News Analysis (09 Dec, 2019)

Susceptibility of Infants to Measles

Why in News

According to recent studies,infants become susceptible to **measles infection at the end of three months after birth** and not six months as earlier thought.

- A study observed that **maternal antibodies disappear by the end of three months, contrary** to the **common notion that maternal antibodies** against measles **protect** infants for the **first six months of age**.
- Currently, in countries like **India** with **ongoing transmission of measles the first dose of vaccination is given only at 9-12 months of age**.
    In countries with **no ongoing transmission,** the **first dose** is administered when the baby is **12-15 months of age**.
- Thus babies remain susceptible to measles infection for a longer period of time before they get vaccinated with the first dose.

Key Points

- **Measles Burden:** In 2018, measles caused an estimated 10 million cases and 1,42,000 deaths globally. Nearly **72,000 cases** have been reported in **India during** 2018-2019 which is the **third-highest** in the **world**.
    - At **2.3 million**, India has the **second-highest** number of children who are **not vaccinated** against measles after Nigeria.
    - But the number of unvaccinated children in India had **reduced** from 2.9 million (2017) to 2.3 million (2018).

- **Vaccination Coverage:** The World Health Organisation (WHO) recommends the **high coverage [over 95%]** of two doses of measles-containing vaccine to protect infants from measles.
    - But, in 2018, **86%** of children received the **first dose** and only **69%** received the **second dose** globally.
- **Time for Vaccination:** The vaccine-induced protection is **less in infants** if the vaccine is given **earlier than recommended**.
    - Also, **early vaccination may "alter response"** after the second dose of vaccine, leading to “lower levels of the antibody” compared with children who are vaccinated as per schedule.
    - The **pregnant mothers cannot** be administered measles vaccine as the vaccine uses live, weakened virus. The weakened or live virus after the injection may cause an **infection in the vaccinated person’s body**.
- **Threshold level of Protection:** In the case of India, many mothers gain immunity through **natural infection** and are also continually exposed to the virus, leading to **"repeated immunologic boosting and more robust antibody levels"**.
    - Infants born to mothers in **countries where measles virus** has been **eliminated** have **lower maternal antibodies** and these antibodies quickly fall below the threshold of protection before they receive the first measles vaccination dose.
- **Maternal Age:** The **probability** of infants getting infected **increases with maternal age**. This is because **pregnant mothers** remain **protected through vaccination** and not through natural infection.
    - A one-month-old infant has a 25% probability of getting infected with measles if the mother is 25 years old but the probability increases to 40% if the mother is 40 years old.

Indian Government Initiatives

- **Measles-Rubella (MR) vaccination**
    - The Ministry of Health and Family Welfare launched MR Vaccination program in **2017**.
    - The MR campaign targets around 41 crore children across the country, the largest ever in any campaign.
    - All children aged between 9 months and less than 15 years will be given a single shot of Measles-Rubella (MR) vaccination irrespective of their previous measles/rubella vaccination status or measles/rubella disease status.
    - MR vaccine will be provided free- of- cost across the states.
- Other Initiatives include Universal Immunization Programme (UIP), Mission Indradhanush and Intensified Mission Indradhanush.

Measles

- Measles **virus** is an enveloped, ribonucleic acid virus of the genus Morbillivirus.
- Measles is highly contagious, and an infected person often transmits the virus to over **90% of unprotected close contacts**.
- The virus infects the **respiratory tract**, then spreads throughout the body. Measles is a **human disease** and is **not known to occur in animals**.
- Measles can be entirely prevented through a **two-dose vaccine** and had been officially eliminated in many countries with advanced healthcare systems.
    - The **first dose of measles vaccine** was introduced in the **1990s** in India.
    - India introduced the **second dose** from **2010 onwards**. India was **one of the last countries** to add a second dose of measles vaccine.
- **Treatment**
    - **No specific antiviral treatment** exists for measles virus.
    - Severe complications from measles can be avoided through medical care that ensures good nutrition, adequate fluid intake, and treatment of dehydration.

Source: TH

Combination Therapy for TB

Why in News

Researchers from Bengaluru have made an important discovery of the mechanism used by Tuberculosis (TB) bacteria to tolerate TB drugs.

What is the Mechanism?

- **Macrophages** (a type of white blood cell), when infected with **pathogens** (such as bacteria or virus), as a first-line of defence, **reduce the pH range in the body**, i.e. making pH acidic.
- The researchers found that instead of controlling the TB bacteria, **the mildly acidic pH was actually facilitating a fraction of the bacteria to continue multiplying** and develop drug tolerance.
    - Anti-TB drugs induce oxidative stress to kill bacteria inside macrophages.
    - However, the drug tolerant bacteria have a remarkable ability **to counter oxidative stress**.
    - The bacteria uses the acidic pH of macrophages as a cue to specifically increase its capacity to deal with oxidative stress.
    - The bacteria also induce efflux pumps (to expel antibiotics) as an additional mechanism to reduce antibiotic efficacy.
- This is against the common notion that only the non-replicating or slowly metabolising TB bacteria become tolerant to anti-TB drugs.

