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Cardiovascular And Respiratory Disease : A Meta Analysis Of Large Trials

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Abstract

Objectives: Biomarkers can accurately predict a patient's risk of developing cardiovascular and respiratory diseases. The body contains substances that can act as biomarkers, or illness indicators. Novel remedies for common and unusual heart and lung diseases will be discovered through research.

Methods: From January 1st to March 4th, 2020, all Oplus Heart Center Dehradun patients were included. An NHS Local Health Authority computerised hospital activity analysis register was used for this study. The ACALM study approach was then used to create a database from raw data.

Result: Between January 1, 2020, and March 4, 2022, 10,259,67 patients were treated at the hospitals studied. Cardiovascular disease was more common in COPD patients than in non-COPD individuals. Soaring rates of lung cancer and pneumonitis Multivariate analysis

Conclusion: The higher risk of cardiovascular illness was associated to increased risk of death from any cause in a large cohort analysis of COPD, asthma, and idiopathic pulmonary disease (ILD). Despite these findings, patients with COPD, asthma, or ILD had lower rates of coronary revascularization operations.

Keywords: COPD, Surgery, Cardiac, WHO, Lung Cancer

Introduction

Diseases of the airways and other areas of the lungs are known as chronic respiratory diseases (CRDs). Allergies including asthma, occupational lung disease and pulmonary hypertension are among the most frequent. Air pollution, workplace toxins and dust, and recurring lower respiratory diseases during childhood are among elements that raise a person's risk of getting asthma. Despite the fact that CRDs cannot be cured, there are a variety of therapy choices that can aid people with the condition manage their symptoms and enhance their quality of life. All people can breathe freely in a world where the WHO Global Alliance against CRDs (GARD) is focused on supporting the needs of people living in low- and middle-income countries who have CRDs. The leading causes of premature death worldwide are cardiovascular and respiratory diseases; in the United Kingdom alone, one in four individuals will die from heart disease and one in five people will die from lung disease. When it comes to heart disease, half of all fatalities are unexpected and unanticipated.

A patient's risk of acquiring cardiovascular and respiratory disease can be precisely predicted by employing biomarkers. There are chemicals in the human body that can act as biomarkers, which are signs of disease.

Research into some of the most widespread and rarest forms of heart and lung illness will lead to the discovery of novel treatments.

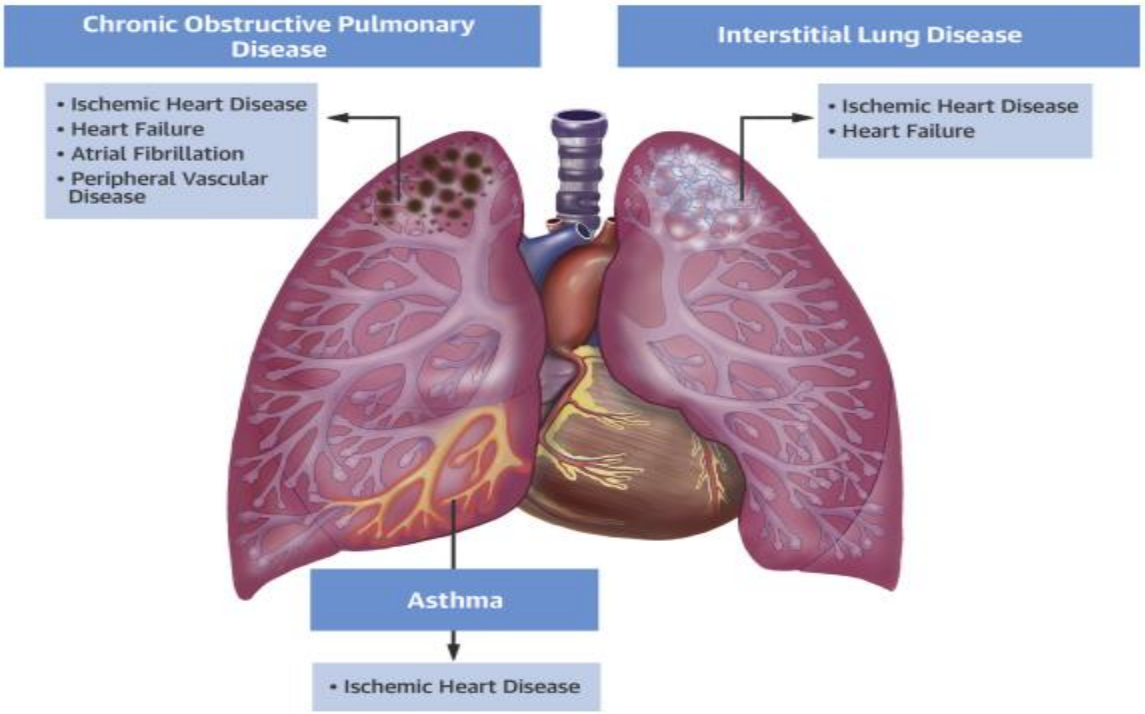

Fig 1: C.O.P.D., asthma, and idiopathic pulmonary fibrosis are all linked to cardiovascular disease.

