

# INPLASY PROTOCOL

To cite: Gui et al. Prevalence of poor sleep quality in COVID-19 patients: a systematic review and meta-analysis. Inplasy protocol 202320121. doi: 10.37766/inplasy2023.2.0121

Received: 28 February 2023

Published: 28 February 2023

**Corresponding author:**  
ZHEN GUI

yc27624@um.edu.mo

**Author Affiliation:**  
University of Macau.

**Support:** The study was supported by the University of Macau (MYRG2019-00066-FHS; MYRG2022-00187-FHS).

**Review Stage at time of this submission:** Preliminary searches.

**Conflicts of interest:**  
None declared.

## Prevalence of poor sleep quality in COVID-19 patients: a systematic review and meta-analysis

Gui, Z<sup>1</sup>; Wang, YY<sup>2</sup>; Li, JX<sup>3</sup>; Xiang, YT<sup>4</sup>.

**Review question / Objective:** The inclusion criteria for this study are based on the PICOS acronym: Participants (P): COVID-19 patients based on positive Coronavirus RT-PCR (reverse transcription-polymerase chain reaction) of nasopharyngeal and oropharyngeal swabs or a history of COVID-19 infection. Following previous research, the COVID-19 patients in this study will include the period of COVID-19 infection, symptom onset, recovery, and the onset of post-acute COVID-19 symptoms. Interventions (I): not applicable; Comparisons (C): healthy controls in comparative studies, or not applicable to epidemiological surveys; Outcome (O): the prevalence of poor sleep quality (PSQ) or available data could yield the prevalence of PSQ in COVID-19 patients. Sleep quality in COVID-19 patients will be assessed using standardized scales such as the Pittsburgh Sleep Quality Index (PSQI); Study design (S): epidemiological and comparative studies (only the baseline data of cohort study will be extracted).

**INPLASY registration number:** This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 28 February 2023 and was last updated on 28 February 2023 (registration number INPLASY202320121).

### INTRODUCTION

**Review question / Objective:** The inclusion criteria for this study are based on the PICOS acronym: Participants (P): COVID-19 patients based on positive Coronavirus RT-PCR (reverse transcription-polymerase chain reaction) of nasopharyngeal and oropharyngeal swabs or a history of

COVID-19 infection. Following previous research, the COVID-19 patients in this study will include the period of COVID-19 infection, symptom onset, recovery, and the onset of post-acute COVID-19 symptoms. Interventions (I): not applicable; Comparisons (C): healthy controls in comparative studies, or not applicable to epidemiological surveys; Outcome (O): the

prevalence of poor sleep quality (PSQ) or available data could yield the prevalence of PSQ in COVID-19 patients. Sleep quality in COVID-19 patients will be assessed using standardized scales such as the Pittsburgh Sleep Quality Index (PSQI); Study design (S): epidemiological and comparative studies (only the baseline data of cohort study will be extracted).

**Condition being studied:** Participants (P): COVID-19 patients based on positive Coronavirus RT-PCR (reverse transcription-polymerase chain reaction) of nasopharyngeal and oropharyngeal swabs or a history of COVID-19 infection. Following previous research, the COVID-19 patients in this study will include the period of COVID-19 infection, symptom onset, recovery, and the onset of post-acute COVID-19 symptoms. Interventions (I): not applicable; Comparisons (C): healthy controls in comparative studies, or not applicable to epidemiological surveys.

## METHODS

**Search strategy:** This meta-analysis will be conducted based on the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) and Meta-analysis of Observational Studies in Epidemiology (MOOSE) recommendations. Three researchers (ZG, YY-W, and JX-L) will independently retrieve relevant literature in PubMed, Web of Science, Embase, and PsycINFO databases, with the following search terms: (SARS-CoV-2 [MeSH] OR SARS Coronavirus 2 OR Coronavirus 2, SARS OR Coronavirus Disease 2019 Virus OR 2019 Novel Coronavirus OR 2019 Novel Coronaviruses OR Coronavirus, 2019 Novel OR Novel Coronavirus, 2019 OR SARS-CoV-2 Virus OR SARS CoV 2 Virus OR SARS-CoV-2 Viruses OR Virus, SARS-CoV-2 OR 2019-nCoV OR COVID-19 Virus OR COVID 19 Virus OR COVID-19 Viruses OR Virus, COVID-19 OR COVID19 Virus OR COVID19 Viruses OR Virus, COVID19 OR Viruses, COVID19 OR 2019 novel coronavirus infection OR COVID19 OR coronavirus disease 2019 OR coronavirus disease-19 OR 2019-nCoV disease OR 2019 novel coronavirus disease OR 2019-nCoV

infection OR COVID-19 patients OR COVID-19 patient OR COVID-19 survivor) AND (Sleep Quality [MeSH] OR Qualities, Sleep OR Quality, Sleep OR Sleep Qualities OR quality of sleep OR sleeping quality OR pittsburgh sleep quality index OR PSQI).

