Received: 7 September 2022 | Revised: 10 October 2022 | Accepted: 19 October 2022

DOI: 10.1002/alr.23103

RESEARCH NOTE

The growing burden of long COVID in the United Kingdom: Insights from the UK Coronavirus Infection Survey

Shyam Ajay Gokani MBBS[1] | **Ngan Hong Ta MBBS**[1,2] | **Andreas Espehana MBBS**[1] | **Elizabeth Mairenn Garden MBChB**[1] | **Gabija Klyvyte**[1] | **Louis Luke MBChB**[3] | **Tharsika Myuran MBBS**[4] | **Vinushy Uththerakunaseelan**[1] | **Duncan Cameron Boak BSc**[5] | **Carl Martin Philpott MD**[1,3]

[1]Rhinology & ENT Research Group, Norwich Medical School, University of East Anglia, Norwich Research Park, Norwich, UK

[2]Institute of Head and Neck Studies and Education, University of Birmingham, Birmingham, UK

[3]ENT Department, James Paget University Hospital, Great Yarmouth, Norfolk, UK

[4]ENT Department, Addenbrooke's Hospital, Cambridge, Cambridgeshire, UK

[5]Fifth Sense, Phoenix Business Centre, Barrow in Furness, UK

Correspondence
Shyam Ajay Gokani, Rhinology & ENT Research Group, Norwich Medical School, University of East Anglia, Norwich Research Park, Norwich NR4 7TJ, UK;
E-mail: s.gokani@uea.ac.uk

Potential conflict of interest: None disclosed.

View this article online at wileyonlinelibrary.com.

KEYWORDS
COVID-19, Olfaction Disorders, Taste Disorders

1 | INTRODUCTION

"Long COVID" is defined as symptoms that persist 12 weeks beyond the acute phase of the coronavirus-2019 (COVID-19) infection and is estimated to affect 3.0% to 11.7% of the UK population. Symptoms include headache, myalgia, fatigue, and loss of taste and smell.[1] Parosmia can persist for months after initial infection[2] alongside brain fog and memory loss.[3]

The UK Office for National Statistics (ONS) Coronavirus Infection Survey (CIS) measures the number of people in England, Wales, Northern Ireland, and Scotland who test positive for a COVID-19 to provide national data to help government decision-making and inform the public and media. The aim of this study was to report the prevalence of ear-nose-throat (ENT)-related symptoms of long COVID and the population groups at greatest risk of long COVID from the CIS.

2 | METHODS

Data were drawn from the ongoing UK CIS, which involves longitudinal follow-up of patients identified through repeated cross-sectional national surveys.[4,5] The primary objectives are to estimate prevalence of symptomatic and asymptomatic COVID-19 infection in the general population, and the prevalence of long COVID.

Participants were volunteers aged 2 years or older (no upper age limit), resident in private households randomly

TABLE 1 Prevalence of symptoms of long COVID

Long COVID symptom	Prevalence after >12 weeks of COVID	Prevalence after >4 weeks of COVID[a]
Weakness or tiredness (fatigue)	50.3% [48.4%-52.3%]	51.2% [49.5%-52.9%]
Shortness of breath	33.5% [31.9%-35.0%]	32.9% [31.6%-34.3%]
Loss of smell	31.4% [29.8%-33.0%]	26.4% [25.2%-27.6%]
Difficulty concentrating	25.2% [23.9%-26.5%]	23.4% [22.3%-24.5%]
Muscle ache	23.8% [22.5%-25.0%]	22.7% [21.6%-23.8%]
Headache	21.6% [20.3%-22.9%]	21.7% [20.7%-22.8%]
Cough	17.4% [16.2%-18.4%]	20.7% [19.6%-21.7%]
Loss of taste	23.8% [22.5%-25.2%]	20.6% [19.4%-21.6%]
Memory loss or confusion	20.1% [18.9%-21.3%]	18.7% [17.7%-19.6%]
Trouble sleeping	18.5% [17.4%-19.6%]	17.5% [16.5%-18.4%]
Worry or anxiety	17.2% [16.1%-18.3%]	16.0% [15.1%-17.0%]
Low mood	16.9% [15.8%-18.0%]	15.9% [15.0%-16.8%]
Vertigo or dizziness	13.2% [12.2%-14.2%]	12.6% [11.9%-13.5%]
Chest pain	12.3% [11.3%-13.3%]	11.8% [11.0%-12.6%]
Runny nose or sneezing	10.6% [9.7%-11.5%]	11.1% [10.4%-11.9%]
Noisy breathing (wheezy)	10.8% [9.9%-11.6%]	10.8% [10.0%-11.5%]
Palpitations	10.4% [9.6%-11.3%]	9.6% [8.9%-10.4%]
Sore throat	9.3% [8.4%-10.2%]	9.6% [8.9%-10.3%]
Loss of appetite	8.4% [7.6%-9.2%]	8.0% [7.4%-8.7%]
Abdominal pain	7.3% [6.5%-8.0%]	6.6% [6.0%-7.2%]
Nausea or vomiting	5.4% [4.7%-6.0%]	5.5% [4.9%-6.1%]
Diarrhea	4.4% [3.7%-4.9%]	4.3% [3.8%-4.8%]
Fever	2.8% [2.3%-3.2%]	2.6% [2.3%-3.0%]

