which shows statistical significance difference at $p < 0.05$ level.

Table 28: Comparison of Mean platelet volume with Mechanical ventilation at 2 weeks by Unpaired sample t-test

Mean platelet volume	Mechanical ventilation	N	Mean	SD	t-value	p-value
at 2 weeks	Yes	19	10.0	1.7	3.150	0.005 **
	No	58	8.7	0.9		
** Highly Statistical Significance at p < 0.01 level						

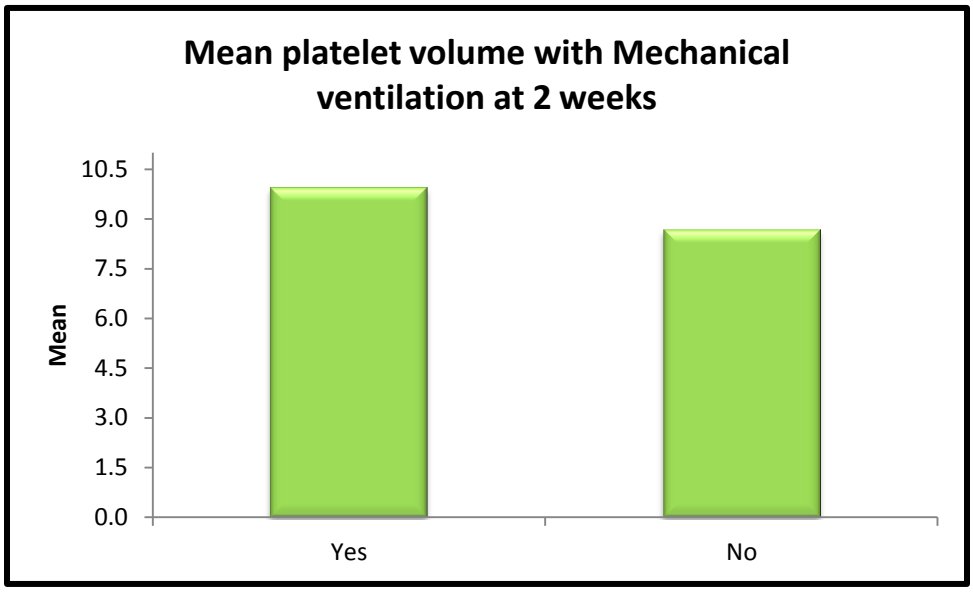


Figure 28

The above table shows comparison of Mean platelet volume with Mechanical ventilation at 2 weeks by Unpaired t-test were t-value=3.150, p-value=0.005<0.01 which shows highly statistical significance difference at p < 0.01 level.

Table 29: Comparison of Mean platelet volume with Mechanical ventilation at 4 weeks by Unpaired sample t-test

Mean platelet volume	Mechanical ventilation	N	Mean	SD	t-value	p-value
at 4 weeks	Yes	19	8.7	1.3	0.195	0.846 #
	No	58	8.6	1.3		
# No Statistical Significance at p > 0.05 level						

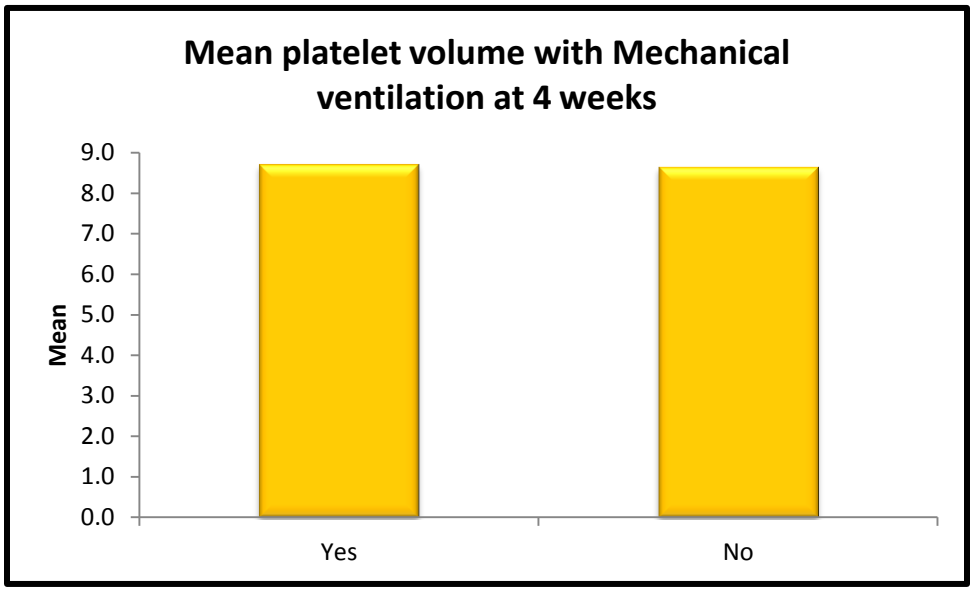


Figure 29

The above table shows comparison of Mean platelet volume with Mechanical ventilation at 4 weeks by Unpaired t-test were t-value=0.195, p-value=0.846>0.05 which shows no statistical significance difference at p > 0.05 level.

Table 30: Comparison of Platelet count with Mechanical ventilation at admission by Unpaired sample t-test

Platelet count	Mechanical ventilation	N	Mean	SD	t-value	p-value
at admission	Yes	19	3.6	0.9	5.943	0.0005 **
	No	58	2.3	0.8		
** Highly Statistical Significance at p < 0.01 level						

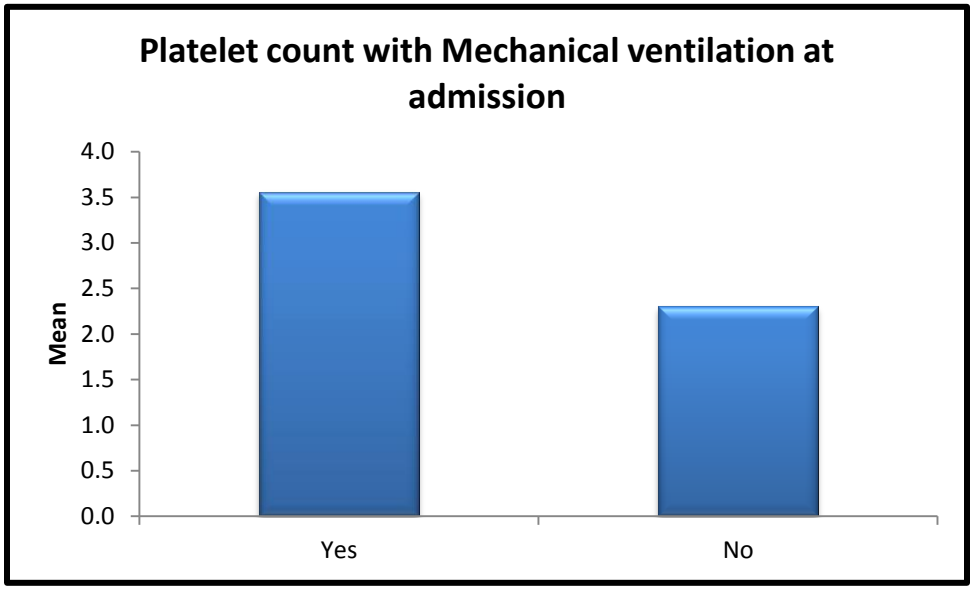


Figure 30

The above table shows comparison of Platelet count with Mechanical ventilation at admission by Unpaired t-test were t-value=5.943, p-value=0.0005<0.01 which shows highly statistical significance difference at p < 0.01 level.