Material & Methods

The study comprised all Oplus Heart Center Dehradun patients between January 1st, 2020 and March 4th, 2022. For this study, we used data from the NHS Local Health Authority's computerised hospital activity analysis register. The ACALM study methodology was then utilised to turn the raw data into a research database. An amalgamation of frequently gathered data called ACALM has been extensively used in medical research. The ACALM approach assures no patient is counted twice. With multiple admissions, the first admission data is used. Each of the three study groups has its own age and sex-matched control group. Each study group contained sex and age decile matched control groups. The control groups had more than five times the participants as the research groups.

Statistical Analysis

In demographics, continuous and categorical variables were compared using ANOVA and 2 tests. The Kaplan-Meier estimator was used to assess the percentage of events occurring after the initial evaluation. Defined as 100% less the Kaplan-Meier estimate of being event free. This study used Kaplan-Meier curves to explain the clinical prognosis for groups of patients with obstructive airway disease characteristics and identify those at risk. For this, we employed a Cox regression model. The underlying timescale was examination time, and all Cox models were aged. A comprehensive multivariable model included proven cardiovascular risk factors: family history of cardiovascular disease, smoking, BMI, hypertension, diabetes mellitus, total cholesterol levels, and leisure activity. Suffixes () denoted significance in our study.

Outcomes

vascular issues heart disease, heart failure, atrial fibrillation, and venous disease (PVD) Procedural cardiothoracic and cerebral The ACALM trial methodology employed ICD-10 and OPCS-4 coding to identify operations like PCI and CABG (CABG). Other than cardiovascular disease and COPD, the top 10 major causes of mortality in the UK were found using ICD-10 and OPCS-4 coding (i.e., lung cancer, breast cancer, colon cancer, pneumonia, and chronic kidney disease). There was no restriction on who could see their medical records or what they could see.

Results & Discussion

A total of 10,259,67 patients were treated to the hospitals included in the research between January 1, 2020, and March 4, 2022. COPD was present in 35.66% of patients, asthma in 61.9%, and ILD was present in 1.88% of patients at the beginning of the study. There were 18,8914 patients in the control group for COPD, 208,901 in the control group for asthma and 14,7987 in the control group for ILD in this study. For each respiratory ailment and its matched control, the baseline characteristics of the patients are shown in Table 1.

COPD Patients

COPD patients had higher baseline rates of cardiovascular disease than non-COPD patients (Table 1). Lung cancer and pneumonitis were both rising. Multivariable analysis linked AF (OR: 1.39) and PVD (OR: 1.39; 95 percent CI: 1.34 to 1.44), IHD (OR: 1.78; 94 percent CI: 1.68to 1.70) and HF (OR: 2.15; 96 percent CI: 2.14 to 2.19). (Table 2). (OR: 1.85; 95% CI: 1.74-2.00) Cerebrovascular disease and COPD are not causally linked (OR: 0.97; 95 percent CI: 0.92 to 1.03). During the study's follow-up, 16,812 COPD patients (53.1%) and 46,873 matched controls (29.5%) died. IHD (HR: 1.03; 95 percent CI: 1.01-1.05), hypertension (HR: 1.65; 95 percent CI: 1.61-1.68), afib (HR: 1.10), and cardiovascular disorders (HR: 1.109-1.110) were all independently associated to death in COPD patients (Table 3, Fig 1) Those with ILD had higher rates of type 2 diabetes, IHD, HF, and AF than those without (Table 1). Pneumonia and lung cancer cases rose. (OR: 1.57; 95 percent CI: 1.36 to 1.24) and HF (Table 2). (OR: 2.23; 95 percent CI: 1.88 to 2.66). (OR: 1.12, 95 percent confidence interval 0.34 to 1.34) or PVD (OR: 0.34, 95 percent confidence interval 0.34 to 1.34) (OR: 1.06 95 percent CI: 0.76 to 1.54). Patients with ILD had lower rates of cerebrovascular disease (OR: 0.68; 95 percent CI: 0.35 to 0.65). During the study's follow-up, 1,118 ILD patients (68.4%) and 2,737 matched controls (32.9%) died (p 0.001). HF (1.54; 95 percent CI: 1.45 to 1.74), cerebrovascular illness (1.94; 95 percent CI: 1.56 to 2.36), and PVD (1.94; 95 percent CI: 1.56 to 2.36). (hazard ratio [HR]: 1.28; 95 percent CI: 1.08 to 1.40).

