VITAMIN D & NEURODEVELOPMENTAL ISSUES – SCIENCE & TECHNOLOGY

NEWS: A large-scale **Danish study in *The Lancet Psychiatry*** links **low neonatal vitamin D levels** to higher risks of **schizophrenia, ADHD, and autism** citing similar clinical concerns observed in India.

- **Study scope**: Researchers used **dried blood spot samples from 88,764 individuals** in Denmark born between 1981 and 2005 **to measure levels of 25-hydroxyvitamin D [25(OH)D]** and vitamin D-binding protein.

WHAT'S IN THE NEWS?

Key Findings on Vitamin D and Neurodevelopmental Disorders

- **Protective Neurodevelopmental Link:**
  Higher levels of vitamin D in newborns were significantly associated with a lower risk of developing certain neurodevelopmental disorders later in life—specifically:
    - **18% lower risk of schizophrenia**
    - **11% lower risk of ADHD (Attention-Deficit/Hyperactivity Disorder)**
    - **7% lower risk of autism spectrum disorder (ASD)**
- **Preventable Burden Through Intervention:**
  Modelling studies suggest that if all neonates had vitamin D levels within the top 60% of the population sample, it might have been possible to prevent:
    - Up to **15% of schizophrenia cases**
    - Up to **9% of ADHD cases**
    - Up to **5% of autism cases**
- **Early Protective Effect:**
  The risk-reducing influence of vitamin D was observable **from early childhood**, indicating that its role begins during the prenatal and neonatal period itself.
- **No Link with Certain Disorders:**
  The study did **not find any significant association** between neonatal vitamin D levels and the risk of **depression or bipolar disorder**, likely because:
    - These conditions typically **onset later in life**, and
    - They may operate through **different biological mechanisms** not influenced by early vitamin D status.

Understanding the Disorders

- **Schizophrenia:**
  A severe psychiatric disorder that alters how the brain processes information, affecting thinking, emotions, memory, and behavior. It often manifests in late adolescence or early adulthood.

- **ADHD (Attention-Deficit/Hyperactivity Disorder):**
  A neurodevelopmental condition characterized by persistent issues with attention regulation, hyperactivity, and impulsive behavior, commonly starting in childhood.
- **Autism (Autism Spectrum Disorder):**
  A developmental disorder that impacts social interaction, communication, and behavior. Symptoms typically appear in the first few years of life and vary widely in severity.

India's Vitamin D Deficiency Scenario

- **High Prevalence Despite Abundant Sunlight:**
  Several Indian studies reveal alarming levels of vitamin D deficiency:
  - **74% of infants** and **85.5% of mothers** were deficient in AIIMS Rishikesh (2017–18).
  - **92.1% of newborns** were found deficient in a study conducted in Bengaluru.
- **Maternal-Fetal Vitamin D Transfer:**
  Vitamin D status in newborns is highly dependent on the **mother's levels during pregnancy**. Despite biological mechanisms in late pregnancy meant to increase transfer, these adaptations are **ineffective without improved maternal sunlight exposure or dietary intake**.
- **Transgenerational Impact Confirmed:**
  A **2024 study from Bundelkhand** established a strong correlation between maternal and neonatal vitamin D levels, suggesting that vitamin D deficiency can be **biologically passed across generations**.

Role and Functions of Vitamin D

- **Calcium and Phosphate Absorption:**
  Vitamin D facilitates the absorption of calcium and phosphate from the intestine, both of which are vital for bone and tooth formation.
- **Bone Health and Disease Prevention:**
  It helps in the maintenance of bone density and strength, and prevents conditions like **rickets in children** and **osteoporosis in adults**.
- **Support for Muscle Function:**
  Adequate vitamin D levels are essential for maintaining muscle strength and coordination, thus reducing the risk of **falls and fractures**, especially in the elderly.
- **Immune System Regulation:**
  Vitamin D enhances the immune system's ability to combat infections and may contribute to **lower incidence of autoimmune disorders**.
- **Anti-inflammatory Properties:**
  It helps reduce chronic inflammation in tissues, playing a role in managing conditions such as **asthma, arthritis, and cardiovascular diseases**.

- **Cellular Growth and Repair:**
  Vitamin D supports healthy cell growth and differentiation, and may help **protect against cancerous changes and tissue damage**.

Major Sources of Vitamin D

- **Sunlight Exposure:**
  The primary natural source—UVB rays convert cholesterol in the skin to vitamin D.
- **Dietary Sources:**
  Includes **fortified foods (like milk and cereals)**, **oily fish (like salmon, mackerel)**, **egg yolk**, **mushrooms**, and **cod liver oil**.

Source: https://www.thehindu.com/sci-tech/science/consilient-evidence-links-lack-of-vitamin-d-to-neurodevelopmental-issues/article69845246.ece