Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Significant association between ischemic heart disease and elevated risk for COVID-19 mortality: A meta-analysis

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A number of previous papers have examined the association between ischemic heart disease (IHD) and the risk for mortality among patients with coronavirus disease 2019 (COVID-19), but there have been inconsistent findings across studies. For example, a few studies have found that there was a significant association between IHD and an elevated risk for COVID-19 mortality [1,2], but some other studies have concluded that IHD was not significantly associated with the risk for COVID-19 mortality [3,4]. Therefore, we performed this quantitative meta-analysis to determine whether there was a significant association between IHD and COVID-19 mortality or not. Gender, age and several comorbidities have been documented to affect the clinical outcomes of COVID-19 patients [5-8], indicating that those variables might affect the relationship between IHD and the risk for COVID-19 mortality. Taken together, the pooled effect on the relationship between IHD and COVID-19 mortality was estimated on the basis of adjusted effects in this meta-analysis.

We searched PubMed, Web of Science and EMBASE up to February 20, 2022 by using the following keywords: ("SARS-CoV-2" or "COVID-19" or "2019-nCoV") and ("ischemic heart disease") and ("death" or "mortality" or "fatality" or "deceased" or "non-survivor"). Studies were considered eligible if they evaluated the association between IHD and COVID-19 mortality based on adjusted effects. Case reports, review papers, errata, duplications, comments and studies reporting un-adjusted effects were excluded. The additional eligible articles were identified through reading the references of the included studies or related reviews.

We applied R software for this meta-analysis. Heterogeneity was measured using I^2 statistic. The pooled effect size was calculated by appropriate analysis model. If significant heterogeneity was observed ($I^2 > 50\%$, $P < 0.1$), the random effects model was used; otherwise, the fixed effects model was used. Sensitivity analysis was used to assess the stability of our results. Publication bias was evaluated by Begg's test and Egger's test. $P < 0.05$ was considered statistically significant.

A total of 36 studies (335, 720 cases) were included in this meta-analysis (Supplementary Table 1). Our meta-analysis demonstrated that there was a significant association between IHD and an elevated risk of COVID-19 mortality (pooled effect size = 1.27, 95% confidence interval (CI) [1.17–1.38]; Fig. 1A). The significant association was also observed in the subgroup analyses by cases (pooled effect size = 1.22, 95% CI [1.11–1.33] for ≥ 1000 and pooled effect size = 1.62, 95% CI [1.29–2.05] for < 1000), region (pooled effect size = 1.77, 95% CI [1.33–2.36] for Asia; pooled effect size = 1.15, 95% CI [1.07–1.23] for North America and pooled effect size = 1.22, 95% CI [1.10–1.36] for Europe), study design (pooled effect size = 1.37, 95% CI [1.21–1.56] for retrospective studies and pooled effect size = 1.15, 95% CI [1.10–1.20] for prospective studies), setting (pooled effect size = 1.16, 95% CI [1.06–1.27] for all patients and pooled effect size = 1.33, 95% CI [1.20–1.48] for hospitalized patients), age (pooled effect size = 1.27, 95% CI [1.13–1.43] for age ≥ 60 and pooled effect size = 1.39, 95% CI [1.17–1.64] for age < 60) and proportion of males (pooled effect size = 1.31, 95% CI [1.19–1.45] for ≥ 50% and pooled effect size = 1.20, 95% CI [1.08–1.33] for < 50%). Sensitivity analysis showed that our results were stable (Fig. 1B). Publication bias was found in Begg's test ($P = 0.027$) and Egger's test ($P = 0.002$).

In summary, our meta-analysis showed that IHD was significantly associated with an increased risk for death among COVID-19 patients. Further well-designed studies with large sample sizes are required to verify the findings of our present study.

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ajem.2022.03.010.

Statements and declarations

All authors report that they have no potential conflicts of interest.

Author contributions

Haiyan Yang and Yadong Wang conceptualized the study. Ruiying Zhang and Yuqing Hao performed literature search and data extraction. Ruiying Zhang, Yuqing Hao and Yadong Wang analyzed the data. Ruiying Zhang wrote the manuscript. All the authors approved the final manuscript.

