

Detecting microplastics in human blood.

Microplastics are tiny bits of plastic found in the environment in various places — the oceans, the environment, and now as per recent studies in human blood as well.

In the study, blood from 22 healthy volunteers was collected and analysed for its plastic content. It found that 77% of tested people (17 of the 22 persons) carried various amounts of microplastics above the limit of quantification.

It is not yet clear if these microplastics can cross over from the blood stream to deposit in organs and cause diseases.

The story so far: Microplastics are, as the name suggests, tiny particles of plastics found in various places — the oceans, the environment, and now in human blood. A study by researchers from The Netherlands (Heather A. Leslie et al, Environment International, Published online 24 March) has examined blood samples of 22 persons, all anonymous donors and healthy adults, and found plastic particles in 17 of them. A report on this work, published in The Guardian conveys that about half of these were PET (polyethylene terephthalate) plastics, which is used to make food grade bottles.

The size of the particles that the group looked for was as small as about 700 nanometres (equal to 0.0007 millimetres). This is really small and it remains to be seen if there is a danger of such particles crossing the blood cell walls and affecting the organs. Also, a larger study needs to be conducted to firm up the present findings.



What are microplastics?

Microplastics are tiny bits of various types of plastic found in the environment. The name is used to differentiate them from “macroplastics” such as bottles and bags made of plastic. There is no universal agreement on the size that fits this bill — the U.S. NOAA (National Oceanic and Atmospheric Administration) and the European Chemical Agency define microplastic as less than 5mm in length. However, for the purposes of this study, since the authors were interested in measuring the quantities of plastic that can cross the membranes and diffuse into the body via the blood stream, the authors have an upper limit on the size of the particles as 0.0007 millimetre.

What were the plastics that the study looked for in the blood samples?

The study looked at the most commonly used plastic polymers. These were polyethylene terephthalate (PET), polyethylene (used in making plastic carry bags), polymers of styrene (used in food packaging), poly (methyl methacrylate) and poly propylene. They found a presence of the first four types.

How was the study conducted?

In the study, blood from 22 adult healthy volunteers was collected anonymously, stored in vessels protected from contamination, and then analysed for its plastic content. The size of the bore in the needle served to filter out microplastics of a size greater than desired. This was compared against suitable blanks to rule out pre-existing plastic presence in the background.

What are the key results of this study?

The study found that 77% of tested people (17 of the 22 persons) carried various amounts of microplastics above the limit of quantification. In 50% of the samples, the researchers detected PET particles. In 36%, they found presence of polystyrene. 23% of polyethylene and 5% of poly(methyl methacrylate) were also found. However, traces of poly propylene were not detected.

They found in each donor, on average, 1.6 microgram of plastic particles per milli litre of blood sample. They write in the paper that this can be interpreted as an estimate of what to expect in future studies. It is a helpful starting point for further development of analytical studies for human matrices research.

What is the significance of the study?

Making a human health risk assessment in relation to plastic particles is not easy, perhaps not even possible, due to the lack of data on exposure of people to plastics. In this sense, it is important to have studies like this one. The authors of the paper also remark that validated methods to detect the tiny (trace) amounts of extremely small-sized (less than 10 micrometre) plastic particles are lacking. Hence this study, which builds up a methods to check the same, is important. Owing to the small size of the participants, the study results cannot be taken as such to mould policy etc, but the power of this paper is in the method and in demonstrating that such a possibility of finding microplastics in the blood exists.

Does the presence of microplastics in blood have health impacts?

It is not yet clear if these microplastics can cross over from the blood stream to deposit in organs and cause diseases. The authors point out that the human placenta has shown to be permeable to tiny particles of polystyrene (50, 80 and 24 nanometre beads). Experiments on rats where its lungs were exposed to polystyrene spheres (20 nanometre) led to translocation of the nanoparticles to the placental and foetal tissue. Oral administration of microplastics in rats led to accumulation of these in the liver, kidney and gut.

Further studies have to be carried out to really assess the impact of plastics on humans.

Expected Question (Prelims Exams)

Q. consider the following statements.

1. Microplastics are tiny bits of various types of plastic found in the environment.
2. Microplastics are generally defined to be less than 5mm in length.

which of the above statements is/are correct?

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) None

Expected Question (Mains Exams)

Q. What are microplastics? Discuss the significance of the study of microplastics and its impact on human health. (250 Words)

Note: - The question of the main examination given for practice is designed keeping in mind the upcoming UPSC main examination. Therefore, to get an answer to this question, you can take the help of this source as well as other sources related to this topic.