**Participant or population:** COVID-19 patients based on positive Coronavirus RT-PCR (reverse transcription-polymerase chain reaction) of nasopharyngeal and oropharyngeal swabs or a history of COVID-19 infection. Following previous research, the COVID-19 patients in this study will include the period of COVID-19 infection, symptom onset, recovery, and the onset of post-acute COVID-19 symptoms.

**Intervention:** Not applicable.

**Comparator:** Healthy controls in comparative studies, or not applicable to epidemiological surveys.

**Study designs to be included:** Epidemiological and comparative studies (only the baseline data of cohort study will be extracted).

**Eligibility criteria:** Exclusion criteria are as follows: (1) non-English language; (2) studies that will only use some items, rather than the full version of a standardized scales on sleep quality; (3) as recommended in a previous meta-analysis, studies conducted in patients with sleep-related disorders will be excluded to avoid selection bias. If a dataset is used in multiple papers, only the paper with the complete information will be included in this meta-analysis.

**Information sources:** Three researchers (ZG, YY-W, and JX-L) will independently retrieve relevant literature in PubMed, Web of Science, Embase, and PsycINFO databases. This meta-analysis will be conducted based on the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) and Meta-analysis of Observational Studies in Epidemiology (MOOSE) recommendations.

**Main outcome(s):** The prevalence of poor sleep quality (PSQ) or available data could yield the prevalence of PSQ in COVID-19 patients. Sleep quality in COVID-19 patients will be assessed using standardized scales such as the Pittsburgh Sleep Quality Index (PSQI).

**Additional outcome(s):** Pooled prevalence of poor sleep quality, PSQI global and component score in COVID-19 patients; Odds Ratio for poor sleep quality between COVID-19 patients and healthy controls; Subgroup and meta-regression analyses of COVID-19 patients.

**Data management:** Three researchers (ZG, YY-W, and JX-L) independently will retrieve relevant literature in PubMed, Web of Science, Embase, and PsycINFO databases. The same three researchers will independently screen the titles and abstracts of all relevant publications, then read the full texts to determine eligibility. Any disagreement will be resolved by consensus among the three researchers or by discussion with a senior researcher (YT-X).

**Quality assessment / Risk of bias analysis:** For epidemiological studies, study quality will be assessed using an eight-item assessment instrument with a scale of 0-8, where studies with scores of 0-3, 4-6, and 7-8 are considered 'low quality', 'moderate quality', and 'high quality', respectively. Study quality of comparative studies will be assessed using the Newcastle-Ottawa Scale (NOS). The NOS included eight items in three categories. In addition to the maximum of 2 stars for comparability, the remaining items could be rated up to 1 star, with a full score of 9 stars. Therefore, the NOS total score in this study ranges from 1 to 9 points, with a higher score indicating higher quality.

**Strategy of data synthesis:** All data analyses will be performed using R software (version 4.2.2; <https://www.r-project.org>) with the "meta" package. The random-effects model will be used to estimate the pooled prevalence of poor sleep quality (PSQ) with the corresponding

95% confidence intervals (95% CIs). The I<sup>2</sup> statistic will be used to assess the heterogeneity of the study, with I<sup>2</sup> greater than 50% indicating high heterogeneity. If there are at least 10 studies, meta-regression analyses will be performed for the following continuous variable: sample size, mean age (year), male proportion, married proportion, smoking proportion, average days at hospitalization, ICU admission proportion, quality score, and the prevalence of anxiety and depression.

**Subgroup analysis:** Subgroup analyses will be performed based on the following categorical variables if there are at least 3 studies in each subgroup: cut-off values of standard scales on sleep quality, income levels by country (i.e., High income, vs. upper middle income, vs. lower middle income) according to the World Bank standard (<https://www.worldbank.org>), assessment method (e.g., online survey vs. face-to-face interview), day zero (e.g., symptom onset vs. hospital discharge vs. hospital admission of COVID-19 patients), study design, gender, and sampling method.

**Sensitivity analysis:** Sensitivity analysis examined the consistency of preliminary results by excluding studies one by one. Significant level was set at  $p < 0.05$  (two-tailed). Funnel plot and Egger's test will be used to examine the publication bias.

**Language restriction:** Only English articles are included in this meta-study.

**Country(ies) involved:** Macau, China.

**Keywords:** poor sleep quality; COVID-19 patients; meta-analysis; prevalence.

**Contributions of each author:**

Author 1 - ZHEN GUI - Author 1 ZHEN GUI will participate in the entire research process and draft the manuscript, and will participate in literature retrieval, screening, reading the full text and data analysis.

Email: [yc27624@um.edu.mo](mailto:yc27624@um.edu.mo)

Author 2 - Yue-Ying WANG - Author 2 will participate in the literature retrieval, screening and reading of the full text.

---

Email: mc25805@um.edu.mo

Author 3 - Jia-Xin Li - Author 3 will participate in the literature retrieval, screening and reading of the full text.

Email: mc25810@umac.mo

Author 4 - Yu-Tao XIANG - Author 4 will be involved in the guidance of the whole study, including study design, study process and data analysis guidance, manuscript revision, etc.

Email: ytxiang@um.edu.mo