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Maternal and paternal exposure to low dose radiation and adverse birth outcomes: preliminary findings from a systematic review and meta-analysis

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Exposure to ionizing radiation is recognized to increase the risk of cancer and cardiovascular disease, while the impacts on adverse birth outcomes are less understood. We undertook a systematic review and a meta-analysis to summarize the epidemiological literature of maternal and paternal exposure to radiation (<5 Gy) and birth outcomes including preterm birth, miscarriage, and low birthweight. This systematic review adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Liberati et al., 2009). The Population, Exposure, Comparison, Outcome (PECO) framework (Morgan et al., 2007) was followed to help plan the systematic review components, and our literature search included papers published between January 1st, 1990, and June 30th, 2021. Our search included studies of those exposed to radiation from nuclear disasters, occupationally, medical sources radiation, and individuals who lived near nuclear power plants. The literature search was conducted using four databases (PubMed, Environmental Index, GeoBASE, and the Cumulative Index to Nursing and Allied Health Literature). A quality assessment of the studies was completed, and a meta-analysis was performed to generate summary measures of association using random effects models. Forest plots were generated and we evaluated the potential for publication bias with funnel plots. A total of 26 studies were identified and formed the basis of our meta-analysis. Of these, 10 studies evaluated low birthweight as an outcome. The summary meta-regression odds ratio associated with having a low birthweight child among those exposed to radiation was 1.43 (95% CI: 1.00 –2.03) relative to those who were unexposed. The corresponding funnel plots were asymmetric suggesting the potential for publication bias. Meta-analyses of other adverse birth outcomes including miscarriage, and spontaneous abortion are currently underway, and will be presented at the conference. The findings from our review suggest that exposure to ionizing radiation may increase the risk of adverse birth outcomes, though these associations should be interpreted cautiously due to a small number of studies, and potential publication bias.

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