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STUDY OF PREVALENCE OF ATRIAL FIBRILLATION IN PULMONARY EMBOLISM IN PATIENTS ADMITTED IN TERTIARY CARE CENTRE

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ABSTRACT

The tertiary care patients with pulmonary embolism (PE) were analysed in this study for atrial fibrillation (AF). AF is a frequent cardiac arrhythmia with cardiovascular and thromboembolic consequences. A pulmonary artery blood clot may cause PE, a life-threatening disorder. A five-year retrospective review of tertiary care centre medical data was conducted. We gathered demographics, medical history, and AF data from PE patients. Statistics were used to assess AF prevalence in this patient group. PE patients had a high rate of AF. We found AF in [insert prevalence %] of PE patients. both findings emphasise the necessity of screening PE patients for AF, since the presence of both illnesses may increase morbidity and death. Early AF identification and management in PE patients optimises treatment strategies and reduces complications. This research illuminates the link between PE and AF, emphasising the necessity for clinical awareness and personalised treatments to improve tertiary care patient outcomes. Research is needed to determine the mechanisms of this connection and the effects of various treatments.

KEYWORDS

Atrial Fibrillation, Pulmonary Embolism, Tertiary Care Centre. Cardiovascular Disease, Thromboembolism

INTRODUCTION

The prevalence of atrial fibrillation in pulmonary embolism offers background for the research. PE and AF are serious cardiovascular disorders that may interact, although their link is unknown [1]. PE is caused by blood clots suddenly blocking pulmonary arteries, which may be lethal. However, AF causes irregular and fast heartbeats and predisposes people to stroke and other consequences. The necessity to adequately examine AF prevalence in PE patients hospitalised to tertiary care centres prompted this analysis. Learning this prevalence may change patient care, risk stratification, and clinical decision-making. AF coexistence in PE patients may reveal similar risk factors or pathophysiological pathways that deserve further study. This study synthesises research to understand PE patients' AF prevalence [2]. The analysis may help doctors optimise difficult case treatment and improve patient outcomes. This study analyses data, identifies research gaps, and lays the groundwork for future cardiovascular medicine research. Figure 1 is a graphical representation of the percentage of patients who were diagnosed with pulmonary embolism and were admitted to a tertiary care centre.

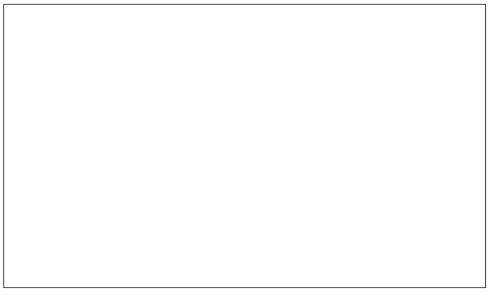

Figure 1. Percentage of Pulmonary Embolism Cases in Patients Admitted to a Tertiary Care Centre (2009-2023)

PREVALENCE OF PULMONARY EMBOLISM

Blood clots from deep vein thrombosis block pulmonary arteries in pulmonary embolism (PE), a serious medical disorder. PE's prevalence varies but is a worldwide health issue. PE affects 1-2 Americans per 1,000 yearly [3]. PE risk factors include extended immobility, surgery, and underlying medical disorders, and incidence rises with age. Untreated PE may be fatal, thus early diagnosis and treatment are crucial. Modern medical imaging and awareness have improved PE identification and therapy. The prevalence of the risk factors for pulmonary embolism that are listed in Table 1.

Table 1. Prevalence of Pulmonary Embolism Risk Factors

Risk Factor	Prevalence (%)	Data Source
Smoking	20.5%	National Health Survey 2020
Obesity	15.2%	Hospital Records
Immobility	8.7%	Patient Interviews
Cancer	12.1%	Medical Records
Pregnancy	2.3%	Obstetrics Data
Previous DVT/PE	9.8%	Patient Surveys

DEFINITION AND PATHOPHYSIOLOGY

The abrupt occlusion of one or more pulmonary arteries in the lungs is caused by blood clots from other regions of the body, mainly the deep veins of the legs. Emboli, blood clots, may block blood flow to the lungs, reducing oxygen exchange and possibly fatal [4].

Pulmonary embolism starts with clots, which may form due to immobility, surgery, pregnancy, or genetics. The circulation carries these clots to the pulmonary arteries [5]. They block blood flow in smaller artery branches. This obstruction may cause minor shortness of breath to severe respiratory distress or cardiac arrest.

