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Risk of Long COVID Symptoms and Conditions After SARS-CoV-2 Compared to Other Respiratory Viral Infections: A Systematic Review and Meta-Analysis

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BACKGROUND

- Long COVID incidence and symptoms remain unclear due to selection biases, heterogeneous study methods, and lack of control groups.
- Comparing post-acute sequelae of COVID-19 (PASC) with post-acute infection syndromes (PAIS) from other respiratory viruses helps clarify whether Long COVID is SARS-CoV-2–specific or a general post-infectious response.
- We conducted a systematic review and meta-analysis to assess the risk of Long COVID in adults after SARS-CoV-2 compared with other respiratory viral infections.

SUMMARY

SARS-CoV-2 increases the risk of some long-term symptoms and conditions, but many 'Long COVID' features equally occur after other respiratory viral infections.

METHODS

- Study selection: PRISMA flowchart of cohort studies with ≥3 months follow-up.
- Comparison: Persistent symptoms/conditions consistent with Long COVID in adults with SARS-CoV-2 vs. other respiratory viral infections.
- Quality assessment: Newcastle–Ottawa Scale.
- Registration: PROSPERO CRD42024560894.
- Meta-analysis: Random-effects model; heterogeneity assessed with I^2. Only outcomes reported in ≥3 studies were included in the pooled analysis.

RESULTS

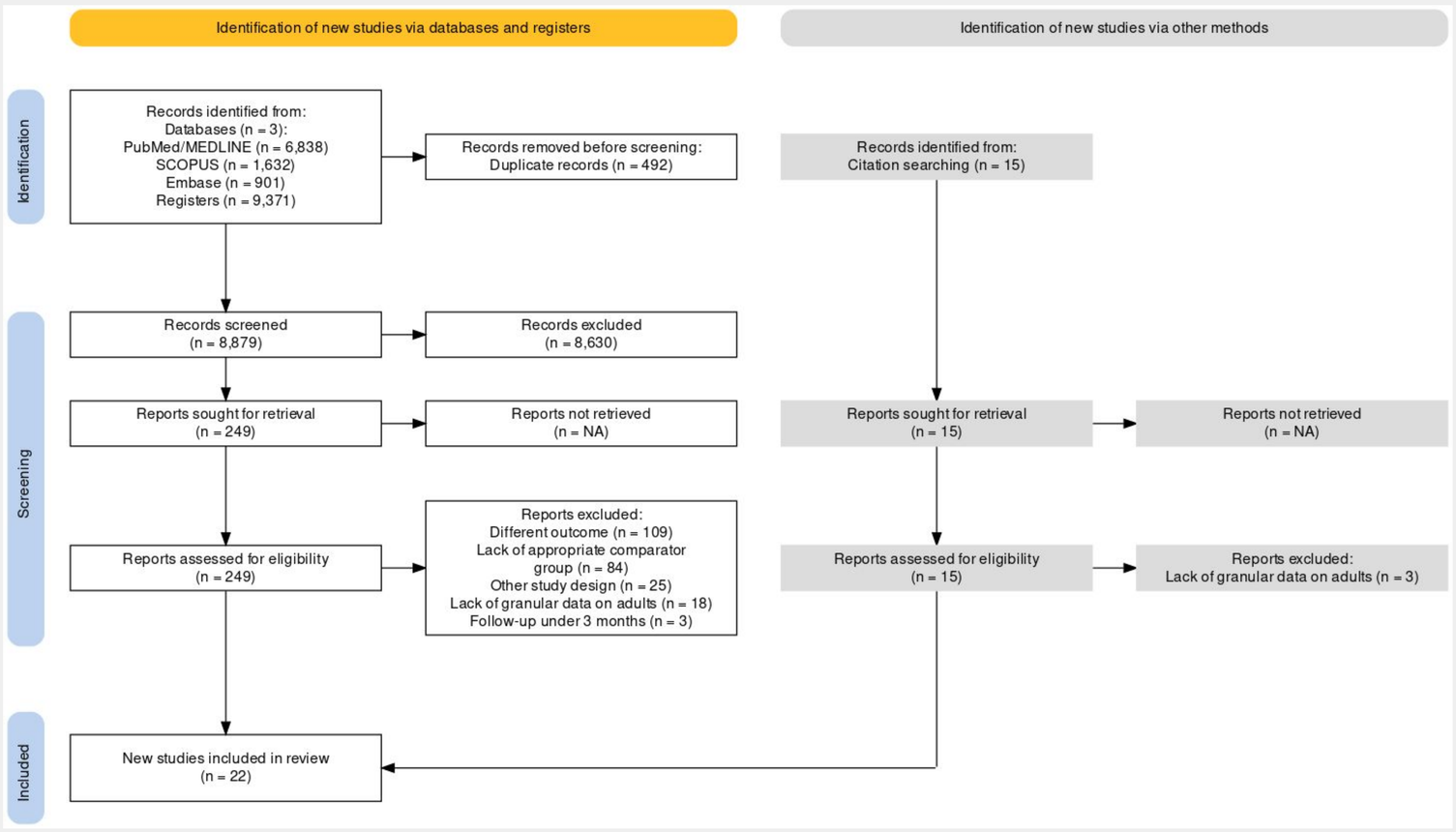

Figure 1. PRISMA flowchart of study selection and screening for cohort studies.