- The mechanism was found responsible for longer TB treatment of six-nine months.
- The drug-tolerant bacteria were found in macrophages that were more acidic (pH 5.8) while the drug-sensitive bacteria were seen in macrophages that were less acidic (pH 6.6).

Researchers' Solution

- The researchers used already approved **anti-malaria drug chloroquine in combination with a TB drug isoniazid** in mice and guinea pigs.
- The **chloroquine** drug **neutralised the pH** within the macrophages. This prevented the bacteria from inducing the mechanism to protect themselves from oxidative stress. So no drug-tolerant TB bacteria emerged.
- Once the pH was neutralised, the **isoniazid drug** was able to **eradicate TB from animals**.
- The two-month treatment was able to completely sterilise mouse lungs and a near-complete eradication was observed from the lungs of guinea pigs.
- In addition, it was found that the drug combination also reduces the chances of TB relapse.

Tuberculosis

- TB is caused by **bacteria (Mycobacterium tuberculosis)** that most often affect the **lungs**.
- **Transmission:** TB is spread from person to person through the air. When people with lung TB cough, sneeze or spit, they propel the TB germs into the air.
- **Symptoms:** Cough with sputum and blood at times, chest pains, weakness, weight loss, fever and night sweats.
- **Treatment:** TB is **treatable and curable disease**. It is treated with a standard 6 month course of 4 antimicrobial drugs that are provided with information, supervision and support to the patient by a health worker or trained volunteer.
- Anti-TB medicines have been used for decades and strains that are resistant to 1 or more of the medicines have been documented in every country surveyed.
    - **Multidrug-resistant tuberculosis (MDR-TB)** is a form of TB caused by bacteria that do not respond to isoniazid and rifampicin, the 2 most powerful, first-line anti-TB drugs. MDR-TB is treatable and curable by using second-line drugs.
    - **Extensively drug-resistant TB (XDR-TB)** is a more serious form of MDR-TB caused by bacteria that do not respond to the most effective second-line anti-TB drugs, often leaving patients without any further treatment options.

Source: TH

Rare Diseases in India

Why in News

Recently, it was reported that the application of the majority of patients suffering from **Lysosomal Storage Disorders (a rare disease)** has been pending with the Union Ministry of Health and Family Welfare for several months.

- There are more than **2,000 children infected with rare diseases** across the country. Many of them require **Enzyme Replacement Therapy (ERT)**.
    - ERT is a medical treatment which replaces an enzyme that is deficient or absent in the body.
- There is also a demand for the **reformulation of National Policy for Treatment of Rare Diseases, 2017**.

Lysosomal Storage Disorders

- Lysosomal storage disorder is an **inherited metabolic disease** that is characterized by **an abnormal build-up of various toxic materials** in the **body's cells** as a result of **enzyme deficiencies**.
- It may affect different parts of the body, including the skeleton, brain, skin, heart, and central nervous system.
- There is currently **no approved treatment** for many lysosomal storage diseases.

Rare Diseases

- A rare disease is a health condition of low prevalence that affects a **small number of people** compared with other prevalent diseases in the general population.
    - There is **no universally accepted definition** of rare diseases and the definitions usually vary across different countries.
- Though rare diseases are of **low prevalence and individually rare**, collectively they affect a **considerable proportion of the population**.
- **80%** of rare diseases are **genetic in origin** and hence disproportionately **impact children**.
- In India there are **56-72 million people** affected by rare diseases.

National Policy for Treatment of Rare Diseases, 2017

- The policy highlights the **measures and steps,** both in the **short as well as in the long term,** that need to be taken to deal comprehensively with rare diseases.
- The policy intends to constitute an **Inter-ministerial Consultative Committee** to coordinate and steer the initiatives of different ministries and departments on rare diseases.

- It also mentions for the **creation of a corpus fund at Central and State** level for funding treatment of rare diseases.
- The policy aims to create a **patient registry for diseases** housed in Indian Council of Medical Research (ICMR).
- However, recognizing the higher cost of treatment for rare diseases, the policy also seeks to **strike a balance between access to treatment with health system sustainability**.
- It also aims to create awareness among health professionals, families of patients and the public in general, about rare diseases.

Source: TH

35th SAARC Founding Day

Why in News

The Prime Minister of India has addressed a letter to the South Asian Association for Regional Cooperation (SAARC) Secretariat on the founding day of the bloc.

- The letter highlighted the need for **greater collaboration** among countries in South Asia in order to **resist the threat of terrorism** that poses a challenge to prosperity and peace in the region.
- **In the last three years, India has been distancing itself from the SAARC,** citing security challenge facing the region from terror networks based in Pakistan, which is also a member of the grouping.