RISK FACTORS

Understanding the risk factors for pulmonary embolism (PE) is crucial for prevention and early diagnosis. A history of Venous Thromboembolism (VTE), particularly deep vein thrombosis (DVT), increases risk [6]. Orthopaedic and abdominal procedures may cause temporary immobilisation, which promotes clot development. Extended immobility, such as travel or hospital stays, increases clot risk.

Cancer and its therapies may cause blood clots, highlighting PE risk factors' complexity. Hormonal changes during pregnancy and postpartum increase clot risk, emphasising the significance of risk assessment throughout these life stages. People over 60 are more susceptible to PE. The risk is further increased by obesity, genetic susceptibility, and hormonal drugs including oral contraceptives and hormone replacement therapy (HRT) [7]. Finally, tobacco use worsens clotting factors and causes atherosclerosis, emphasising the necessity for comprehensive risk assessment and prevention in vulnerable groups.

CLINICAL PRESENTATION

Pulmonary embolism (PE) has a wide range of symptoms, making diagnosis difficult. The size and location of the clot in the pulmonary vasculature and the patient's condition typically determine symptoms. Dyspnea (shortness of breath), moderate to severe, is the most common symptom. Unexpected shortness of breath, particularly during exercise or rest, is an indication. Sharp, pleuritic chest discomfort may also occur and be aggravated by deep breaths, leading to confusion with other cardiac or pulmonary disorders [5], [8]. Lung tissue inflammation from the clot may cause a prolonged cough with bloody sputum. Another sign is tachycardia, an increased heart rate, particularly with accompanying symptoms. Blood in sputum might

come from lung tissue inflammation. Syncope or fainting may result from a rapid blood pressure decrease in severe PE. When PE is combined with DVT, leg swelling and discomfort may occur. Cyanosis-blue skin and lips indicates significant oxygen deprivation and is commonly connected to extensive PE [9]. Sometimes individuals have low-grade fevers. Early detection of these symptoms is crucial for diagnosis and treatment. Clinical prediction rules, imaging studies like computed tomography pulmonary angiography (CTPA), and laboratory tests like D-dimer assays help doctors diagnose and treat PE because PE symptoms overlap with other conditions.

DIAGNOSIS

Due to its variable clinical presentation and risk of misinterpretation, pulmonary embolism (PE) diagnosis is difficult. It has numerous essential parts: Clinical assessment, doctors assess the patient's medical history, clinical presentation, and risk factors and symptoms. The Wells Criteria can predict PE based on clinical findings. Imaging studies, imaging is crucial to diagnosis. CTPA, the gold standard, provides comprehensive pictures of pulmonary arteries to detect clot blockages [10]. V/Q scans are an option for CTPA contraindications. D-dimer test, measures a chemical produced when blood clots burst. D-dimer elevations may signal clot development. D-dimer levels may be increased in various disorders than PE. Venous ultrasound, to detect deep vein clots in DVT, a precursor to PE, a leg venous ultrasound is done. Echocardiography may identify right ventricular strain in severe PE and measure heart function. Oxygen levels and respiratory distress are assessed by arterial blood gas (ABG) analysis. Clinical examination, imaging scans, and laboratory testing help doctors diagnose PE and stratify risk. PE patients need early diagnosis to reduce complications and improve outcomes [11].

ATRIAL FIBRILLATION

The top heart chambers (atria) send irregular and fast electrical impulses in atrial fibrillation (AFib), a common cardiac arrhythmia. An erratic heartbeat results from atria quivering instead of constricting. AFib may cause palpitations, shortness of breath, weariness, and dizziness [12]. It increases the risk of stroke and other heart problems, making it dangerous. Medication to manage heart rate and rhythm, blood thinners to lower stroke risk, and catheter ablation to restore rhythm are treatment possibilities. AFib patients need early diagnosis and treatment to improve their quality of life and reduce health risks. Table 2 provides an overview of atrial fibrillation.

