

## **4. Tackling COVID-19 Through Soaps**

**Prelims Syllabus: Medicine & Pharmaceuticals**

**Mains Syllabus: GS-II Issues relating to development and management of Social Sector or Services relating to Health, Education, Human Resources.**

### **Why in News?**

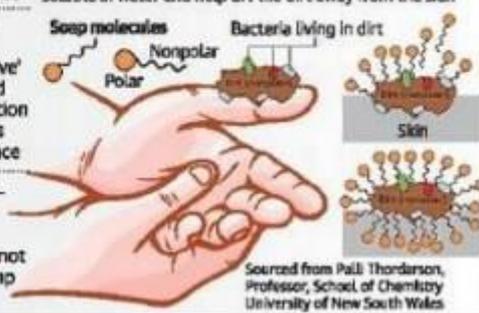
- Guidelines by the **World Health Organization**, to reduce the risk of SARS-CoV-2 infection, specify that one of the ways to reduce the risk of infection is by regularly and thoroughly cleaning one's hands with an alcohol-based hand rub or washing them with soap and water.

### **How does washing with soap help get rid of the Coronavirus?**

- Using soap is more effective in removing microbes on our hands.
  - ✓ Viruses such as coronavirus, influenza-causing viruses, Ebola, Zika have their genetic material encased in a layer of fat called the lipid envelop.
  - ✓ Soap molecules are pin-shaped with a head that is water-loving (hydrophilic) and a tail that is oil-loving (oleophilic). Being oleophilic, the tail portion of the molecule tends to have an affinity for and 'competes' with the lipids in the virus envelope.
  - ✓ Since the chemical bonds holding the virus together are not very strong, the long oleophilic tail gets inserted into the envelope and tends to have a 'crowbar' effect that breaks the lipid envelope of the virus.
  - ✓ The tail also competes with the bond that binds the RNA and the lipid envelop thus dissolving the virus into its components which are then removed by water.

### **Do all viruses have the Lipid Layer?**

- No, certain viruses do not have the lipid envelop and are called the non-enveloped viruses. Rotavirus which causes severe diarrhoea, poliovirus, adenovirus that cause pneumonia and even human papillomavirus (HPV) do not contain the lipid envelop.
- The oil-loving tail of the soap molecule also disrupts the bond that binds dirt and non-enveloped viruses to the hand.
- The dirt and viruses are surrounded by several tails making them remain as suspended particles. Rinsing with water washes away the suspended particles leading to clean hands.

<b>Good old soap</b>		As the number of SARS-CoV-2 cases continues to rise globally, washing hands thoroughly with soap or alcohol-based hand sanitisers has been advised as a preventive measure. A look at how a soap and water combination helps wash the virus away	
<ul style="list-style-type: none"> <li>When an infected person coughs or sneezes without covering himself, droplets expelled end up on different surfaces. While the droplets dry out quickly, the virus remains active</li> <li>When a healthy person touches an infected surface, the virus latches onto the skin. When he or she touches the face, nose or mouth,</li> </ul>	<p>the virus can enter the body easily</p> <ul style="list-style-type: none"> <li>Water is not enough to cleanse the virus since the virus is sticky. Here is where soap comes into play</li> <li>When hands are washed with soap, the fat-like substances in soap 'compete' with the protective layer around the virus and the bond that holds</li> </ul>	<p>the virus together. They are stronger than the viral bonds</p> <ul style="list-style-type: none"> <li>Thus, soap and water together effectively 'dissolve' the viral bond and break the interaction between the virus and the skin surface</li> <li>Though alcohol-based hand-sanitisers are helpful, they are not as effective as soap and water</li> </ul>	<p><b>How soap washes dirt from the skin</b></p> <p>Nonpolar "tails" adhere to dirt on the skin. Polar groups are soluble in water and help lift the dirt away from the skin</p>  <p>Sourced from Palli Thondarson, Professor, School of Chemistry University of New South Wales</p>

### How do alcohol-based hand sanitisers help get rid of coronavirus?

- Like soap, the alcohol present in hand sanitisers dissolve the lipid envelop, thus inactivating the virus.
- In addition, the alcohol also tends to change the shape or denature the mushroom-shaped protein structures that stick out of the lipid envelop. The mushroom-shaped protein structures help the virus to bind to special structures found on human cells and enter the cells. To be effective, the sanitisers should contain at least 60% alcohol.
- Unlike water, alcohol run does not remove the dead viruses from the hand. While a sanitiser can quickly reduce the number of microbes, it does not get rid of all types of germs, and is “not as effective when hands are visibly dirty or greasy”.

### Primary Precautions:

- WHO cautions that using a mask alone will be insufficient to provide an “adequate level of protection”. It should be combined with hand hygiene to prevent human-to-human transmission.