Data expressed as mean (confidence interval).

[a]Also includes respondents with an unknown duration of COVID infection (5.8%).

selected from national address lists. Parents and carers responded for children <12 years old. An analysis of responses from March 6, 2022 to April 3, 2022 was performed. COVID-19 positivity was identified through nose and throat swabs and blood samples. Participants who identified themselves as suffering from long COVID were asked about the presence of 23 individual symptoms and the impact of long COVID on their day-to-day activities.[6] Self-reported long COVID was defined as symptoms persisting for >4 weeks after the first suspected coronavirus infection but not explained by another condition.

UK population estimates were derived using a Bayesian multilevel regression post-stratification model with adjustments for age, sex, and region.[4]

3 | RESULTS

Over 362,771 responses were received, of which 10,431 participants self-reported long COVID (an estimated 1.8 million people or 2.8% of the population).[5] A total of 7464 (72%) respondents with long COVID had a previous positive COVID test and the remainder were self-reported. Almost 12% of respondents were aged <17 years and 58.0% >50 years of age, 46.2% were male, and 92.9% were of "white" ethnicity. An estimated 1.3 million people (73%) reported long COVID symptoms >12 weeks after COVID infection.

The duration of symptoms from confirmed or suspected COVID infection was categorized as: 21.3% <12 weeks; 18.0% 12 to <26 weeks; 9.3% 26 to < 39 weeks; 1.4% 39 to <52 weeks; 18.9% 52 to <78 weeks; 12.0% 78 to <104 weeks; 13.1% ≥104 weeks; and 5.8% unknown duration. Of the estimated people with long COVID, 556,000 (31%) first reported confirmed or suspected COVID before the Alpha variant, 249,000 (14%) in the Alpha period, 446,000 (25%) in the Delta period, and 438,000 (24%) in the Omicron period.

Table 1 illustrates the prevalence of long COVID symptoms. Fatigue was the most common, while ENT-related symptoms included dyspnea, loss of smell, loss of taste, vertigo, sore throat, wheezing, rhinorrhea, and sneezing. UK population estimates for the presence of long COVID are demonstrated in Figure 1. Adults aged 35 to 49 years had the highest estimated prevalence of self-reported long