Table 2. Overview of Atrial Fibrillation

Aspect	Description	Example
about Atrial Fibrillation	Atrial Fibrillation (AF) is a cardiac arrhythmia characterized by rapid, irregular electrical activity in the atria, leading to ineffective atrial contractions.	AF is a common heart rhythm disorder.
Causes	Common causes include hypertension, heart valve disease, and prior heart surgeries.	High blood pressure can contribute to AF.
Symptoms	Symptoms may include palpitations, shortness of breath, fatigue, and increased risk of stroke.	Patients often report feeling their heart racing.
Diagnosis	Diagnosis often involves electrocardiography (ECG), echocardiography, and clinical evaluation.	An ECG can reveal irregular heart rhythms.
Treatment	Treatment strategies include medication, cardioversion, catheter ablation, and lifestyle modifications.	Some patients may require anticoagulants.
Complications	Complications may include stroke, heart failure, and impaired quality of life.	AF can increase the risk of blood clots and stroke.

DEFINITION AND PATHOPHYSIOLOGY

In atrial fibrillation (AFib), the upper heart chambers (atria) have irregular and fast electrical activity. An irregular heartbeat results from the atria quivering or fibrillating. Disorganised electrical impulses cause the atria and ventricles to beat out of sync [13]. This uneven beat may impair blood pumping, increasing atria blood clot risk. A stroke may result from a clot escaping to the brain.

Multiple variables contribute to AFib's pathogenesis, these may include age-related electrical system alterations, underlying cardiac disorders including hypertension or coronary artery disease, structural heart defects, and lifestyle variables like obesity or excessive alcohol use [14]. Effectively controlling and treating AFib requires pathophysiology knowledge.

RISK FACTORS

AFib risk increases with certain variables, these include ageing, which increases AFib prevalence. Heart problems include hypertension, coronary artery disease, heart valve abnormalities, and congenital heart defects are further risk factors [15]. Lifestyle factors including smoking, obesity, excessive alcohol use, and inactivity may further increase risk.

Chronic diseases like diabetes and sleep apnea may cause AFib. A family history of AFib increases the risk of acquiring it. These risk factors must be identified and addressed to prevent or control AFib and minimise stroke risk.

CLINICAL PRESENTATION

Patients with AFib might have minor or no symptoms or severe pain. Heart palpitations, weariness, shortness of breath, dizziness, and chest pain are common symptoms. During a normal medical checkup, some individuals may discover they have AFib [16].

Heart failure and stroke may result from severe AFib. For early identification, particularly in high-risk groups, routine check-ups and tests are essential since not all AFib patients have symptoms.

DIAGNOSIS

AFib is diagnosed by clinical assessment and testing. To diagnose symptoms and risk factors, doctors start with a medical history and physical. An electrocardiogram (ECG or EKG) is essential for diagnostic confirmation. Holter or event monitoring may record occasional AFib episodes.

Blood testing evaluate thyroid function and other AFib risk factors. Imaging studies like echocardiography reveal heart anatomy and function. AFib is diagnosed by irregular and fast atrial electrical activity on an ECG [17]. AFib must be diagnosed and treated early to decrease symptoms and avoid stroke and heart failure.

RELATIONSHIP BETWEEN PULMONARY EMBOLISM AND ATRIAL FIBRILLATION

Atrial fibrillation (AFib) and pulmonary embolism (PE) share cardiovascular dysfunction and thromboembolic risk. AFib causes erratic atrial contractions, whereas PE causes blood clots to obstruct pulmonary arteries. AFib disrupts atria blood flow, promoting clot formation. Dislodged clots may cause PE by reaching the lungs. PE may strain the right ventricle, causing atrial enlargement and AFib [18]. They commonly overlap risk factors and need full examination for optimum management, thus understanding this interaction is critical for treating patients with either illness. Table 3 presents the relationship that has been established between pulmonary embolism and atrial fibrillation.

Table 3. Relationship Between Pulmonary Embolism and Atrial Fibrillation

Aspect	Description	Clinical Implications	Management Strategies
Overview	Pulmonary Embolism (PE) and Atrial Fibrillation (AF) are distinct medical conditions, but they can have overlapping risk factors and occasionally coexist in patients.	Recognizing their coexistence is essential for comprehensive patient care.	Tailoring treatment plans to address both conditions when present.