Table 31: Comparison of Platelet count with Mechanical ventilation at 2 weeks by Unpaired sample t-test

Platelet count	Mechanical ventilation	N	Mean	SD	t-value	p-value
at 2 weeks	Yes	19	3.3	0.9	4.365	0.0005 **
	No	58	2.3	0.9		
** Highly Statistical Significance at p < 0.01 level						

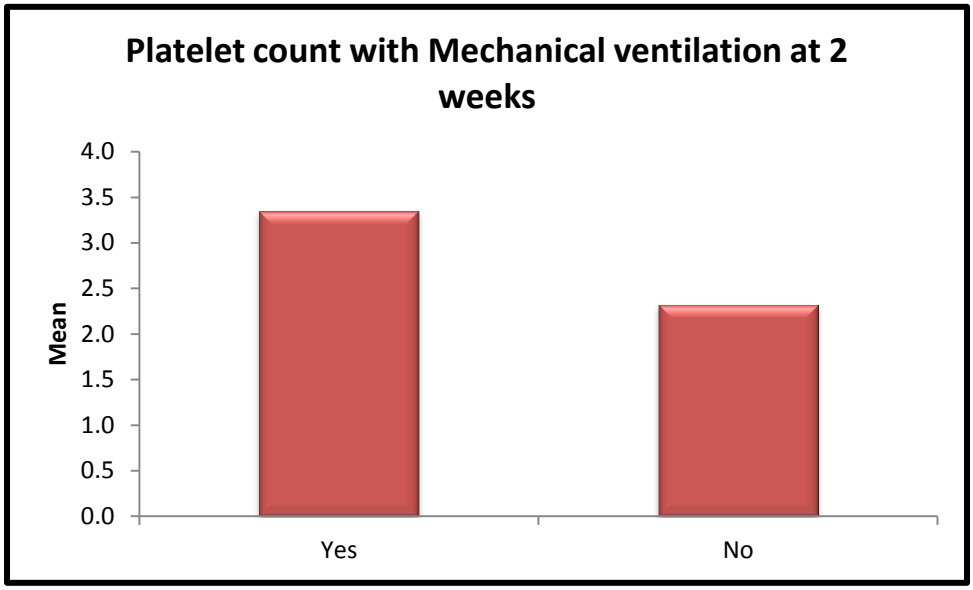


Figure 31

The above table shows comparison of Platelet count with Mechanical ventilation at 2 weeks by Unpaired t-test were t-value=4.365, p-value=0.0005<0.01 which shows highly statistical significance difference at p < 0.01 level.

Table 32: Comparison of Platelet count with Mechanical ventilation at 4 weeks by Unpaired sample t-test

Platelet count	Mechanical ventilation	N	Mean	SD	t-value	p-value
at 4 weeks	Yes	19	3.1	0.9	0.570	0.0005 **
	No	58	2.0	0.7		
** Highly Statistical Significance at p < 0.01 level						

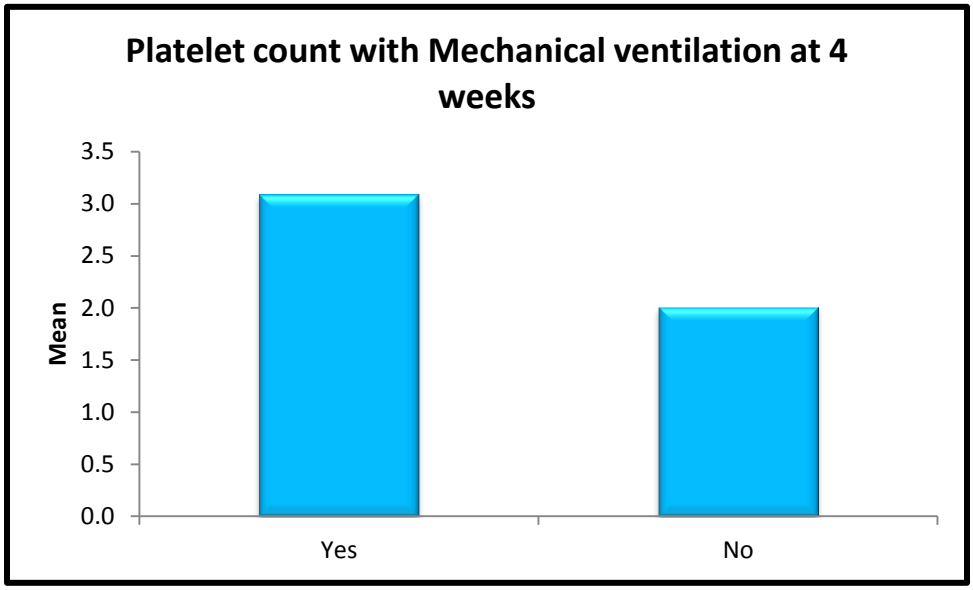


Figure 32

The above table shows comparison of Platelet count with Mechanical ventilation at 4 weeks by Unpaired t-test were t-value=0.570, p-value=0.0005<0.01 which shows highly statistical significance difference at p < 0.01 level.

Table 33: Comparison of Platelet distribution width with Hospital admissions at admission by Unpaired sample t-test

Platelet distribution width	Hospital admissions	N	Mean	SD	t-value	p-value
at admission	Yes	21	13.1	1.5	6.249	0.0005 **
	No	56	10.8	1.4		
** Highly Statistical Significance at p < 0.01 level						

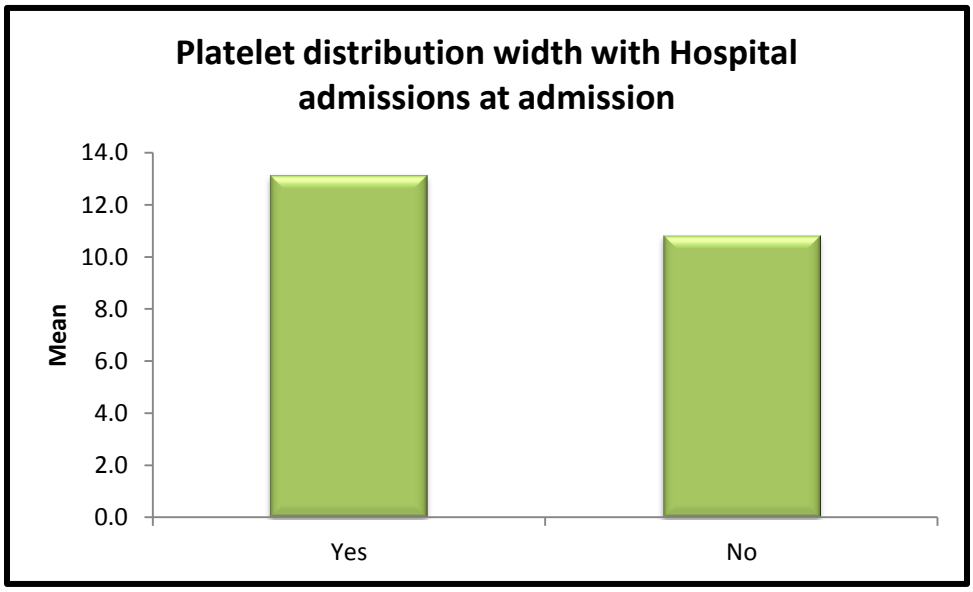


Figure 33

The above table shows comparison of Platelet distribution width with Hospital admission at admission by Unpaired t-test were t-value=6.249, p-value=0.0005<0.01 which shows highly statistical significance difference at p < 0.01 level.