TABLE 1 Baseline Characteristics According to Respiratory Disease and Matched Controls

	Control (n ¼ 158,230)	COPD (n ¼ 31,646)	p Value	Control (n ¼ 302,120)	Asthma (n ¼ 60,424)	P Value	Control (n ¼ 8,310)	ILD Fibrosis (n ¼ 1,662)	p Value
Demographics									
Age, yrs	70.0 12.0	70.3 12.0		48.6 20.0	48.5 20.0		71.3 12.0	71.5 12.0	
Male	80,710 (51.0)	16,142 (51.0)		110,860 (36.7)	22,172 (36.7)		4,715 (56.7)	943 (56.7)	
Ethnic group									
Caucasian	133,209 (84.2)	28,527 (90.1)		231,451 (76.6)	47,828 (79.2)		7,057 (84.9)	1,427 (85.9)	
South Asian	6,082 (3.8)	555 (1.8)		24,604 (8.1)	5,343 (8.8)		304 (3.7)	113 (6.8)	
Afro-Caribbean	2,383 (1.5)	175 (0.6)		9,208 (3.0)	1,520 (2.5)		116 (1.4)	17 (1.0)	
Other	2,828	292		11,273	1,870		135	15 (0.9)	

	(1.8)	(0.9)		(3.7)	(3.1)		(1.7)		
Unknown	13,728 (8.7)	2,097 (6.6)		25,584 (8.5)	3,863 (6.4)		698 (8.4)	90 (5.4)	
Cardiovascular disease									
Hypertension	53,396 (33.7)	11,992 (37.9)	<0.001	50,243 (16.6)	14,752 (24.4)	<0.001	2,840 (34.2)	575 (34.6)	0.741
Hyperlipidemia	15,855 (10.0)	3,051 (9.6)	0.040	16,181 (5.4)	4,478 (7.4)	<0.001	799 (9.6)	150 (9.0)	0.455
T1DM	2,253 (1.4)	340 (1.1)	<0.001	3,287 (1.1)	875 (1.4)	<0.001	108 (1.3)	17 (1.0)	0.355
T2DM	20,655 (13.1)	4,879 (15.4)	<0.001	20,105 (6.7)	5,945 (9.8)	<0.001	1,133 (13.6)	281 (16.9)	<0.001
IHD	28,380 (17.9)	9,188 (29.0)	<0.001	24,149 (8.0)	7,291 (12.1)	<0.001	1,526 (18.4)	452 (27.2)	<0.001
Heart failure	10,076 (6.4)	5,449 (17.2)	<0.001	7,617 (2.5)	1,879 (3.1)	<0.001	560 (6.7)	295 (17.7)	<0.001
AF	15,123 (9.6)	5,444 (17.2)	<0.001	11,106 (3.7)	2,504 (4.1)	<0.001	896 (10.8)	263 (15.8)	<0.001
CKD	6,275 (4.0)	2,290 (7.2)	<0.001	4,653 (1.5)	925 (1.5)	0.866	357 (4.3)	149 (9.0)	<0.001
Cerebrovascular disease	8,304 (5.2)	1,932 (6.1)	<0.001	6,563 (2.2)	1,119 (1.9)	<0.001	512 (6.2)	79 (4.8)	0.026
PVD	3,750 (2.4)	1,714 (5.4)	<0.001	3,010 (1.0)	617 (1.0)	0.576	204 (2.5)	52 (3.1)	0.113
PCI	3,619 (2.3)	418 (1.3)	<0.001	3,843 (1.3)	829 (1.4)	0.047	180 (2.2)	16 (1.0)	0.001
CABG	2,153 (1.4)	236 (0.7)	<0.001	1,859 (0.6)	360 (0.6)	0.574	113 (1.4)	12 (0.7)	0.033
Other disease									
Pneumonia	6,957 (4.4)	4,870 (15.4)	<0.001	5,818 (1.9)	1,619 (2.7)	<0.001	422 (5.1)	316 (19.0)	<0.001
Dementia	7,157 (4.5)	1,615 (5.1)	<0.001	4,671 (1.5)	615 (1.0)	<0.001	430 (5.2)	83 (5.0)	0.761
Breast cancer	2,509 (1.6)	543 (1.7)	0.093	3,532 (1.2)	677 (1.1)	0.308	122 (1.5)	34 (2.0)	0.083
Lung cancer	2,676 (1.7)	1,844 (5.8)	<0.001	2,210 (0.7)	399 (0.7)	0.059	133 (1.6)	83 (5.0)	<0.001

