Uranium In Breast Milk

Mains: *GS III – Environment*

Why in News?

Recently, A study published from Bihar has revealed traces of uranium (U238) in the breast milk of lactating mothers across six districts of the State.

What is the study about ?

- **Paper title** – Discovery of uranium content in breast milk and assessment of associated health risks for mothers and infants in Bihar, India.
- **Publication** – The study was published in the magazine, *Nature.*
- **Number of samples** – Samples of breast milk were taken from *40 mothers selected randomly.*
- **Districts covered** – Begusarai, Katihar, Nalanda, Samastipur, Kagharia and Bhojpur.
- **Investigation** – The samples underwent a detailed uranium analysis at the Mahavir Cancer Sansthan & Research Centre in Patna.

What impact does it have on breast milk?

- **Observations** – The results showed all breast milk samples had uranium concentrations between 0 microgram/L and 5.25 microgram/L.
- The highest U238 concentration was observed in Katihar district.
- The authors linked uranium in breast milk to uranium contamination of ground water, citing earlier groundwater studies to establish the link.
- **Permissible limit** – There is currently no permissible limit or benchmark specified for uranium concentration in breast milk.
    - However, the World Health Organization has set a provisional guideline limit of 30 microgram/L of uranium in drinking water.
- **U238** – Scientists found the uranium isotope 238 (U238), said to be the most common isotope, making up over 99% of natural uranium in breast milk.
    - It is a weakly radioactive, dense, and very heavy metal.
    - It occurs naturally in the environment, and can be found in almost all rock, soil, and water, including the oceans, though in low concentrations.
- **Study of (USEPA) – United States Environmental Protection Agency** observed that external exposure to uranium is not as dangerous as exposure to other radioactive elements because the skin will block the alpha particles [in the uranium].
- However, ingestion of high concentrations of uranium can cause health effects, such as cancer of the bone or liver.

- A person can be exposed to uranium by inhaling dust in air, or ingesting water and food contaminated with uranium.
- The general population is exposed to trace levels of uranium primarily through food and water, according to the USEPA.
- **Uranium in ground water** – In recent years, groundwater uranium [U238] poisoning has posed serious health hazards in the exposed population.
    - In India, an estimated 151 districts and 18 States have reported groundwater uranium contamination, and about 1.7% of groundwater sources are affected in Bihar.

Does it affect mothers and infants?

- **Low impacts** – Uranium was found in all samples but remains under permissible limits, implying low expected health impact.
- The study concludes that the actual impact on infant health is likely low, and that most of the uranium absorbed by mothers is excreted primarily through urine, not concentrated in breast milk.
- **Non carcinogenic risk** – 70% of the infants showed potential non-carcinogenic risk in the assessment but the levels observed are expected to have "minimal actual health impact" on mothers and infants, and breastfeeding should continue unless a clinical reason requires otherwise.
- **Potential threat** – If long-term exposure to uranium continues in infants, it may affect kidney development and cognitive and mental health outcomes (including low IQ and neurodevelopmental delay).

What lies ahead?

- The actual immediate danger, is that people might misunderstand or misinterpret the study, and stop breast-feeding in panic. Insufficient breast-feeding is a major cause of infant mortality, infections, and malnutrition.
- Therefore, while reporting the study, it must be emphasised that breast-feeding is safe.
- Periodic groundwater studies must be conducted to ensure that concentrations of metals and other contaminants do not exceed 'safe' limits in the food chain.
- The paper calls for future studies with larger sample sizes and environmental uranium profiling (in water, soil, and diet).
- Isotope-specific measurements are warranted to better understand maternal-infant uranium kinetics in exposed populations.
- Further studies are being planned to study uranium contamination in breast milk in other States.

Reference

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