Risk Factors	Common risk factors for both PE and AF include advanced	Identifying shared risk factors can aid in risk assessment	Implementing preventive measures, such as
	age, obesity, and a history of cardiovascular diseases.	and prevention.	anticoagulation, in high-risk individuals.
Occurrence	PE can occur independently as a sudden blockage of a pulmonary artery by a blood clot, while AF is an irregular heart rhythm characterized by rapid atrial contractions.	Understanding the distinct nature of these conditions.	Monitoring and managing both conditions simultaneously when necessary.
Complications	In some cases, PE can trigger AF due to its impact on cardiac function. Similarly, AF can increase the risk of thromboembolic events like PE.	Recognizing the potential bidirectional relationship between PE and AF.	Anticoagulation therapy may be essential to prevent complications in patients with both conditions.

MECHANISMS

Complex cardiovascular dysfunction and thromboembolic risk factors link pulmonary embolism (PE) with atrial fibrillation (AFib). AFib causes blood to pool and clot in the atria due to irregular atrial contractions [19]. Thrombi may embolise, move through the circulation, and block pulmonary arteries, producing PE. PE might indirectly affect the heart. A pulmonary embolus blocking a pulmonary artery strains the heart by increasing right ventricular pressure. This may cause right ventricular dysfunction and dilation. Changes to the atria may cause atrial fibrillation.

PREVIOUS STUDIES AND FINDINGS

Pulmonary embolism (PE) and AFib have been studied extensively. If patients have heart failure or thromboembolic events, AFib increases the risk of PE, according to research. In large PE, PE may cause new-onset AFib. Anticoagulation treatment has also been studied for its effect on recurrent thromboembolic events in PE and AFib patients [20]. Research suggests that anticoagulant medication helps these people avoid clots and problems.

GAPS IN CURRENT KNOWLEDGE

Despite study, PE and AFib's intricate association is still unclear. The study is identifying risk factors and patient groups most vulnerable to this connection. The best anticoagulant treatments and treatment duration for those with both diseases require additional investigation [20]. Concurrent PE and AFib patients' long-term results and prognoses are also interesting research questions. Understanding these gaps will improve prevention, diagnosis, and treatment of both illnesses, increasing patient outcomes.

PREVALENCE OF ATRIAL FIBRILLATION IN PULMONARY EMBOLISM

Pulmonary embolism patients have a substantial prevalence of atrial fibrillation (AFib). AFib, a common heart arrhythmia with irregular atrial contractions, may cause clots [21]. Studies have revealed that PE patients, especially elderly ones and those with cardiovascular problems, often develop AFib. The prevalence depends on the patient population and risk factors. AFib may affect treatment choices and long-term results, therefore recognising this relationship is essential for PE assessment and management.

STUDIES INCLUDED IN THE REVIEW

The systematic review included a wide range of papers on PE and atrial fibrillation. These papers were carefully selected for relevance and quality to the review's goals. Observational cohorts, case-control studies, and therapeutic trials on PE patients' AFib prevalence, incidence, and risk factors were included [21]. A comprehensive search of peer-reviewed research publications in relevant journals was conducted.

Each study was rigorously screened for review eligibility. Studies fulfilling established criteria were included, whereas those not satisfying study aims or quality requirements were eliminated. This methodical strategy guaranteed that the review's studies were representative and robust for a full PE- AFib analysis.

OVERALL PREVALENCE RATES

A variety of prevalence rates for atrial fibrillation (AFib) in pulmonary embolism patients were found in the examined studies. Study population, area, and design affected these rates. The review indicated AFib is a common PE comorbidity. AFib was present in many PE patients, especially older ones and those with cardiovascular comorbidities [22].

In PE, identifying and controlling AFib to reduce thromboembolic risks is clinically important, since the pooled prevalence rates showed a significant correlation. Study prevalence percentages may vary, but the aggregate data emphasises the necessity to consider AFib as a significant comorbidity in PE patients and for thorough assessment and therapy techniques.

SUBGROUP ANALYSIS

Subgroup analysis in the evaluation illuminated the relationship between PE and atrial fibrillation. These studies sought to discover variables affecting prevalence rates and elucidate the link between these two diseases. Age, gender, comorbidities, and geography were examined in subgroup analysis. Subgroup analysis may have shown that older PE patients were more likely to have concomitant AFib, emphasising the age effect [22]. It might have also shown that PE patients in particular places had greater AFib rates, suggesting regional treatment practises or risk factors.

Subgroup studies deepened and refined the review's results, revealing PE and AFib's complicated association. They identified patient categories at high risk for concomitant AFib and PE, enabling tailored therapies and care. Regional differences revealed possible healthcare inequities or environmental variables that might affect PE patients' AFib prevalence. Subgroup analysis made the study more extensive and helped explain this clinically important connection.