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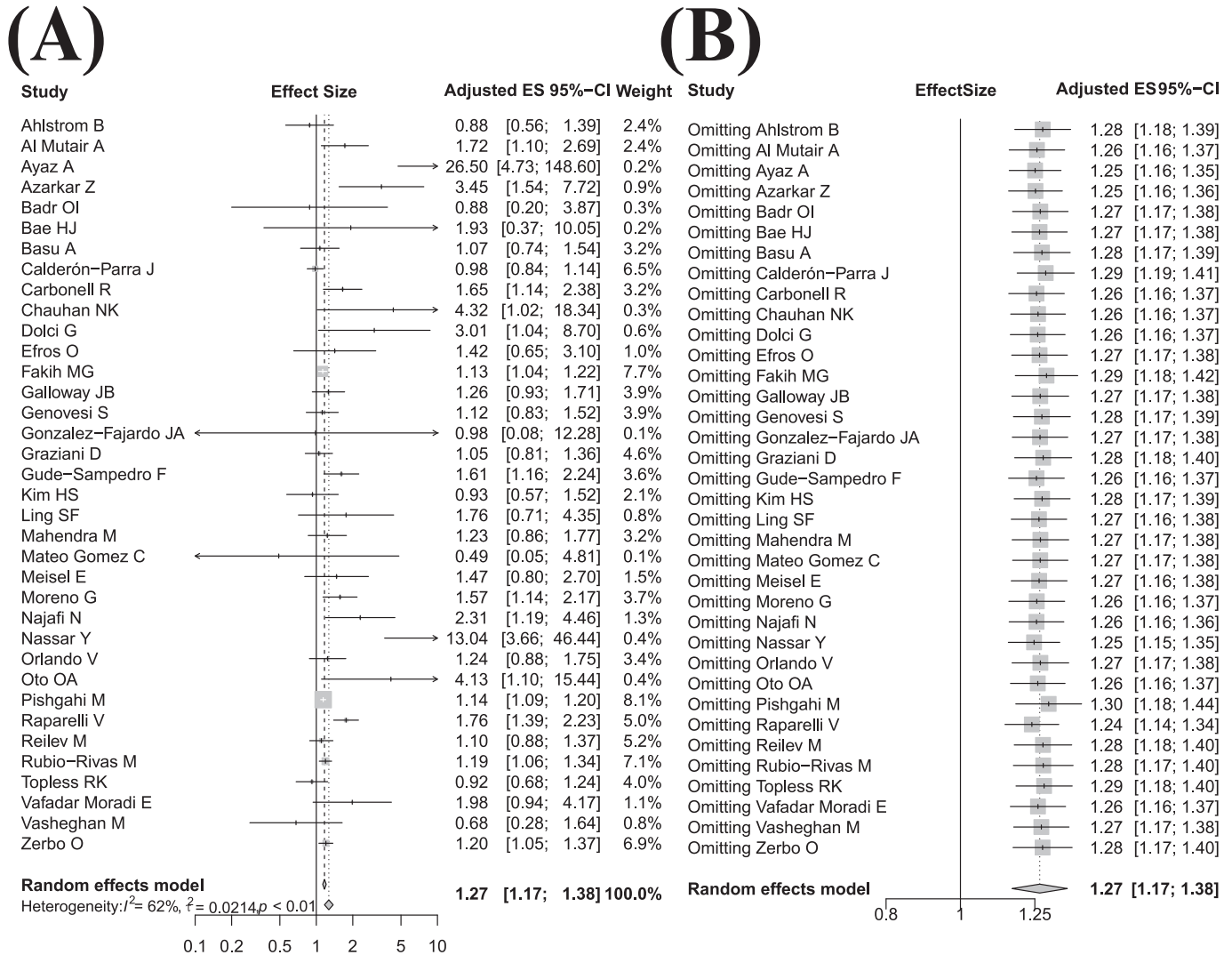

Fig. 1. Forest plot demonstrated the significant association between ischemic heart disease (IHD) and the elevated risk for mortality among coronavirus disease 2019 (COVID-19) patients (A) and leave-one-out sensitivity analysis exhibited the stability of our results (B).

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Data availability statement

The data that support the findings of this study are included in this article and available from the corresponding author upon reasonable request.

Ethics approval

Not applicable.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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