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Letter to Editor

Microplastic Contamination of Human Semen: A Hidden Threat to Reproductive Health

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Dear Editor,

Microplastics (MPs) are minute plastic particles (less than 5 mm) that are commonly found in soil, water and air, posing a threat to be ingested, absorbed, digested and removed (or remain) by human beings, possibly disrupting their normal physiology[1]. They are environmental contaminants and are reported to be found in human samples such as blood, breastmilk, stool, sputum or urine and human organs like lungs, spleen, brain and reproductive organs[2]. MPs' effects on reproductive toxicity are growing, as it has been recently discovered that the interstitial compartment surrounding the seminiferous tubules in the testis is also capable of storing MPs[3]. MPs have also been detected in maternal placentas, which is very concerning as it can have consequences on gestation, embryo development, health and disease load of exposed subjects and offspring[4].

Recent studies have shown significant changes in the morphological structure of seminiferous tubules, Sertoli cells and Leydig cells after exposure to MPs (0.5 and 5 µm) particles[5]. Concurrently, research has shown the microplastics in human sperm, with Polystyrene (PS) being the most common of the eight identified polymers. Moreover, the theory that MPs enter the semen through the epididymis and the seminal vesicles, which are the most prone to inflammation, could be one explanation for the presence of MPs in human semen[6,7]. Recent studies have reported a potential association of MPs with decreased sperm number and motility, decline in testis weight, increased sperm deformity rate and low testosterone. The possible mechanisms by which MPs impact the reproductive system and cause toxicity could be oxidative stress, disruption of the Hypothalamic Gonadal Axis, microcirculation dysfunction and alteration of food consumption and energy allocation. However, further research is needed in this regard[8,9].

The presence of MPs in the placenta is equally harmful, given the crucial role of the placenta in supporting the fetus's development and functioning as a barrier between the fetus and the external environment. The presence of exogenous and harmful plastic particles requires more attention. It can trigger immune responses or may lead to the release of toxic contaminants, resulting in harmful, adverse pregnancy outcomes and fetal growth restriction through parenteral transmission. (4)including in food and drinking water. Consequently, there is growing concern about the human health risks associated with microplastic exposure through diet. However, the occurrence of microplastics in the human body, particularly in mothers and fetuses, is incompletely understood because of the limited amount of data on their presence in the body and the human placenta. This study evaluated the presence

and characteristics of microplastics in 17 placentas using laser direct infrared (LD-IR A report published on Earth Day reveals that infants have 10 times more microplastics in their feces samples than adults and the potential risks of these microplastics may be even greater for infants because they lack sufficient metabolizing enzymes, have less ability to remove microplastics and are more vulnerable to target organs. Moreover, microplastics are also vectors for bacteria and viruses; they can attract heavy metals and other toxic chemicals, all of which significantly impact human health[10,11].

According to the United Nations Environment Program (UNEP), up to 23 million tons of plastic are disposed of in water sources annually and 78,000 to 211,000 microplastic particles are ingested by humans annually[12]. The presence of MPs in human fluids and organs poses severe health risks, as it can alter the body's normal functioning[7]. To prevent the possible health hazards associated with the consumption of microplastics, we need to focus not only on the reduction of plastic production but also on the social implementation of eco-friendly lifestyle modifications. Working on decreasing the production of plastic goods could help us reduce the environmental hazards related to it, but decreasing consumer demand would help us overcome it. If our ancestors could live in a plastic-free society, it surely wouldn't be difficult for us if we were willing to make the change.

Declarations

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Authors' Contribution

MO, MM, DN and JK significantly contributed to this study.

Conflict of Interest Statement

None.

References

1. Zuri G, Karanasiou A, Lacorte S. Human biomonitoring of microplastics and health implications: A review. Environ Res, 2023;237(1): 116966.
2. Roslan NS, Lee YY, Ibrahim YS, et al. Detection of microplastics in human tissues and organs: A scoping review. J Glob Health, 14: 04179.
3. Nikolic S, Gazdic-Jankovic M, Rosic G, et al. Orally administered fluorescent nanosized polystyrene particles affect cell viability, hormonal and inflammatory profile and behavior in treated mice. Environmental Pollution, 2022;305: 119206.
4. Zhu L, Zhu J, Zuo R, et al. Identification of microplastics in human placenta using laser direct infrared spectroscopy. Sci Total Environ, 2023;856(1): 159060.
5. Gao L, Xiong X, Chen C, et al. The male reproductive toxicity after nanoplastics and microplastics exposure: Sperm quality and changes of different cells in the testis. Ecotoxicol Environ Saf, 2023;267: 115618.
6. Li N, Yang H, Dong Y, et al. Prevalence and implications of microplastic contaminants in general human seminal fluid: A Raman spectroscopic study. Science of The Total Environment, 2024;937: 173522.
7. Montano L, Giorgini E, Notarstefano V, et al. Raman Micro spectroscopy evidence of microplastics in human semen. Science of The Total Environment, 2023;901: 165922.
8. Zhang C, Chen J, Ma S, et al. Microplastics May Be a Significant Cause of Male Infertility. Am J Mens Health, 2022;16(3): 15579883221096549.
9. Hu CJ, Garcia MA, Nihart A, et al. Microplastic presence in dog and human testis and its potential association with sperm count and weights of testis and epididymis. Toxicol Sci, 2024;200(2): 235-240.
10. Mišľanová C, Valachovičová M, Slezáková Z. An Overview of the Possible Exposure of Infants to Microplastics. Life (Basel), 2024;14(3): 371.
11. Babies vs. Plastics Report - Earth Day, 2024.
12. World Economic Forum. Microplastics: Are we facing a new health crisis - and what can be done about it? 2024.