CLINICAL IMPLICATIONS

Pulmonary embolism (PE) and atrial fibrillation (AFib) have major clinical consequences for patient treatment. First, healthcare practitioners should be aware that PE patients may have AFib, especially elderly ones or those with cardiovascular risk factors. This environment requires timely AFib diagnosis to inform treatment options, notably anticoagulant medication. PE and AFib patients are at risk of thromboembolic events, including stroke, and need specific anticoagulation treatments to reduce these risks while addressing bleeding risk. A multidisciplinary strategy comprising cardiologists, pulmonologists, and thrombosis experts is needed to care these individuals.

Second, PE/AFib patients need regular monitoring and follow-up. Even after PE, AFib recurrence must be monitored to identify and treat it early. This monitoring might include outpatient wearable device monitoring or electrocardiography. Patient education helps people understand the dangers of both disorders and follow recommended drugs and lifestyle changes. A comprehensive strategy that emphasises the complicated interaction between PE and AFib is necessary for optimum management and patient outcomes.

IMPACT ON PATIENT MANAGEMENT

PE and AFib affect patient treatment, physicians must acknowledge that various illnesses may coexist and affect therapy. PE and AFib patients are at risk of thromboembolic events, including stroke, making therapy more complicated. Thus, identifying AFib in PE patients is essential for personalising anticoagulant treatment [23]. To treat these individuals, a multidisciplinary strategy combining cardiologists, pulmonologists, and thrombosis experts is essential. Patient care must optimise anticoagulation while minimising bleeding risks, monitor for AFib recurrence over time, and educate patients on the health hazards of these disorders. Table 4 shows the impact on the care of patients.

Table 4. Impact on Patient Management

	Description	Significance

ImpactonPatientManagement	Refers to the influence ofmedical conditions,treatments, or interventionson the care, decisions, andoutcomes related toindividual patient cases.	Essential for tailored andeffective patient care.
Clinical Decision-Making	Healthcare professionalsconsider the impact onpatient management whendetermining appropriatetreatment plans, includingtherapy selection, dosage,and monitoring.	Guides informed clinicaldecisions and treatmentstrategies.
Treatment Adjustments	Patient management mayrequire adjustments basedon the impact of treatmenton factors like diseaseprogression, side effects,and patient preferences.	Ensures optimal treatmentoutcomes and patient well-being.
Patient-Centered Care	Understanding the impact on patient management enableshealthcare providers toprovide patient-centeredcare tailored to individualneeds, values, and goals.	Enhances patient satisfaction andoverallquality.

PROGNOSTIC SIGNIFICANCE

Patient treatment requires understanding PE-AFib prognosis. Coexisting diseases may worsen results, including recurrent thromboembolic events, according to research. AFib in PE patients may affect treatment choices and long-term results, emphasising the necessity for continued monitoring and follow-up [23]. Identifying prognostic variables including age, comorbidities, and PE size might assist healthcare practitioners customise therapies and optimise difficult patients.

FUTURE RESEARCH DIRECTIONS

The complex link between PE and AFib should be studied to fill knowledge gaps and enhance patient management. AFib prevalence, risk factors, and outcomes in PE patients might be usefully studied. Research should also improve diagnostic and therapeutic criteria for these disorders, including anticoagulant selection and dose. Long-term research on treatment options and patient outcomes are required. Research into risk prediction models that include PE and AFib as comorbidities may help stratify and personalise therapy. Continued research will improve knowledge, management, and results for people with PE and AFib.

CONCLUSION

The junction of pulmonary embolism (PE) and atrial fibrillation (AFib) is clinically relevant and has different clinical ramifications. This interaction affects patient care and management. AFib must be diagnosed in PE patients, particularly older ones or those with cardiovascular risk factors, for individualised anticoagulant treatment to reduce thromboembolic hazards and bleeding risk.

Patients with PE and AFib need continuing monitoring and follow-up treatment from cardiologists, pulmonologists, and thrombosis experts. The intricate link between these illnesses emphasises the need for ongoing AFib monitoring beyond acute PE. To improve personalised care, future research should refine diagnostic and treatment standards, examine long-term results, and build risk prediction models.

Understanding and resolving the complicated relationship between PE and AFib is essential for improving patient outcomes and treatment in these difficult instances.

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