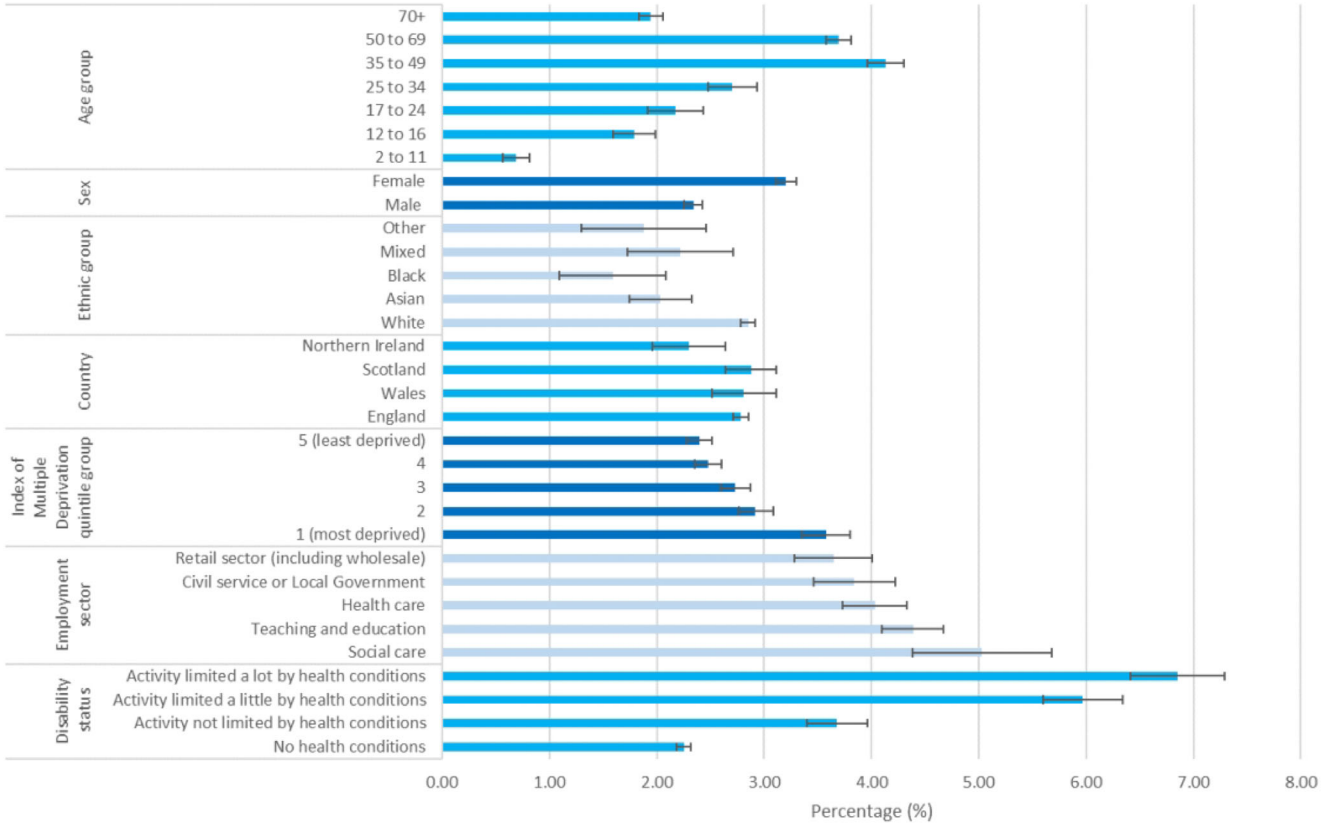

FIGURE 1 Estimated percentage of people living in private households with self-reported long COVID of any duration. UK Coronavirus Infection Survey: 4-week period ending April 3, 2022.[5]

COVID (4.13%; 95% confidence interval [CI], 3.96%-4.30%). The estimated percentage of women with long COVID (3.20%; 95% CI, 3.11%-3.30%) was higher than men (2.34%; 95% CI, 2.25%-2.42%).

Those of white ethnic origin had higher estimated prevalence rates of long COVID (2.85%; 95% CI, 2.78%-2.92%) compared with those of Asian (2.03%; 95% CI, 1.74%-2.33%) or black (1.59%; 95% CI, 1.09%-2.08%) ethnicity. Those in the most deprived index of multiple deprivation quintile group had the highest estimated prevalence of long COVID (3.58; 95% CI, 3.35%-3.80%). Individuals who had pre-existing health conditions and disabilities that limited their activity by a little (5.97%; 95% CI, 5.60%-6.34%) or by a lot (6.85%; 95% CI, 6.41%-7.29%) had a higher estimated prevalence of long COVID compared to those with no other health conditions (2.25%; 95% CI, 2.19%-2.32%).

4 | DISCUSSION

This study identifies ENT-related long COVID symptoms including dyspnea, anosmia, ageusia, vertigo, and sore throat. Groups at increased risk of long COVID include women, and those 35 to 49 years old, of "white" ethnic origin, or with disabilities.

The analysis is strengthened by a large, weighted sample with longitudinal follow-up of participants. However, results can be confounded by nonresponse or dropout relating to the presence or absence of long COVID. The majority of respondents were of white ethnicity, which limits the generalizability of results to other population groups.

The inclusion of symptoms at 4 weeks after COVID infection may overestimate the prevalence of post-COVID syndrome. Therefore, this study has reported separate data for symptom prevalence at >12 weeks and >4 weeks after onset. Furthermore, the survey relies on self-reporting despite a known mismatch between subjective reporting and psychophysical testing of symptoms.[7] Finally, the presence of symptoms such as rhinorrhea, sneezing, and wheezing could relate to individual variants of COVID but specific data on this were not available.