Colon cancer	1,059 (0.7)	195 (0.6)	0.287	871 (0.3)	129 (0.2)	0.001	57 (0.7)	7 (0.4)	0.217

TABLE 2 Multivariable-Adjusted Association of Cardiovascular Diseases With Each Respiratory Disease

	COPD Odds Ratio (95% CI)	p Value	Asthma Odds Ratio (95% CI)	p Value	ILD Odds Ratio (95%CI)	p Value
Hypertension	1.089 (1.059–1.120)	<0.001	1.656 (1.614–1.698)	<0.001	0.950 (0.840–1.075)	0.417
Hyperlipidemia	0.876 (0.837–0.917)	<0.001	1.053 (1.013–1.094)	0.009	0.929 (0.758–1.138)	0.475
T1DM	0.662 (0.587–0.746)	<0.001	1.055 (0.976–1.139)	0.176	0.709 (0.415–1.211)	0.209
T2DM	1.034 (0.997–1.073)	0.074	1.295 (1.253–1.339)	<0.001	1.195 (1.024–1.395)	0.024
IHD	1.742 (1.688–1.797)	<0.001	1.483 (1.435–1.533)	<0.001	1.571 (1.367–1.805)	<0.001
Heart failure	2.167 (2.081–2.255)	<0.001	1.057 (0.999–1.117)	0.053	2.234 (1.878–2.657)	<0.001
AF	1.391 (1.339–1.444)	<0.001	1.016 (0.969–1.066)	0.505	1.100 (0.930–1.302)	0.267
CKD	1.229 (1.164–1.298)	<0.001	0.828 (0.769–0.892)	<0.001	1.586 (1.276–1.971)	<0.001
Cerebrovascular	0.973 (0.921–1.027)	0.316	0.767 (0.718–0.819)	<0.001	0.606 (0.468–0.784)	<0.001
PVD	1.849 (1.737–1.969)	<0.001	0.792 (0.724–0.866)	<0.001	1.088 (0.781–1.516)	0.617
PCI	0.484 (0.435–0.538)	<0.001	0.753 (0.696–0.816)	<0.001	0.418 (0.246–0.708)	0.001
CABG	0.422 (0.366–0.485)	<0.001	0.597 (0.531–0.672)	<0.001	0.469 (0.252–0.872)	0.017

TABLE 3 Multivariable Cox Regression Models of the Contribution of Cardiovascular Diseases to Mortality in Patients With Each Respiratory Disease

	N	Deaths	COPD HR (95% CI)	p Value	N	Asthma Deaths HR (95% CI)	p Value	N	Deaths	ILD HR (95% CI)	p Value
Total	31,646	16,812 (53.1)			60,424	6,649 (11.0)		1,662	1,149 (69.1)		
Hypertension	11,992	5,698 (47.5)	0.763 (0.750–0.776)	<0.001	14,752	2,671 (18.1) (0.773–0.807)	<0.001	575	407 (70.8)	0.775 (0.723–0.830)	<0.001
Hyperlipidemia	3,051	972 (31.9)	0.613 (0.592–0.635)	<0.001	4,478	487 (10.9) (0.589–0.641)	<0.001	150	83 (55.3)	0.619 (0.538–0.712)	<0.001
T1DM	340	192 (56.5)	1.346 (1.265–1.433)	<0.001	875	197 (22.5) (1.510–1.720)	<0.001	17	10 (58.8)	1.282 (0.969–1.695)	0.082
T2DM	4,879	2,546 (52.2)	1.132 (1.107–1.157)	<0.001	5,945	1,290 (21.7) (1.218–1.286)	<0.001	281	192 (68.3)	1.145 (1.049–1.250)	0.003
IHD	9,188	5,226 (56.9)	1.029 (1.009–1.050)	0.004	7,291	1,802 (24.7) (1.013–1.067)	0.003	452	335 (74.1)	1.098 (1.016–1.187)	0.018
Heart failure	5,449	4,219 (77.4)	1.645 (1.608–1.684)	<0.001	1,879	1,005 (53.5) (1.752–1.866)	<0.001	295	241 (81.7)	1.588 (1.448–1.742)	<0.001
AF	5,444	3,785 (69.5)	1.080 (1.057–1.103)	<0.001	2,504	940 (37.5) 1.070 (1.039–1.103)	<0.001	263	207 (78.7)	1.053 (0.966–1.148	0.239

