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Editorial: Environmental threats to human reproduction

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Editorial on the Research Topic

Environmental threats to human reproduction

The human reproduction involves a cascade of complex events that is controlled by several social, biological, and environmental factors. Environmental factors include heavy metals such as arsenic and lead (1–3), pesticides (4), industrial chemicals like phthalates and bisphenol A (5–7), infection (8), and endocrine disruptors which include pharmaceuticals (9). Environmental toxicants disrupt menstrual cycles, and reduce ovarian reserve and oocyte quality (10, 11). These toxicants also reduce circulating testosterone and sperm quality (12).

More so, these stressors influence pregnancy outcomes. They induce miscarriage and stillbirth, birth defects, preterm birth and low birth weight, and neurodevelopmental disorders (13, 14).

These environmental stressors act via multiple pathways. First, they disrupt the endocrine system by mimicking or blocking sex hormones (15). They may also induce oxidative stress by upregulating the generation of free radicals and suppressing antioxidants (16, 17), trigger inflammation and immune response (18, 19), and promote genotoxicity (20). This Research Topic provides emerging evidences linking environmental toxicants with human reproduction.

Wu et al. reviews the impact of taxanes on ovarian function in women and analyzed the possible reasons for different outcomes. They reported that taxanes-induced ovarian damage is associated with abnormal cell division, follicular cell apoptosis, and reactive oxygen species accumulation. Pan et al. observed an inverted U-shaped association of blood lead levels with oestrogen and a U-shaped association between blood lead levels and sex hormone-binding globulin in female adolescent, indicating that adjusting blood lead exposure to mitigate the effects of lead on growth and development is important for adolescents. He and Wan demonstrated a positive association between smoking and elevated infertility risk.

In a meta-analysis by Hamed et al., it was observed that organophosphate pesticides reduced sperm quality via a testosterone-independent mechanism. Odetayo et al. reported that omega 3 fatty acid attenuated bisphenol F-induced reductions in testosterone and

sperm quality by downregulating oxidative stress, inflammation, and apoptosis. [Sustarsic et al.](#) observed in a meta-analysis that lifestyle intervention may be beneficial in overweight and obese women diagnosed with infertility by improving ovulation, chances of pregnancy, and rate of live births.

[Yao et al.](#) demonstrated a positive association between phthalate exposure and antral follicular count, suggesting that this plasticizer may promote primordial follicle recruitment and depletion of ovarian reserve. [Wang et al.](#) demonstrated an inverse association between Life's simple 7 (LS7) metric scores and infertility. They showed that higher LS7 scores are associated with reduced fertility among women between 18 and 44 years. This finding provides a novel evidence linking cardiovascular status with reproductive health. [Qi et al.](#) observed a positive correlation between higher dietary inflammatory index (DII) score and female infertility.

Although SARS-CoV-2 remains quite novel, convincing evidences have been provided on its possible link with infertility ([21, 22](#)). [Hu et al.](#) showed that asymptomatic or mild SARS-CoV-2 infection during controlled ovarian stimulation had no adverse effect on assisted reproductive technique outcome. Although they observed mild inflammation in the serum, this was absent in the follicular fluid of the subjects. [Liprino et al.](#) showed that phase angle is positively associated with low sperm quality. This confirms the reliability of phase angle as a marker of membrane integrity ([23](#)). [Yu et al.](#) provided a review on the role of epigenetics in female reproduction. They revealed that environmental toxicants impair female reproductive functions via the induction of epigenetic modification.

Summing up, this Research Topic provides interesting data, from experimental to clinical and meta-analysis, demonstrating the influence of environmental stress on human reproduction.

Author contributions

RA: Conceptualization, Investigation, Methodology, Project administration, Software, Writing – original draft, Writing – review & editing.

Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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