South Asian Association for Regional Cooperation

- SAARC was established with the signing of the SAARC Charter in Dhaka (Bangladesh) on **8th December 1985**.
- **Eight Member States:** Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka.
- **Secretariat:** Kathmandu (Nepal).
- **Objective:** To promote the welfare of the people of South Asia and to improve their quality of life, and to accelerate economic growth, among other things.

- **SAARC Summits:**
    - These are usually held biennially and hosted by member states in alphabetical order.
    - The **last SAARC Summit in 2014** was held in Kathmandu (Nepal), which was attended by India.
    - The 2016 SAARC summit was to be held in Islamabad. The summit was called off after India, Bangladesh, Bhutan and Afghanistan declined to participate in the Islamabad meet, because of an attack on an Indian army camp in Uri (Jammu and Kashmir).
- The latest meeting of the SAARC Foreign Ministers took place in New York on 26th September, 2019 on the sidelines of the UN General Assembly, which was attended by the Minister of External Affairs of India.

Source: IE

Natyashastra

Why in News

Recently, a three-day festival on Natyasastra was organised in Chennai (Tamil Nadu).

Natyashastra

- **Natyashastra,** in full **Bharata Natyashastra**, is a detailed treatise and handbook on **dramatic art** that deals with all aspects of classical Sanskrit theatre.
- It is believed to have been **written by the mythic Brahman sage and priest Bharata (200 BC – 200 AD)**.
- Its many chapters contain detailed treatments of all the diverse arts that are embodied in the classical Indian concept of the drama, including dance, music, poetics, and general aesthetics.
- It is **also known as the fifth veda** as it has been evolved by taking words from the Rigveda, music from the Samaveda, gestures from the Yajurveda and emotions from the Atharvaveda.

Source: TH

Tyre Pyrolysis

Why in News

The Central Pollution Control Board (CPCB) has ordered the closure of about 270 **tyre pyrolysis units** in 19 States for flouting environmental norms and causing a high level of pollution.

- **Tyre pyrolysis** refers to a technique of **breaking down used tyres in the absence of oxygen**. Shredded tyres, at temperatures between **250°C and 500°C**, produce **liquid oil and gases**.
    In addition to the domestic tyres waste (6% of global tyre waste), India also receives used tyres from Australia and the U.K., which are sent for recycling and disposal.
- It was considered a safer technique than burning tyres but pyrolysis leaves **fine carbon matter, pyro-gas, oil as residue**. Also, the inadequate management of these by-products poses health risks.
    - Tyre pyrolysis technology is **polluting and harmful to the health** of workers employed.
    - The **National Green Tribunal in 2014 prohibited** used tyres from being burnt in the open or being used as fuel in brick kilns, because of the toxic emissions.

Source: TH

RailWire

Why in News

Railways has successfully completed the work of **providing free public Wi-Fi** at 5500 stations across the country. The Wi-Fi is being provided under the brand name of **RailWire** and is **one of the largest** Wi-Fi networks in the world.

Key Points

- Indian Railways mandated **RailTel, a Miniratna Public Sector Undertaking (PSU) under the Ministry of Railways**, to provide free high-speed Wi-Fi at the Railway stations for the **digital inclusion**.
- It was started in **January 2016** from **Mumbai Central station**.
- RailTel has partnered with **Google, Tata Trust, Power Grid Corporation of India Limited (PGCIL)** for the project and also got **funding from Universal Service Obligation Fund (Department of Telecommunications)**.

Significance

- Bridges the digital divide between rural and urban India.

- Students can utilise their waiting time to download study materials.
- Vendors can use the service for digital payment transactions.
- Daily passengers can use their time in learning new skills and net-surfing.

Source: PIB

Icicles, Stalactites and Stalagmites

Icicles

- Icicles typically form on days when **the air temperature is subfreezing but sunshine warms and melts some snow or ice**. As it drips off, a water droplet freezes when it loses its heat to the cold air.
- It starts with a few frozen droplets and after reaching a certain size drops begin to drip along the side of the structure turning into a pointy stick-like structure.
- Icicles formed in caves are also known as **ice stalactites**.

Stalactite

It is an icicle-shaped formation that hangs from the ceiling of a cave and is produced by the **precipitation of minerals** from water dripping through the cave ceiling. Most stalactites have **pointed tips**.

Stalagmite

- It is an **upward-growing mound** of mineral deposits that have precipitated from water dripping onto the floor of a cave. Most stalagmites **have rounded or flattened tips**.
- The dominant mineral in such deposits is **calcite (calcium carbonate)**, and the largest displays are formed in **caves of limestone and dolomite**. Other minerals that may be deposited include other carbonates, opal, chalcedony, limonite, and some sulfides.