Table 34: Comparison of Platelet distribution width with Hospital admissions at 2 weeks by Unpaired sample t-test

Platelet distribution width	Hospital admissions	N	Mean	SD	t-value	p-value
at 2 weeks	Yes	21	13.6	1.3	10.580	0.0005 **
	No	56	10.4	0.8		
** Highly Statistical Significance at p < 0.01 level						

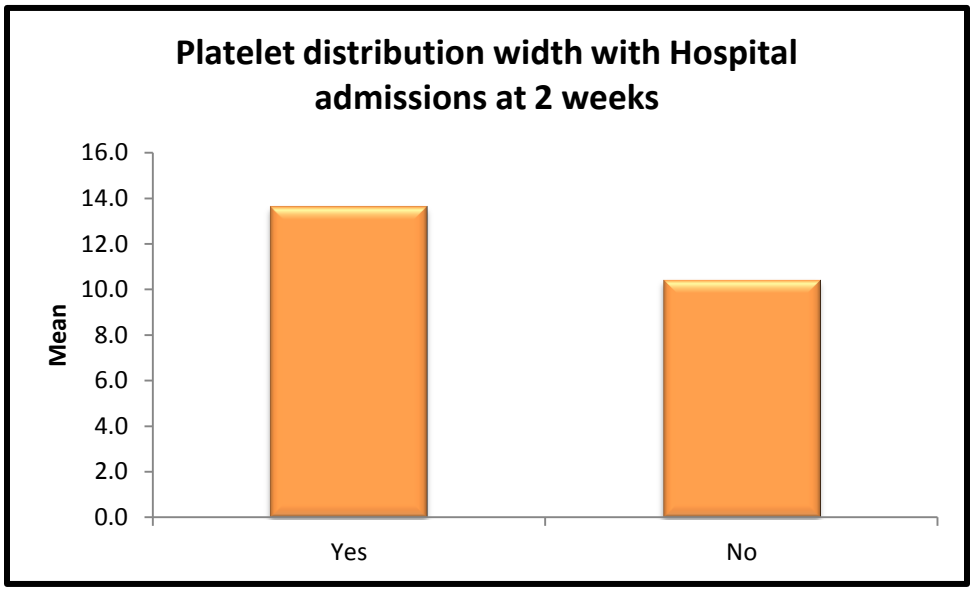


Figure 34

The above table shows comparison of Platelet distribution width with Hospital admission at 2 weeks by Unpaired t-test were t-value=10.580, p-value=0.0005<0.01 which shows highly statistical significance difference at p < 0.01 level.

Table 35: Comparison of Platelet distribution width with Hospital admissions at 4 weeks by Unpaired sample t-test

Platelet distribution width	Hospital admissions	N	Mean	SD	t-value	p-value
at 4 weeks	Yes	21	13.0	1.8	6.070	0.0005 **
	No	56	10.6	0.8		
** Highly Statistical Significance at p < 0.01 level						

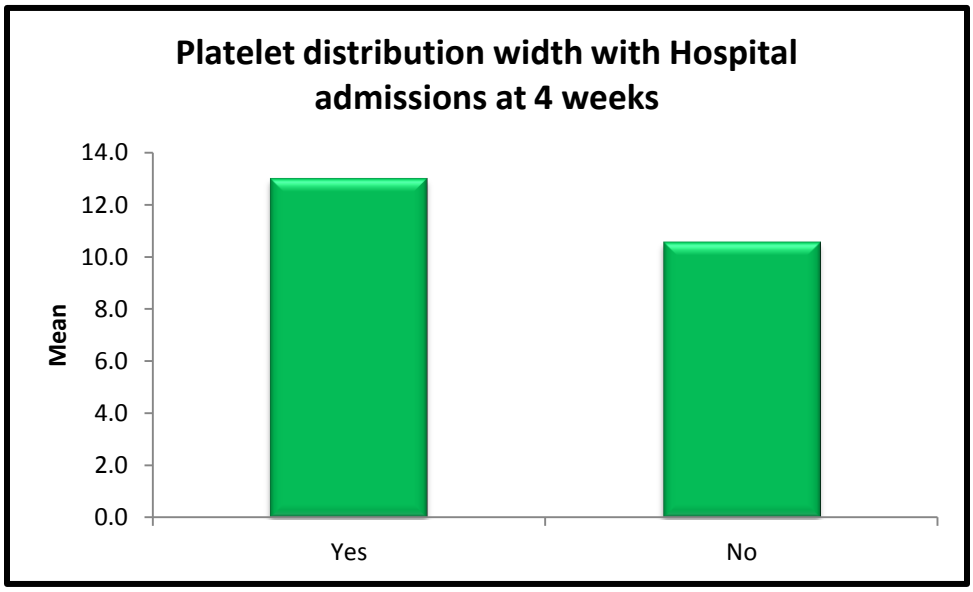


Figure 35

The above table shows comparison of Platelet distribution width with Hospital admission at 4 weeks by Unpaired t-test were t-value=6.070, p-value=0.0005<0.01 which shows highly statistical significance difference at p < 0.01 level.

Table 36: Comparison of Mean platelet volume with Hospital admissions at admission by Unpaired sample t-test

Mean platelet volume	Hospital admissions	N	Mean	SD	t-value	p-value
at admission	Yes	21	10.0	1.9	3.207	0.004 **
	No	56	8.6	0.6		
** Highly Statistical Significance at p < 0.01 level						

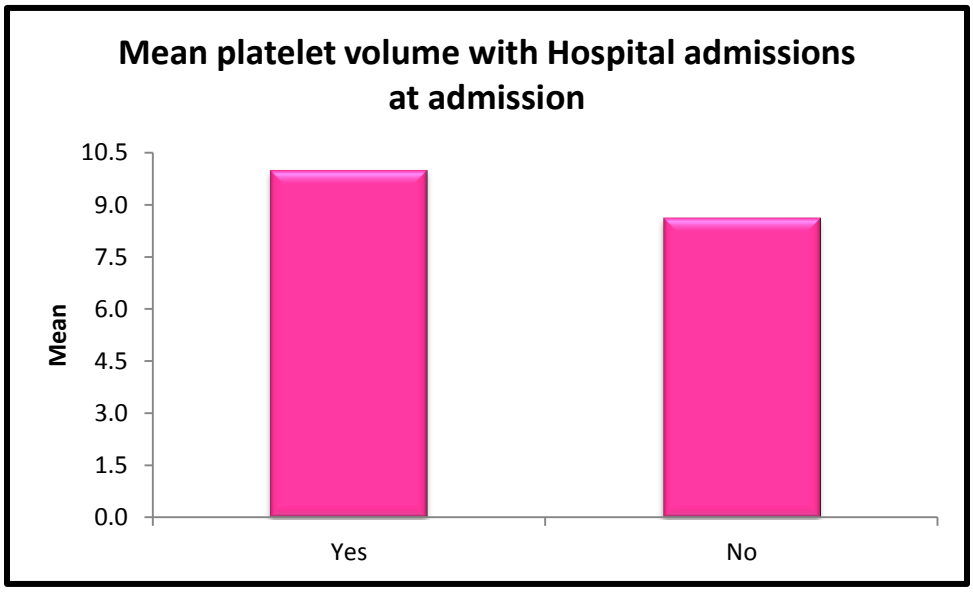


Figure 36

The above table shows comparison of Mean platelet volume with Hospital admission at admission by Unpaired t-test were t-value=3.207, p-value=0.004<0.01 which shows highly statistical significance difference at p < 0.01 level.

