

IS THERE AN INCREASED RISK OF DEVELOPING HYPERTENSION AFTER A COVID-19 INFECTION?

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BACKGROUND

Hypertension is the most prevalent chronic disease worldwide, affecting one-third of adults 1. It presents a major public health challenge globally. This widespread, deadly condition can lead to stroke, heart attack, heart failure, kidney damage, and various other health problems. Hypertension is often asymptomatic, which is why it is referred to as the "silent killer" 2, and it is frequently undiagnosed. The global prevalence of hypertension has doubled between 1990 and 2019 1. In the UK, the prevalence of hypertension has also increased 3.

In addition to the primary risk factors for hypertension, such as genetic predisposition, overweight/obesity, physical inactivity, alcohol consumption, high salt intake, stress, tobacco use, and poor sleep 4, recent studies have shown that COVID-19 is associated with an increased risk of developing hypertension in the year following infection 5, 6, 7, 8.

These studies, along with others in the literature, primarily focus on hospitalised COVID-19 patients. Since hospitalised patients typically represent more severe cases, there is a need to better understand hypertension development in primary care patients—those who experienced mild COVID-19 without complications during the acute phase, as most hypertensive patients receive follow-up care in primary care settings.

OBJECTIVES

The aim of this study is to examine the association between exposure to COVID-19 and the subsequent development of hypertension using data from UK primary care.

METHODS

A retrospective population-based, open cohort study (n=160,479 patients) was conducted from March 1, 2020, to July 31, 2021, using data from the THIN® UK database (The Health Improvement Network). THIN® UK is part of Cegedim Health Data's European network of medical databases, which includes electronic health records from UK practices. These data are provided by voluntary physicians who are committed to supporting longitudinal research, in full compliance with current regulations, to advance medical progress.

The exposed group consisted of adult patients diagnosed with acute COVID-19 infection (n=32,582). The index date was defined as the day the diagnosis code was registered by the physician. The unexposed group (n=127,897) was randomly matched to the exposed group by age, gender, GP practice, and follow-up duration based on the index date. Exclusion criteria included having less than 12 months of medical history within THIN® UK prior to the index date, less than 6 months of follow-up after the index date, a pre-existing diagnosis of hypertension, or prior use of antihypertensive treatment.

The study analysed the risk of developing hypertension (or incident use of an anti-hypertensive agent) following COVID-19 infection, focusing on the period between 4 weeks and 6 months after diagnosis. Covariates of interest included chronic kidney disease, chronic obstructive pulmonary disease, heart failure, myocardial infarction and type 2 diabetes mellitus. Incident hypertension was identified using adjusted hazard ratios and p-values from Cox proportional hazards models. Study design, data extraction and analysis were performed using Dexter, an epidemiological platform 9.

