

Exposure to micro- and nanoplastics and human reproductive outcomes: a systematic review

Kathryn Hunt¹, Anna Davies², Abigail Fraser², Christy Burden¹, Amy Howell³, Kirsten Buckley⁴, Sam Harding¹, and Danya Bakhbakhi¹

¹North Bristol NHS Trust

²University of Bristol Medical School

³University of Bristol Faculty of Health Sciences

⁴North Bristol NHS Trust Learning and Resource Centre

July 1, 2023

Abstract

Background: Micro- and nanoplastics are novel pollutants which have been detected in human tissues including placenta and fetal meconium. However, their association with adverse fertility or pregnancy outcomes in humans is not known. **Objectives:** To synthesise evidence for the presence of micro- and nanoplastics in human reproductive tissue and their associations with environmental exposures and reproductive outcomes. **Search Strategy:** Medline, Embase, Emcare, CINAHL, ClinicalTrials.gov and ICTRP were searched from inception to 03/02/2023. **Selection Criteria:** Studies of human participants, assessing presence of micro- and nanoplastics in reproductive tissues, environmental exposures to micro- and nanoplastics, and fertility or pregnancy-related outcomes. **Data Collection and Analysis:** Two independent reviewers selected studies and extracted data on study characteristics, microplastics detected, environmental exposures, reproductive outcomes, and risk of bias. Narrative synthesis was performed due to methodological heterogeneity. **Main Results:** Of 1094 citations, seven studies were included, covering 96 participants. Microplastics were detected in 68 out of 96 placentas examined across all studies, and in all 14 meconium samples. Two studies reported associations between lifestyle factors (daily water intake, use of scrub cleanser or toothpaste, bottled water and takeaway food) and placental microplastics. One study reported associations between meconium microplastics and microbiota diversity and composition. One reported placental microplastics levels correlated with reduced birth weights and 1-minute Apgar scores. All studies had a very high risk of bias. **Conclusions:** There is a need for high-quality observational studies to assess the effects of microplastics on human reproductive health. **Funding:** None received **Keywords:** microplastics, nanoplastics, pregnancy, fertility, environmental pollution

Hosted file

Exposure to micro- and nanoplastics and human reproductive outcomes_ a systematic review.docx available at <https://authorea.com/users/634814/articles/652516-exposure-to-micro-and-nanoplastics-and-human-reproductive-outcomes-a-systematic-review>

Hosted file

Figure 1 - PRISMA flow diagram.docx available at <https://authorea.com/users/634814/articles/652516-exposure-to-micro-and-nanoplastics-and-human-reproductive-outcomes-a-systematic-review>

Hosted file

Table 1 - characteristics and findings of included studies.docx available at <https://authorea.com/users/634814/articles/652516-exposure-to-micro-and-nanoplastics-and-human-reproductive-outcomes-a-systematic-review>

human-reproductive-outcomes-a-systematic-review

Hosted file

Table 2 - risk of bias of included studies.docx available at <https://authorea.com/users/634814/articles/652516-exposure-to-micro-and-nanoplastics-and-human-reproductive-outcomes-a-systematic-review>