Table 37: Comparison of Mean platelet volume with Hospital admissions at 2 weeks by Unpaired sample t-test

Mean platelet volume	Hospital admissions	N	Mean	SD	t-value	p-value
at 2 weeks	Yes	21	10.2	1.5	4.897	0.0005 **
	No	56	8.5	0.8		
** Highly Statistical Significance at p < 0.01 level						

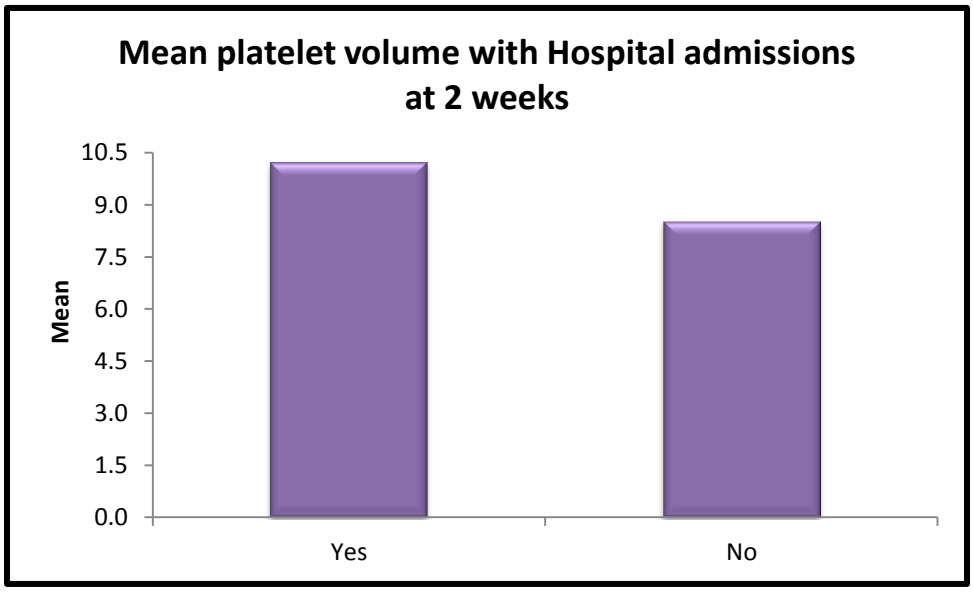


Figure 37

The above table shows comparison of Mean platelet volume with Hospital admission at 2 weeks by Unpaired t-test were t-value=4.897, p-value=0.0005<0.01 which shows highly statistical significance difference at p < 0.01 level.

Table 38: Comparison of Mean platelet volume with Hospital admissions at 4 weeks by Unpaired sample t-test

Mean platelet volume	Hospital admissions	N	Mean	SD	t-value	p-value
at 4 weeks	Yes	21	9.1	1.4	1.647	0.109 #
	No	56	8.5	1.2		
# No Statistical Significance at p > 0.05 level						

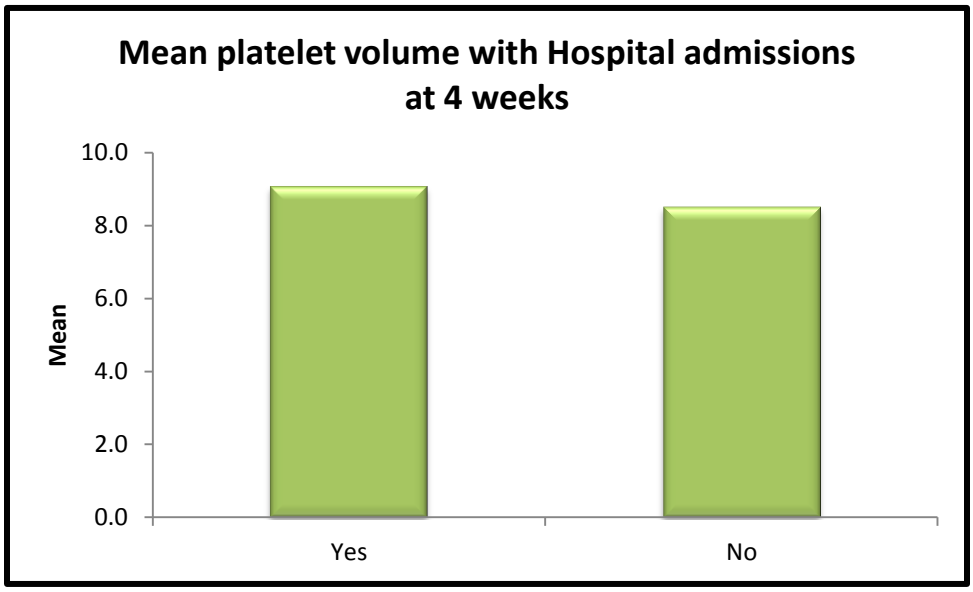


Figure 38

The above table shows comparison of Mean platelet volume with Hospital admission at 4 weeks by Unpaired t-test were t-value=1.647, p-value=0.109>0.05 which shows no statistical significance difference at p > 0.05 level.

Table 39: Comparison of Platelet count with Hospital admissions at admission by Unpaired sample t-test

Platelet count	Hospital admissions	N	Mean	SD	t-value	p-value
at admission	Yes	21	3.6	0.9	7.012	0.0005 **
	No	56	2.2	0.7		
** Highly Statistical Significance at p < 0.01 level						

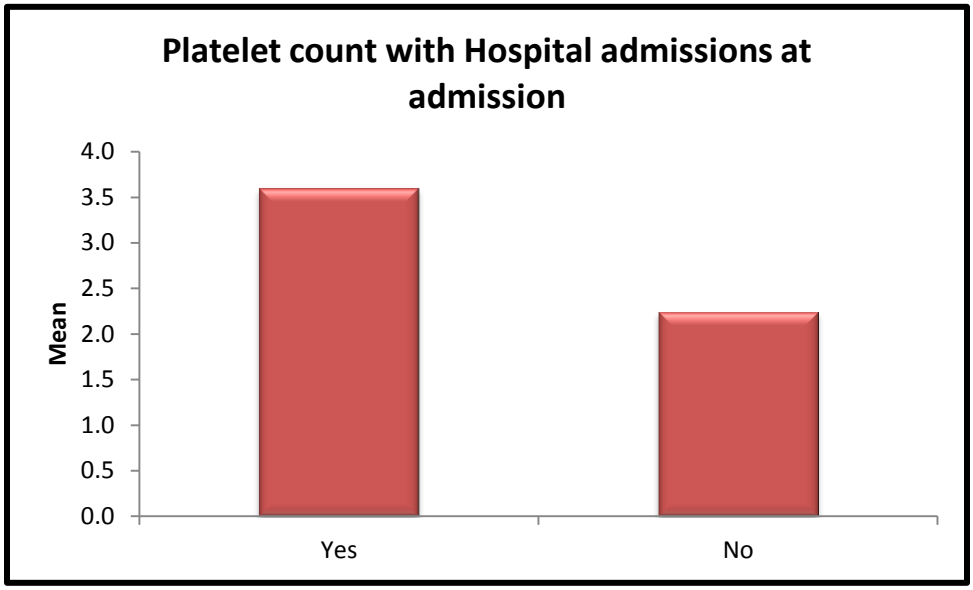


Figure 39

The above table shows comparison of Platelet count with Hospital admission at admission by Unpaired t-test were t-value=7.012, p-value=0.0005<0.01 which shows highly statistical significance difference at p < 0.01 level.