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CKD	2,290	1,632 (71.3)	1.314 (1.277 – 1.352)	<0.001	925	445 (48.1) (1.494– 1.613)	<0.001	149	114 (76.5)	1.183 (1.053– 1.328)	0.005
Cerebrovascular	1,932	1,445 (74.8)	1.843 (1.796 – 1.891)	<0.001	1,119	550 (49.2) (2.031– 2.168)	<0.001	79	63 (79.7)	1.886 (1.702– 2.090)	<0.001
PVD	1,714	1,079 (63.0)	1.320 (1.271 – 1.371)	<0.001	617	213 (34.5) (1.322– 1.470)	<0.001	52	32 (61.5)	1.269 (1.072– 1.503)	0.006
PCI	418	52 (12.4)	0.353 (0.317 – 0.394)	<0.001	829	54 (6.5) (0.367– 0.466)	<0.001	16	5 (31.3)	0.427 (0.276– 0.659)	<0.001
CABG	236	37 (15.7)	0.516 (0.461 – 0.579)	<0.001	360	28 (7.8) (0.503– 0.653)	<0.001	12	3 (25)	0.425 (0.259– 0.700)	0.001

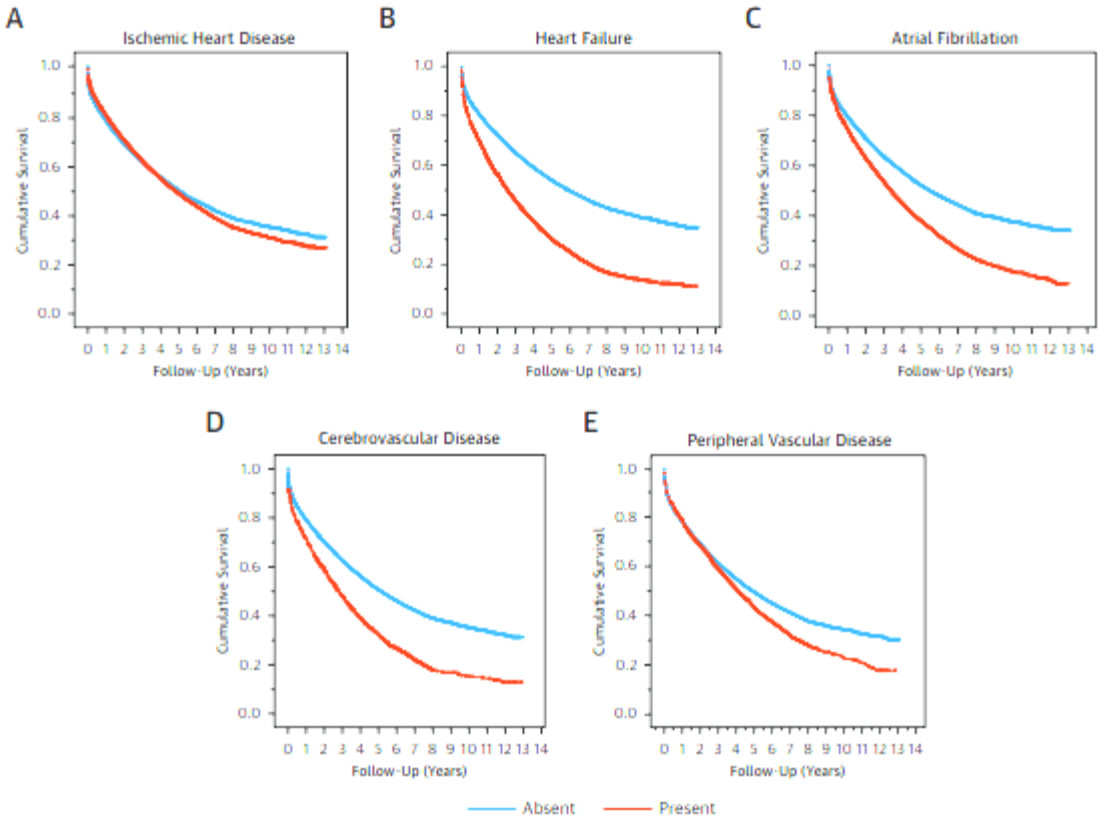

Fig: 2 Impact of Cardiovascular Diseases on All-Cause Mortality in COPD

Conclusion:

In a large cohort analysis, we discovered that COPD, asthma, and idiopathic pulmonary disease (ILD) were all related with an increased risk of cardiovascular disease, which in turn was linked to an increased risk of death from any cause. Despite these findings, patients with COPD, asthma, and ILD were less likely than those without these respiratory diseases to get coronary revascularization surgery.

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