SERB supported study shows that collapse of respiratory center in the brain may cause breakdown of COVID-19 patients

- The team of researchers at CSIR-Indian Institute of Chemical Biology (IICB), Kolkata has explored the **neuro-invasive potential of SARS-CoV-2** and suggested that the virus may **infect respiratory centre** of the brain and attention should be focused on the **respiratory centre** of the central nervous system to search for mortality due to COVID-19.
- The paper published in ACS Chemical Neuroscience and supported by **Science & Engineering Research Board (SERB)**, a **Statutory Body** of the **Department of Science & Technology (DST)**, implies that SARS-CoV-2 virus might enter the human brain through the nose and reaches the olfactory bulb of the brain.
- From there, SARS-CoV-2 virus might infect **PreBötzinger complex (PBC)**, the primary center of the brain that controls the **respiratory rhythm generation**.
- This explains that collapse of the respiratory center in the brain may be responsible for breakdown of COVID-19 patients.
- Although, lung is one of the most infected organs, several other organs, including the brain, are also affected.
- This is the first report that highlights the SARS-CoV-2 may target the **PBC of the brainstem that controls respiration and causes respiratory collapse** of COVID-19 patients.
- The scientists have suggested that **cerebrospinal fluid** of COVID-19 patients and postmortem brain of deceased patients should be assessed to better understand the route of SARS-CoV-2 entry and its spread to respiratory center of brain.

**PreBötzinger complex**

- PreBötzinger complex functions as the **primary respiratory oscillator** and it has been proposed as a **center of respiration**.
- It has been earlier shown that **disruption of PBC causes lethality due to respiratory failure**, suggesting its central role in respiratory rhythm generation.
- It is possible that **SARS-CoV-2 may shut down respiratory center**, and in turn breathing by infecting and **destroying the PBC** of the brainstem.
- Although this underline hypothesis needs to be validated for SARS-CoV-2, another recent study from a group of scientists at King’s College London, **UK highlighting loss of smell** was one of **main symptoms of COVID-19 patients**, hinting at the involvement of the same route through which SARS-CoV-2 may enter the brain.
- SARS-CoV-2 and SARS-CoV not only share high levels of DNA sequence similarity, both of them exploit the same **angiotensin-converting enzyme 2 (ACE2) receptor**, through which the virus enters in target cells.
- Due to this, it was anticipated that the mechanism through which SARS-CoV infected the host cell could also be the same for SARS-CoV-2.

**Way ahead**

- The study highlights that it is important to not only screen the COVID-19 patients for neurological symptoms but also further segregate when the symptom appears.
- The researchers have pointed out that while at present, the brain is not considered as the
site of primary or secondary reason for death of COVID-19, attention need to be focused towards the respiratory center of CNS.

- **Postmortem of brain of COVID-19 patients** could be assessed to know the route of entry and affected areas including detailed assessment of respiratory center of the brain.