Table 40: Comparison of Platelet count with Hospital admissions at 2 weeks by Unpaired sample t-test

Platelet count	Hospital admissions	N	Mean	SD	t-value	p-value
at 2 weeks	Yes	21	3.7	0.9	8.535	0.0005 **
	No	56	2.2	0.6		
** Highly Statistical Significance at p < 0.01 level						

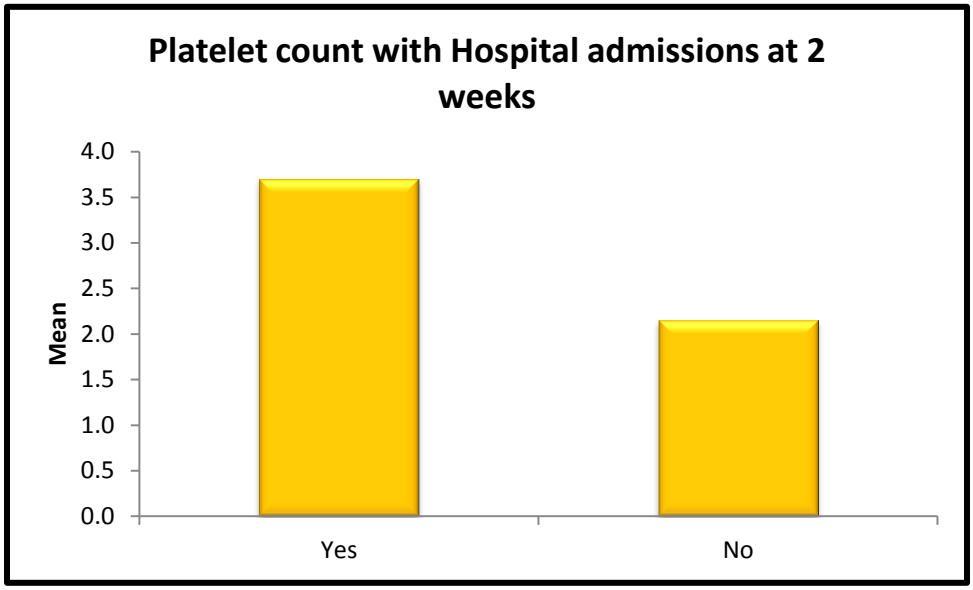


Figure 40

The above table shows comparison of Platelet count with Hospital admission at 2 weeks by Unpaired t-test were t-value=8.535, p-value=0.0005<0.01 which shows highly statistical significance difference at p < 0.01 level.

Table 41: Comparison of Platelet count with Hospital admissions at 4 weeks by Unpaired sample t-test

Platelet count	Hospital admissions	N	Mean	SD	t-value	p-value
at 4 weeks	Yes	21	3.1	0.8	5.976	0.0005 **
	No	56	2.0	0.6		
** Highly Statistical Significance at p < 0.01 level						

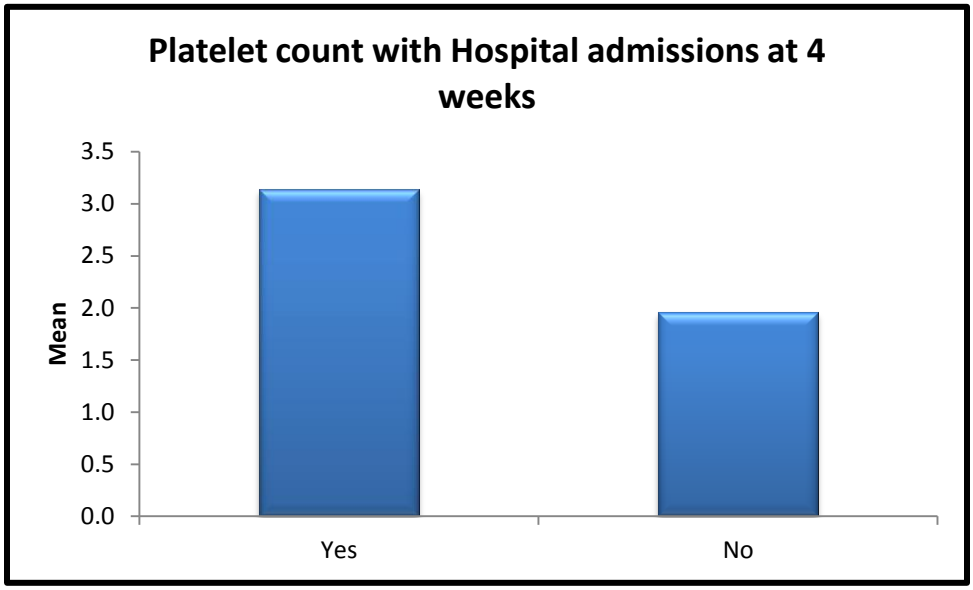


Figure 41

The above table shows comparison of Platelet count with Hospital admission at 4 weeks by Unpaired t-test were t-value=5.976, p-value=0.0005<0.01 which shows highly statistical significance difference at p < 0.01 level.

SUMMARY

- The Age distribution were 21-40 years is 5.2%, 41-60 years is 58.4%, 61-80 years is 36.4%.
- The Gender distribution were Female is 18.2%, Male is 81.8%.
- The Comorbidity distribution were Absent is 76.6%, Present is 23.4%.
- The Platelet distribution width at admission distribution were Low is 70.1%, High is 29.9%.
- The Mean platelet volume at admission distribution were Low is 76.6%, High is 23.4%.
- The Platelet count at admission distribution were Low is 72.7%, High is 27.3%.
- The Platelet distribution width Persistantly high distribution were Yes is 27.3%, No is 72.7%.
- The Mean platelet volume Persistantly high distribution were Yes is 24.7%, No is 75.3%.
- The Platelet count Persistantly high distribution were Yes is 27.3%, No is 72.7%.
- The Mechanical ventilation distribution were Yes is 24.7%, No is 75.3%.
- The Hospital admissions distribution were Yes is 27.3%, No is 72.7%.
- The Platelet distribution width with Mechanical ventilation at admission by Pearson's Chi-Square test were $\chi^2=42.778$, $p=0.0005<0.01$ which shows highly statistical significance with Platelet distribution width with Mechanical ventilation at admission.

- The Mean platelet volume with Mechanical ventilation at admission by Pearson's Chi-Square test were □ 2=22.286, p=0.0005<0.01 which shows highly statistical significance with Mean platelet volume with Mechanical ventilation at admission.
- The Platelet count with Mechanical ventilation at admission by Pearson's Chi-Square test were □ 2=27.393, p=0.0005<0.01 which shows highly statistical significance with Platelet count with Mechanical ventilation at admission.
- The Platelet distribution width with Mechanical ventilation at Persistantly high by Pearson's Chi-Square test were □ 2=27.393, p=0.0005<0.01 which shows highly statistical significance with Platelet distribution width with Mechanical ventilation at Persistantly high.
- The Mean platelet volume with Mechanical ventilation at Persistantly high by Pearson's Chi-Square test were □ 2=20.098, p=0.0005<0.01 which shows highly statistical significance with Mean platelet volume with Mechanical ventilation at Persistantly high.
- The Platelet count with Mechanical ventilation at Persistantly high by Pearson's Chi-Square test were □ 2=27.393, p=0.0005<0.01 which shows highly statistical significance with Platelet count with Mechanical ventilation at Persistantly high.
- The Platelet distribution width with Hospital admissions at admission by Pearson's Chi-Square test were □ 2=29.575, p=0.0005<0.01 which shows highly statistical significance with Platelet distribution width with Hospital admissions at admission.