Condition	RR [95% CI]	N	I^2
Pulmonary embolism	1.767 [1.185 – 2.634]	5	95%
Abnormal breathing	1.593 [1.224 – 2.074]	7	100%
Myoneural Disorders	1.465 [0.650 – 3.301]	3	0%
Chest/throat pain	1.424 [0.702 – 2.888]	5	96%
Fatigue/malaise	1.395 [1.211 – 1.607]	10	99%
Memory loss/brain fog	1.342 [1.140 – 1.580]	10	93%
Loss of taste/smell	1.319 [0.609 – 2.856]	8	99%
Cerebrovascular disorders (unspecified)	1.254 [0.764 – 2.058]	5	99%
Heart Rate Abnormalities	1.241 [1.000 – 1.540]	4	92%
Palpitations	1.232 [1.076 – 1.410]	4	53%
Respiratory Failure	1.189 [0.509 – 2.775]	3	98%
Hemorrhagic stroke	1.168 [0.989 – 1.379]	4	16%
Acute Coronary Syndrome	1.146 [0.749 – 1.754]	4	97%
Diabetes mellitus type 2 (DM Type 2)	1.106 [0.872 – 1.403]	4	94%
Visual and Auditory Disturbance	1.099 [0.908 – 1.330]	3	36%
Ischemic stroke	1.072 [0.743 – 1.548]	4	72%
Movement disorders	1.066 [0.240 – 4.745]	3	97%
Sleep disorders	1.054 [0.942 – 1.179]	6	67%
Anxiety/depression	1.038 [0.874 – 1.234]	5	90%
Seizure/epilepsy	1.004 [0.673 – 1.499]	4	92%
Myalgia/arthralgia	0.998 [0.876 – 1.136]	6	97%
Cough	0.959 [0.678 – 1.356]	4	96%
Peripheral neuropathy	0.956 [0.639 – 1.428]	6	99%
Headache/migraine	0.935 [0.702 – 1.246]	9	99%

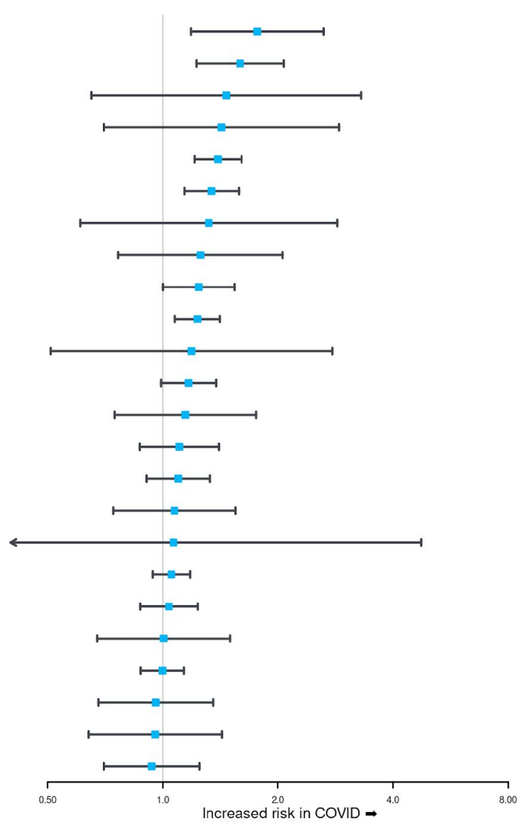

Figure 2. Forest plot of pooled relative risks of persistent symptoms or conditions of Long COVID after SARS-CoV-2 infection compared to other respiratory viral infections (n=7,928,523 participants; 14 studies).

RESULTS

- Studies included: 22 total; 14 provided sufficient data for the meta-analysis (Fig. 1).
- Meta-analysis participants (pooled): 7,928,523 (Fig. 2).
- Study quality (Newcastle–Ottawa Scale): 9 points — 7 studies; 8 points — 13 studies; 7 points — 2 studies.

CONCLUSIONS

- Pulmonary embolism, abnormal breathing, fatigue, memory loss/brain fog, palpitations, and heart rate abnormalities showed an increased aggregated risk after SARS-CoV-2 infection compared to non-SARS-COV-2 respiratory viruses.
- Other long term symptoms and conditions usually assumed to be specific to PASC were similarly frequent in other PAIS.
- Additional evidence is required to differentiate PASC from PAIS associated with non-SARS-COV-2 respiratory viruses.
- Clarifying this distinction is critical to advancing research on pathophysiology, biomarkers, and treatment, while also contributing to broader recognition of PAIS.

AFFILIATIONS

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