This study confirms previous findings on long COVID symptoms including that individuals with disabilities are at higher risk.[3,8] Future policies should focus on assisting the most vulnerable groups by widening access to chemosensory disorder and long COVID clinics in the

UK.[9] A recent James Lind Alliance Priority Setting Partnership has confirmed that there is still demand for high-quality clinical trials in the management of chemosensory disorders and long COVID.[10] Future researchers should draw on data in this study to identify the most affected population groups.

ACKNOWLEDGMENTS

The CIS was funded by the UK Department of Health and Social Care. The authors of this report received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

DATA AVAILABILITY STATEMENT

All data used in this article is publicly available from the UK CIS (https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/bulletins/prevalenceofongoingsymptomsfollowingcoronaviruscovid19infectionintheuk/6may2022#main-points).

DATA ACCESS, RESPONSIBILITY, AND ANALYSIS

Shyam Ajay Gokanihad full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. Data were drawn from the publicly available UK CIS.

PATIENT AND PUBLIC INVOLVEMENT STATEMENT

This report was prepared following consultation with patient groups including the charity "Fifth Sense" for people affected by smell and taste disorders. Advice from members of the charity was taken at all stages and guided the reported outcomes to extend beyond purely anosmia to other chemosensory symptoms.

ETHICAL STATEMENT

The CIS was given ethical approval by South Central-Berkshire B Research Ethics Committee (20/SC/0195).

ORCID

Shyam Ajay Gokani MBBS https://orcid.org/0000-0003-4320-0961

Ngan Hong Ta MBBS https://orcid.org/0000-0002-8747-5329

Carl Martin Philpott MD https://orcid.org/0000-0002-1125-3236

REFERENCES

1. *Technical Article: Updated Estimates of the Prevalence of Post-Acute Symptoms among People with Coronavirus (COVID-19) in the UK*. Office for National Statistics. Accessed June 17, 2022. https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/articles/technicalarticleupdatedestimatesoftheprevalenceofpostacutesymptomsamongpeoplewithcoronaviruscovid19intheuk/26april2020to1august2021
2. Bussière N, Mei J, Lévesque-Boissonneault C, et al. Chemosensory dysfunctions induced by COVID-19 can persist up to 7 months: a study of over 700 healthcare workers. *Chem Senses*. 2021;46:bjab038.
3. Ohla K, Veldhuizen MG, Green T, et al. A follow-up on quantitative and qualitative olfactory dysfunction and other symptoms in patients recovering from COVID-19 smell loss. *Rhinology*. 2022.
4. Pouwels KB, House T, Pritchard E, et al. Community prevalence of SARS-CoV-2 in England from April to November, 2020: results from the ONS Coronavirus Infection Survey. *Lancet Public Health*. 2021;6(1):e30-e38.
5. *Prevalence of Ongoing Symptoms following Coronavirus (COVID-19) Infection in the UK*. Office for National Statistics. Accessed August 3, 2022. https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/bulletins/prevalenceofongoingsymptomsfollowingcoronaviruscovid19infectionintheuk/6may2022#measuring-the-data
6. Ayoubkhani D, Bermingham C, Pouwels KB, et al. Trajectory of long covid symptoms after covid-19 vaccination: community based cohort study. *BMJ*. 2022;377:e069676.
7. Philpott CM, Wolstenholme CR, Goodenough PC, Clark A, Murty GE. Comparison of subjective perception with objective measurement of olfaction. *Otolaryngol Head Neck Surg*. 2006;134(3):488-490.
8. Ayoubkhani D, Khunti K, Nafilyan V, et al. Post-covid syndrome in individuals admitted to hospital with covid-19: retrospective cohort study. *BMJ*. 2021;372:n693.
9. Ball S, Boak D, Dixon J, Carrie S, Philpott CM. Barriers to effective health care for patients who have smell or taste disorders. *Clin Otolaryngol*. 2021;46(6):1213-1222.
10. Philpott CM, Espehana A, Garden M, et al. Establishing UK research priorities in smell and taste disorders: a James Lind alliance priority setting partnership. *Clin Otolaryngol*. 2022. https://doi.org/10.1111/coa.139858

How to cite this article: Gokani SA, Ta NH, Espehana A, et al. The growing burden of long COVID in the United Kingdom: Insights from the UK Coronavirus Infection Survey. *Int Forum Allergy Rhinol*. 2022;1-4. https://doi.org/10.1002/alr.23103