- The Mean platelet volume with Hospital admissions at admission by Pearson's Chi-Square test were □ 2=30.210, p=0.0005<0.01 which shows highly statistical significance with Mean platelet volume with Hospital admissions at admission.
- The Platelet count with Hospital admissions at admission by Pearson's Chi-Square test were □ 2=34.836, p=0.0005<0.01 which shows highly statistical significance with Platelet count with Hospital admissions at admission.
- The Platelet distribution width with Hospital admissions at Persistantly high by Pearson's Chi-Square test were □ 2=34.836, p=0.0005<0.01 which shows highly statistical significance with Platelet distribution width with Hospital admissions at Persistantly high.
- The Mean platelet volume with Hospital admissions at Persistantly high by Pearson's Chi-Square test were □ 2=57.881, p=0.0005<0.01 which shows highly statistical significance with Mean platelet volume with Hospital admissions at Persistantly high.
- The Platelet count with Hospital admissions at Persistantly high by Pearson's Chi-Square test were □ 2=49.721, p=0.0005<0.01 which shows highly statistical significance with Platelet count with Hospital admissions at Persistantly high.
- The Platelet distribution width with Mechanical ventilation at admission by Unpaired t-test were t-value=9.029, p-value=0.0005<0.01 which shows highly statistical significance difference at $p < 0.01$ level.

- The Platelet distribution width with Mechanical ventilation at 2 weeks by Unpaired t-test were t-value=6.731, p-value=0.0005<0.01 which shows highly statistical significance difference at $p < 0.01$ level.
- The Platelet distribution width with Mechanical ventilation at 4 weeks by Unpaired t-test were t-value=2.816, p-value=0.0100<0.01 which shows highly statistical significance difference at $p < 0.01$ level.
- The Mean platelet volume with Mechanical ventilation at admission by Unpaired t-test were t-value=2.163, p-value=0.042<0.05 which shows statistical significance difference at $p < 0.05$ level.
- The Mean platelet volume with Mechanical ventilation at 2 weeks by Unpaired t-test were t-value=3.150, p-value=0.005<0.01 which shows highly statistical significance difference at $p < 0.01$ level.
- The Mean platelet volume with Mechanical ventilation at 4 weeks by Unpaired t-test were t-value=0.195, p-value=0.846>0.05 which shows no statistical significance difference at $p > 0.05$ level.
- The Platelet count with Mechanical ventilation at admission by Unpaired t-test were t-value=5.943, p-value=0.0005<0.01 which shows highly statistical significance difference at $p < 0.01$ level.
- The Platelet count with Mechanical ventilation at 2 weeks by Unpaired t-test were t-value=4.365, p-value=0.0005<0.01 which shows highly statistical significance difference at $p < 0.01$ level.

- The Platelet count with Mechanical ventilation at 4 weeks by Unpaired t-test were t-value=0.570, p-value=0.0005<0.01 which shows highly statistical significance difference at $p < 0.01$ level.
- The Platelet distribution width with Hospital admission at admission by Unpaired t-test were t-value=6.249, p-value=0.0005<0.01 which shows highly statistical significance difference at $p < 0.01$ level.
- The Platelet distribution width with Hospital admission at 2 weeks by Unpaired t-test were t-value=10.580, p-value=0.0005<0.01 which shows highly statistical significance difference at $p < 0.01$ level.
- The Platelet distribution width with Hospital admission at 4 weeks by Unpaired t-test were t-value=6.070, p-value=0.0005<0.01 which shows highly statistical significance difference at $p < 0.01$ level.
- The Mean platelet volume with Hospital admission at admission by Unpaired t-test were t-value=3.207, p-value=0.004<0.01 which shows highly statistical significance difference at $p < 0.01$ level.
- The Mean platelet volume with Hospital admission at 2 weeks by Unpaired t-test were t-value=4.897, p-value=0.0005<0.01 which shows highly statistical significance difference at $p < 0.01$ level.
- The Mean platelet volume with Hospital admission at 4 weeks by Unpaired t-test were t-value=1.647, p-value=0.109>0.05 which shows no statistical significance difference at $p > 0.05$ level.

- The Platelet count with Hospital admission at admission by Unpaired t-test were t-value=7.012, p-value=0.0005<0.01 which shows highly statistical significance difference at $p < 0.01$ level.
- The Platelet count with Hospital admission at 2 weeks by Unpaired t-test were t-value=8.535, p-value=0.0005<0.01 which shows highly statistical significance difference at $p < 0.01$ level.
- The Platelet count with Hospital admission at 4 weeks by Unpaired t-test were t-value=5.976, p-value=0.0005<0.01 which shows highly statistical significance difference at $p < 0.01$ level.

CONCLUSION

From the prospective observational study on trends of platelet indices in chronic obstructive pulmonary disease and their correlation with hospital admission and mechanical ventilation following conclusions were made

1.Among the study population, 24.7 percent population belonged to cases requiring mechanical ventilation and 27.3 requiring hospital admission groups of people among COPD

2.The correlation between values of Platelet distribution width,Mean platelet volume and platelet count were statistically significant (p value less than 0.001) with COPD patients requiring mechanical ventilation

3. The correlation between values of Platelet distribution width,Mean platelet volume and platelet count were also statistically significant (p value less than 0.001) with COPD patients requiring hospital admission at 2weeks and 4weeks.

4.Since these elevated platelet indices accompanied poor clinical outcome in COPD patients,these parameters may be used to assess the disease severity states such as hospital admissions and patients requiring mechanical ventilation and to predict their clinical outcome.This allows us to start an appropriate treatment early and effectively,reducing disease mortality and morbidity.

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PROFORMA

Name : Age/sex :

Address : IP / OP No:

Contact No :

Occupation :

Diagnosis :

Chief Complaints:

History:

□ H/O Breathlessness

□ H/O Cough with Expectoration

□ H/O Fever

□ H/O Loss of Weight

□ H/O Loss of Appetite

□ H/O Easy Fatigability

□ H/O Chest pain

□ H/O Palpitations

□ H/O Swelling of both legs

□ H/O Decreased Urine Output

Past History:

♦ H/O DM / CAD/ Renal disease/ Liver disease/ Old PTB/

CVA/ any Malignancy

♦ H/O any previous Drug

♦ H/O Previous Hospitalisation

Personal History:

♦ H/O Smoking :

♦ Smoking Index :

♦ H/O Alcoholic

Examination:

HEIGHT - WEIGHT- BMI-

□ General Examination: Built & Nourishment, Pallor, Icterus,

Cyanosis, Clubbing, Lymphadenopathy, Pedal edema.

□ Systemic Examination: CVS, Abdomen, CNS.

