Received: 31 January 2021 | Accepted: 18 February 2021

DOI: 10.1111/obr.13250

LETTER TO THE EDITOR

OBESITY Reviews WILEY

Impact of obesity on COVID-19-related mortality: A comment on estimates in Popkin et al 2020

Dear Sir,

The COVID-19 pandemic has been unprecedented in the speed at which information has emerged regarding potential risk factors. In late March/early April, only 3 months after the pandemic started, it emerged from early analyses that one such factor might be obesity status.[1] Popkin et al.[2] have provided a valuable summary and meta-analysis of studies performed up to around August 2020 on this issue, concluding that obesity (BMI > 30) increases the risk of infection with Sars-Cov2 (odds ratio [OR] = 1.46, 95% CI 1.3–1.65), severity of the COVID-19 disease as judged by ICU admission (OR = 1.74, CI 1.46–2.08) and COVID-19-related mortality (OR = 1.48, CI 1.22–1.80). I am interested in this latter effect because I have previously published that fat deposition may have evolved as a protective mechanism against infectious disease-related mortality[3]; hence, these data go against that hypothesis. The meta-analysis for mortality includes 35 studies of mortality that have widely differing effects. Fifteen studies showed an increased risk of mortality linked to obesity, 16 studies showed no significant effect and four studies showed that obesity was protective.

Since the four studies showing obesity was protective matched my previous hypothesis, I was interested to see what factors may have resulted in these papers finding results that contrasted the other papers that showed obesity was irrelevant or detrimental. To my surprise in all four papers there was actually no evidence for a protective effect.

The four papers in question were Goyal et al.,[4] Shah et al.,[5] Kim et al.[6] and ICARNS.[7] The latter was presumably a typo for ICNARC. The ICNARC report for July 2020 includes a Cox-proportional hazard ratio plot for mortality that clearly shows the hazard ratio increases rather than decreases in relation to BMI (fig. 20). I could not find anywhere in the report the OR cited in tab. 7 by Popkin et al.[2] of 0.82 (CI 0.74–0.92). The paper by Goyal et al.[4] concerned 393 patients from New York city. At the time of writing that paper, the outcome for 93 of the patients was unknown as they were still hospitalized. Hence, no ORs were calculated for mortality in the paper or supplementary materials. The paper shows an increased risk of being placed on mechanical ventilation in patients with BMI > 30. The unadjusted risk for being placed on mechanical ventilation attached to BMI > 30 calculated from tab. 1 in that paper is 1.36. Shah et al.[5] studied 522 patients in rural Georgia of which 92 died. The OR for the effect of grade I/II obesity (BMI = 30–40) was 1.49 (CI 0.79–2.77) and for grade III obesity (BMI > 40) was 2.29 (CI 1.11–4.69). The value in fig. 7 of Popkin et al.[2] for the effect of obesity from the same study is 0.63 (CI 0.4–0.99) and appears nowhere in the paper. Finally, the cited work by Kim et al.[8] was to an unreviewed preprint from medRxiv. This has been subsequently published in a peer-reviewed journal. In the reviewed paper, obesity is cited as having an adjusted OR for ICU admission and death of 1.31 (CI 1.16–1.47). The value of 0.69 (CI 0.55–0.86) attributed to this paper by Popkin et al.[2] appears nowhere in the paper (or preprint).

Given these errors, I checked all the other sources cited in Popkin et al.[2] (tab. 7). There are numerous discrepancies in the cited OR values compared to those in the original papers, and in one case, the original paper has been withdrawn. However, in none of the other citations is the effect of obesity reversed in tab. 7 relative to what is shown in the original paper. It is unclear where the estimated ORs in Popkin et al.[2] (tab. 7) that show obesity has a protective effect against mortality come from. However, I conclude from examination of these papers that there is no published evidence that obesity is protective against COVID-19 mortality and that by including these four erroneous values in their meta-analysis, Popkin et al.[2] may have underestimated its true impact.

Sincerely,

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