RESULTS

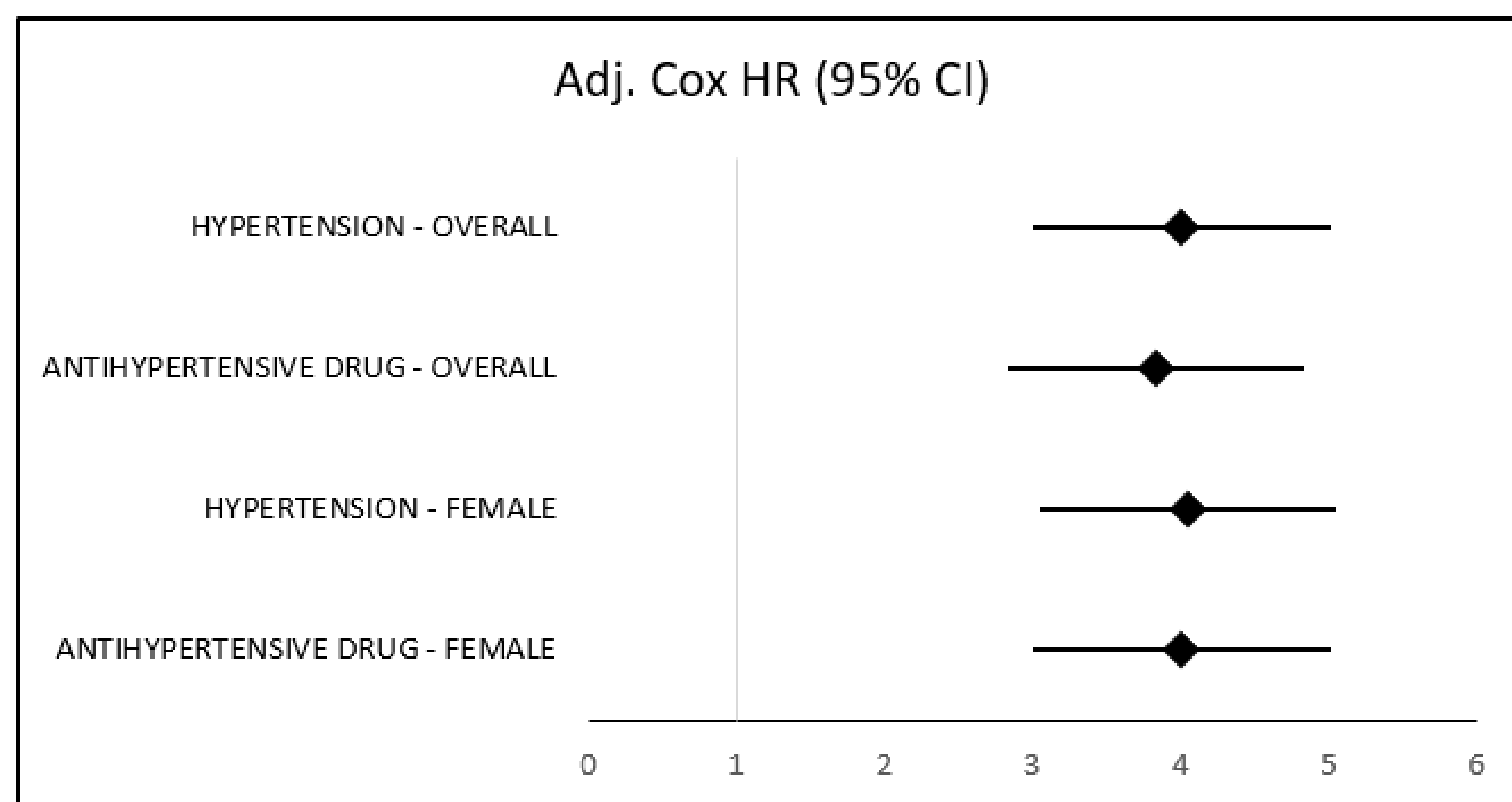
The average age of patients were 40 years with a majority being female (59%). Although the total prevalence of comorbidities was low in the overall cohort compared, the prevalence was higher in the exposed of all comorbidities. (Table 1).

Table 1: Patient characteristics at study entry

Covariate	Overall	Exposed	Unexposed
Mean age (SD)	39.9 (20.2)	40.4 (20.3)	39.8 (20.2)
Age categories (Years)			
0-9	13,809 (8.6)	2,712 (8.3)	11,097 (8.7)
0-10	25,763 (16)	5,193 (16)	20,570 (16)
20-29	28,500 (18)	5,739 (18)	22,761 (18)
30-39	27,305 (17)	5,460 (17)	21,845 (17)
40-49	26,904 (17)	5,472 (17)	21,432 (17)
50-59	13,532 (8.4)	2,965 (9.1)	10,567 (8.3)
60-69	6,430 (4)	1,363 (4.2)	5,067 (4)
70-79	4,871 (3)	1,060 (3.3)	3,811 (3)
80+			
Sex (%)	M 65,269 (41) / F 95,210 (59)	M 13,259 (41) / F 19,323 (59)	M 52,010 (41) / F 75,887 (59)
CKD stage 3 to 5	1,440 (0.9)	589 (1.8)	851 (0.67)
COPD	3,157 (2)	1,358 (4.2)	1,799 (1.4)
Heart failure	855 (0.53)	359 (1.1)	496 (0.39)
Myocardial infarction	1,207 (0.75)	415 (1.3)	792 (0.62)
Type 2 diabetes mellitus	3,336 (2.1)	1,350 (4.1)	1,986 (1.6)

After adjustment for key covariates (age, sex, CKD Stage 3 to 5, COPD, Heart Failure, Myocardial infarction and T2DM) our model showed that patients exposed to COVID-19 had more than a fourfold increased risk of developing hypertension (adjusted HR=4.01; p<0.001). The estimate remained robust in a sensitivity analysis on a hypertension cohort identified by specific treatment (adjusted HR=3.83; p<0.001. (Figure 1)

Figure 1: The risk of developing hypertension (after adjustment for key covariates)



CONCLUSION AND DISCUSSION

These findings offer valuable insights into primary care settings, demonstrating that even among patients diagnosed with COVID-19 outside of hospitals, there is an increased risk of developing incident hypertension. The study also highlights the effectiveness of Dexter in rapidly generating robust evidence.

This initial analysis will be expanded to account for additional hypertension risk factors, including other cardiovascular diseases, endocrinological and metabolic disorders (e.g., thyroiditis), autoimmune diseases (e.g., lupus), and the potential influence of certain medications.

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