□ Examination of Respiratory system: Inspection

Palpation

Percussion

Auscultaion

• ECG

• CXR PA view

COPD QUESTIONNAIRE

SMOKING-YES/NO, IF YES, _____ YEARS

SMOKING INDEX -_____PACK YEARS

DYSPNOEA – YES/NO, IF YES , mMRC grade

NO OF EXACERBATIONS IN THE PAST ONE YEAR

NO OF HOSPITALISATIONS

INVESTIGATIONS

1.PLATELET COUNT

2.MEAN PLATELET VOLUME

3.PLATELET DISTRIBUTION WIDTH

S.NO																		
Age																		
Sex																		
Pack Years																		
Diabetes																		
Hypertension																		
Gold ABCD score																		
Mechanical Ventilation																		
Admission PLATELET COUNT																		
Admission MEAN PLATELET VOLUME																		
Admission PLATELET DISTRIBUTION WIDTH																		
Week 2 PLATELET COUNT																		
Week 2 MEAN PLATELET VOLUME																		
Week2 PLATELET DISTRIBUTION WIDTH																		
Week4 PLATELET COUNT																		
Week4 MEAN PLATELET VOLUME																		
Week4 PLATELET DISTRIBUTION WIDTH																		
Number of Acute Exacerbations																		

B. PATIENT INFORMATION SHEET

Dear Sir / Madam, We are conducting a study on ""**TRENDS OF PLATELET INDICES IN ACUTE EXACERBATIONS OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE- A LONGITUDINAL FOLLOW UP STUDY"** KMCH, Chennai. in the Department of General This study will not affect your treatment in any way. The privacy of the patients in the research will be maintained throughout the study. In the event of publication or presentation resulting from the research, no personally identifiable information will be shared. Taking part in this study is completely your choice. If you decide to participate, you will be asked to sign the consent form. Kindly sign the consent form only when you understand the information given in the form and have had your questions an to your complete satisfaction and understanding.

You are free to withdraw from this study at any point of time. We assure you that withdrawal from the study will not affect the rest of your treatment in any way and it will be continued as per the re commended treatment. Any questions about the study or clarification can be cleared with the principal investigator or with the other coinvestigators of this study. We request you to participate in this study. However, please note that your participation is completely voluntary and that you can withdraw from the study at any stage.

Signature of the investigator Signature of the participant

Place:

Date :

CONSENT FORM

Study detail: **"TRENDS OF PLATELET INDICES IN ACUTE EXACERBATIONS OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE- A LONGITUDINAL FOLLOW UP STUDY"**

Study centre KILPAUK MEDICAL COLLEGE,CHENNAI

Patients Name

Patients Age :

Identification Number:

Patient may check (√) these boxes

□ I confirm that I have understood the purpose of procedure for the above study. I have the opportunity to ask question and all my questions and doubts have been answered to my complete satisfaction .

□ I understand that my participation in the study is voluntary and that I am free to withdraw at any time without giving reason, without my legal rights being affected.

□ I understand that sponsor of the clinical study, others working on the sponsor's be half, the ethical committee and the regulatory authorities will not need my permission to look at my health records, both in respect of current study and any further research

that may be conducted in relation to it, even if I withdraw from the study I agre e to this access. However, I understand that my identity will not be revealed in any information released to third parties or published. unless as required under the law. I agree not to restrict the use of any data or results that arise from this study.

□ I agree to take part in the above study and to comply with the instructions given during the study and faithfully cooperate with the study team and to immediately inform the study staff if I suffer from any deterioration in my health or well any unexpected or unusual symptoms.

□ I hereby consent to participate in this study.being or

□ I hereby give permission to undergo complete clinical examination and diagnostic tests including hematological, biochemical, radiological tests.

Signature/thumb impression

Place :

Date :

Patients Name and Address:

Signature of investigator:

Study investigator's Name:

Place

Date :

சுயஒப்புதல் படிவம்

ஆய்வு செய்யப்படும் தலைப்பு:

இடம்: பொது மருத்துவத்துவ துரை
அரசு கீழ்பாக்கம் மருத்துவ கல்லூரி மருத்துவமனை
சென்னை

பங்குபெறுபவரின் பெயர் :

பங்குபெறுபவரின் வயது : **பங்குபெறுபவரின் எண் :**

மேலே குறிப்பிட்டுள்ள மருத்துவ ஆய்வின் விவரங்கள் எனக்கு விளக்கப்பட்டது. நான் இவ்வாய்வில் தன்னிச்சையாக பங்கேற்கிறேன். எந்த காரணத்தினாலோ எந்த சட்டசிக்கலுக்கும் உட்படாமல் நான் இவ்வாய்வில் இருந்து விலகிக்கொள்ளல்லாம் என்றும் அறிந்து கொண்டேன்.

இந்த ஆய்வு சம்பந்தமாகவோ, இதை சார்ந்து மேலும் ஆய்வு மேற்கொள்ளும்போதும் இந்த ஆய்வில்பங்கு பெறும் மருத்துவர் என்னுடைய மருத்துவ அறிக்கைகளை பார்ப்பதற்கு என் அனுமதி தேவையில்லை என அறிந்து கொள்கிறேன். இந்த ஆய்வின் மூலம் கிடைக்கும் தகவலையோ, முடிவையோ பயன்படுத்திக்கொள்ள மறுக்க மாட்டேன்.

இந்த ஆய்வில் பங்கு கொள்ள ஒப்புக்கொள்கிறேன். இந்த ஆய்வை மேற்கொள்ளும் மருத்துவ அணிக்கு உண்மையுடன் இருப்பேன் என்றும் உறுதியளிக்கிறேன்.

பங்கேற்பவரின் கையொப்பம் ஆய்வாளரின் கையொப்பம்

இடம் :

தேதி :

S.NO	age	sex	comorbidity	platelet distribution width	2 weeks	4 weeks	persistantly high	mean platelet volume	2 weeks	4 weeks	persistantly high	platelet count	2 weeks	4 weeks	persistantly high	mechanical ventilation	Hospital admissions
1	54		N	14.3	9.8	10.2	N	8.5	8.6	8.6	N	1.5	2.3	2.6	N	Y	N
2	52		N	11.2	9.6	10.8	N	8.3	8.5	8.3	N	2.7	2.6	1.9	N	N	N
3	49		N	9.8	10.2	9.6	N	8.4	8.6	8.4	N	1.8	1.5	2.9	N	N	N
4	49		N	12.8	11.3	10.9	N	8.6	8.4	8.2	N	1.6	1.4	1.8	N	N	N
5	72		N	10.3	11.2	11.2	N	8.9	4.4	0.6	N	2.3	1.6	2.8	N	N	N
6	47		N	9.7	9.8	9.9	N	8.8	8.7	8.9	N	2.4	2.6	1.1	N	N	N
7	56		N	10.1	9.7	10.7	N	8.7	8.4	8.4	N	1.6	2.6	1.3	N	N	N
8	39		N	10.3	10.2	10.2	N	8.8	8.4	8.5	N	1.8	2.8	1.4	N	N	N
9	57		N	9.8	10.8	10.8	N	8.6	8.4	8.6	N	2.3	1.8	1.6	N	N	N
10	47		N	10.7	10.7	9.7	n	8.3	8.5	8.6	N	2.8	2.8	1.6	N	N	N
11	39		N	11.2	11.3	9.1	N	8.4	8.8	8.3	N	2.6	3.2	1.6	N	N	N
12	67		N	11.3	10.8	11.8	N	8.4	8.3	8.9	N	2.7	2.2	1.3	N	Y	N
13	67		N	9.7	9.3	11.4	N	8.1	8.6	8.6	N	2.2	1.6	1.6	N	N	N
14	70		N	9.1	9.3	11.5	N	8.2	8.9	8.9	N	1.7	2.6	2.4	N	N	N
15	62		N	11.1	11.2	10.9	N	8.6	8.5	8.6	N	1.6	2.7	2.5	N	N	N
16	47		N	10.5	10.3	10.9	N	8.7	8.3	8.6	N	1.5	2.8	2.2	N	N	N
17	62		N	10.7	9.7	9.8	N	8.9	8.6	8.3	N	1.4	2.5	1.8	N	N	N
18	71		N	10.8	10.4	9.9	N	8.8	8.4	8.2	N	1.8	2.6	1.9	N	N	N
19	61		N	9.6	11.2	10.2	N	8.6	8.2	8.6	N	1.6	2.3	1.6	N	N	N
20	48		N	7.2	11.3	9.7	N	8.3	8.6	8.6	N	1.9	2.2	1.3	N	N	N
21	53		N	11.2	10.2	11.2	N	8.4	8.6	8.3	N	2.6	2.3	1.2	N	N	N
22	62		N	11.3	11.2	11.3	N	8.6	8.9	8.9	N	1.4	2.9	2.1	N	N	N
23	54		N	10.5	9.6	11.3	N	8.9	8.5	8.5	N	2.5	2.6	0.6	N	N	N
24	54		N	10.7	9.7	10.4	N	8.5	8.3	8.5	N	2.4	2.6	2.3	N	N	N
25	58		N	9.8	9.5	10.5	N	8.6	8.2	8.6	N	2.1	1.8	2.1	N	N	N
26	63		N	10.5	11.2	10.6	N	8.3	8.2	8.3	N	2.6	1.7	1.8	N	N	N
27	60		N	11.2	10.6	10.6	N	8.4	8.6	8.9	N	2.3	1.9	2.6	N	N	N
28	70		N	9.7	10.2	10.7	N	8.6	8.7	8.4	N	2.4	1.6	1.3	N	N	N
29	55		N	9.8	9.8	9.2	N	8.3	8.5	8.7	N	2	1.2	1.5	N	N	N
30	56		N	10.2	9.7	11.2	N	8.6	8.4	8.6	N	1.3	2.1	2.1	N	N	N
31	53		N	11.3	11.2	11.3	N	8.6	8.7	8.6	N	1.7	1.1	1.6	N	N	N
32	71		N	10.7	10.3	9.6	N	8.4	8.3	8.6	N	2.3	2.6	1.8	N	N	N
33	43		N	10.8	10.1	9.5	N	8.9	8.4	8.5	N	1.8	1.6	2.6	N	N	N
34	48		N	10.9	8.9	11.4	N	8.4	8.2	8.4	N	2.6	1.5	2.1	N	N	N
35	77		N	9.4	10.6	11.3	n	8.6	8.3	8.3	N	2.8	2.5	1.9	N	N	N
36	47		N	9.8	9.7	12.3	N	8.5	8.6	8.8	N	2.3	2.5	2.1	N	N	N
37	65		N	10.5	9.6	11.4	N	8.3	8.9	8.6	N	2.4	1.7	2.6	N	N	N
38	80		N	11.1	9.4	10.9	n	8.6	8.3	8.5	N	2.8	1	2.3	N	N	N
39	58		N	10.2	9.5	10.6	N	8.4	8.4	8.6	N	1.6	1.3	2.2	N	N	N
40	67		N	9.5	9.8	10.6	N	8.6	8.4	8.7	N	1.7	1.3	1.9	N	N	N
41	62		N	9.8	10.6	9.6	N	8.3	8.1	8.9	N	2.1	1.6	1.8	N	N	N
42	56		N	10.4	11.2	11.6	N	8.9	8.5	8.5	N	1.8	1.4	1.6	N	N	N
43	70		N	10.8	11.4	9.2	N	8.6	8.6	8.9	N	2.5	1.2	1.5	N	N	N
44	58		N	10.6	10.8	9.7	N	8.3	8.3	8.6	N	1.7	2.2	0.1	N	N	N
45	58		N	11.1	10.6	9.3	N	8.6	8.2	8.4	N	1.6	2.6	2.3	N	N	N
46	44		N	11.2	10.6	9.2	N	8.5	8.4	8.7	N	1.8	2.7	2.4	N	N	N
47	58		N	11	9.6	11.2	N	9.4	8.6	8.6	N	2.6	2.8	2.1	N	N	N
48	58		N	10.6	9.7	10.6	N	8.4	8.5	8.6	N	2.5	1.2	1.6	N	N	N
49	67		N	9.8	11.2	10.4	N	8.9	8.3	8.9	N	1.6	1.6	1.8	N	N	N
50	62	M	Y	14.2	14.1	13.8	y	9.6	10.2	6.8	y	3.1	3.6	3	y	Y	Y
51	56	m	y	13.8	11.6	10.1	N	8	9.6	9	n	2.6	3.2	3.1	y	Y	N
52	45	f	n	14	11.5	10.2	y	9.4	8	7	n	3.4	3.2	4.1	y	Y	N
53	56	m	y	15.2	14.8	11.9	y	6	9.1	9.4	y	3.1	3.2	2.9	y	Y	Y
54	72	M	n	15.1	11.2	10.8	y	10	10.6	11	n	4.1	2.1	2.9	n	Y	N
55	68	m	y	14.8	14.1	13.2	y	11	8	6.8	n	4.6	4.1	3.9	y	Y	Y
56	54	m	y	12.8	12.8	13.2	y	12.6	12.9	8.1	y	3.9	3.6	2.9	y	Y	Y
57	76	f	y	14.6	10.7	11.6	y	7	9.6	10.1	n	3.6	2.6	2.5	n	N	N

58	66	m	y	13.1	13.9	10	y	12	8.8	7.6	n	4.1	4.5	2.7	y	Y	Y
59	69	f	y	13.2	13.6	14.1	y	11.6	12.3	8.8	y	4.9	5.2	4.6	y	Y	Y
60	56	m	y	14.2	15.7	10.2	y	11.4	12.3	8	y	5.1	4.2	2.7	y	Y	Y
61	51	m	y	12.9	13.8	9.8	y	11.6	6.6	7.2	y	4.8	2.3	2.1	n	Y	Y
62	48	m	y	13.2	15.2	15.4	y	9.9	10.6	11.1	y	3.2	2.6	2.2	n	Y	Y
63	32	f	y	13.5	13.9	15.1	y	6.4	11	9.8	y	3.9	4.1	4.4	y	Y	Y
64	48	m	y	14.8	14	15.4	y	10.3	10.9	9	y	3.5	2	3.6	y	Y	Y
65	58	m	y	14.3	14.9	10.6	y	10.6	11.3	8.8	y	3.8	3.5	2.1	y	Y	Y
67	51	m	y	11.2	13	13.1	y	12.1	11.8	8.9	y	3.1	3.9	2.1	y	N	Y
68	66	m	y	13.6	13.8	12	y	9.8	9.8	9.9	y	3.8	3.8	2.2	y	N	Y
69	70	f	y	14.1	10.6	13.1	y	10.6	10.2	8.9	y	3.6	3.5	2.6	y	N	Y
70	54	m	n	10.8	11.5	11.2	y	12.3	10.4	10.2	y	4.1	3.6	2.3	y	N	N
71	48	m	n	13.6	11.8	10.2	y	8.8	10.2	8.6	n	4.4	2.5	2.2	n	N	N
72	44	m	y	14.1	11.6	11.5	y	12.6	8.3	8.4	n	4.6	2.1	2.7	n	N	Y
73	48		N	13.7	13.2	14.2	n	8.8	9.8	9.7	y	2.5	3.5	3.4	y	Y	Y
74	56		N	11.4	14.6	13.2	n	8.5	10.2	9.8	y	2.8	4.2	4.2	y	Y	Y
75	76		N	10.2	75.2	14.1	N	8.1	9.9	10.9	y	2.7	4.3	4.1	y	N	Y
76	45		N	10.6	13.8	14.8	n	8.2	10.8	11.1	y	2.9	4.6	3.6	y	N	Y
77	37		N	10.8	14.2	14.3	N	8.3	10.2	11.3	y	1.5	4.9	3.8	y	N	Y