PRAKRITI SANRAKSHAN
Newsletter
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ABOUT US

Save the Environment (STE)

Save the Environment (STE), founded and registered on 19th November 1990, is a Kolkata based NGO which aims to create awareness, inspire rural communities and works towards a better, sustainable environment-friendly technology. It is lead and run by researchers, social workers, students with a mutual aim to 'Save the Environment'. STE has collaborated with various organizations in the past 29 years such as All India Institute of Hygiene & Public Health, AIIH&PH and India Canada Environment Facility, DRDO Ministry of Defence, Department of Science & Technology (DST), Indian Institute of Management (IIM), Ahmedabad to mitigate the effects of arsenic and provide arsenic-free drinking water. The first step towards this objective was taken in 1977 when an arsenic removal plant was set up in West Bengal, later 60 community type filters and 5, 000 domestic filters were installed and till date over 1,00,000 people have benefitted from these plants. With the help of DST Arsenic/Iron removal plants were set up in various parts of India, 24 Parganas (N) & Nadia districts in West Bengal, Balia district in Uttar Pradesh, Bhagalpur District in Bihar and Agartala in Tripura. Furthermore, a special clinic (2001) and a vocational training centre (2003) set up for people who already were suffering from the ill-effects of arsenic and a hospital for the same will be coming up soon. Not only this, a step towards conservation of rainwater in rural areas was taken up by STE in 2003. To conclude, STE not only uses the common methods to save what's left of the environment but also STE members use their scientific expertise to convert unusable environment resources to usable ones.

OUR EVENTS

Webinar on World Environment Day, 2020

A webinar on the theme **'Environment amid Covid-19: Dynamics and Solutions'** was organized by STE on June 6, 2020, on the occasion of World Environment Day. Eminent scientists and professors delivered interesting and informative lectures on topics pertinent to the ongoing Covid-19 pandemic and its repercussions on environment and human health. The event commenced with **Dr. Kshipra Misra, President, STE** formally welcoming all the speakers, delegates and members of STE family. Then, **Prof. Arunabha Majumdar, Patron, STE** addressed the audience on how changes in policies regarding environmental protection should be adopted in a post-pandemic period.

This was followed by **Dr. Priyanka Sharma, Life member, STE introducing Dr. S.K. Goyal, Chief Scientist & Head, NEERI and, Dr. Susan Titus, Scientist 'G', NMRL (DRDO)**, the speakers of the webinar's first session. Dr. Goyal shared his views on ***'Post pandemic lifestyle and environment'***. He discussed the improvement in air and water quality brought about due to lesser human interference in the lockdown period. Dr. Goyal also stressed that a long-term planning, involving use of local resources and sustainable industrial development in the lines of Atmanirbhar Bharat Abhiyan, is what our nation requires. The second talk was delivered by Dr. Susan Titus on the topic, ***'Accelerated bioremediation of marine oil pollution'***, a topic of much relevance while dealing with environmental safety. Dr. Titus elaborated about the indigenously developed 'nutrimix' and biomix' where oil degrading bacteria are used for bioremediation, based on dispersion, degradation and dissolution phenomena.

In the second session of the webinar, **Ms. Jigni Mishra, Research Associate, STE formally introduced Prof. Md. Hussain, Professor, Department of Biotechnology, Jamia MiliaIslamia University and Dr. Sandhya Kaushik, JESS Faculty-** the speakers of the webinar's second session. Prof. Husain's lecture was about '***Emerging respiratory viral infections and strategies of treatment and prevention'***, where he exhaustively discussed the structure, etiology and treatment of viral strains causing various respiratory illnesses. Prof. Husain's talk encompassed comprehensive information regarding the ongoing Covid-19 pandemic and its causative agent, i.e., SARS-CoV-2. Prevention and management strategies being adopted against the Covid-19 disease were also covered. In the last lecture of the webinar, Dr. Sandhya Kaushik illuminated the audience about a very innovative solution to treat clubfoot and other angular deformities. In her discourse entitled

'Necessity is the mother of invention- an innovative technique to treat orthopedic problems', Dr. Kaushik spoke about the truly life changing technique based on 'Joshi External Stabilization System' that has successfully corrected orthopedic disproportions in hundreds of patients so far.

The event concluded with Dr. Priyanka Sharma presenting the vote of thanks to all our speakers, delegates and all members of STE for making the virtual meeting a success.

The webinar witnessed a generous gathering of delegates including scientists, researchers, environmentalists, social workers and policy makers, who stayed connected with us and interacted fervently in the Q&A sessions. It was indeed an enlightening occasion, and the support received by the audience has certainly motivated STE for undertaking future endeavors related to environmental protection and related health aspects.

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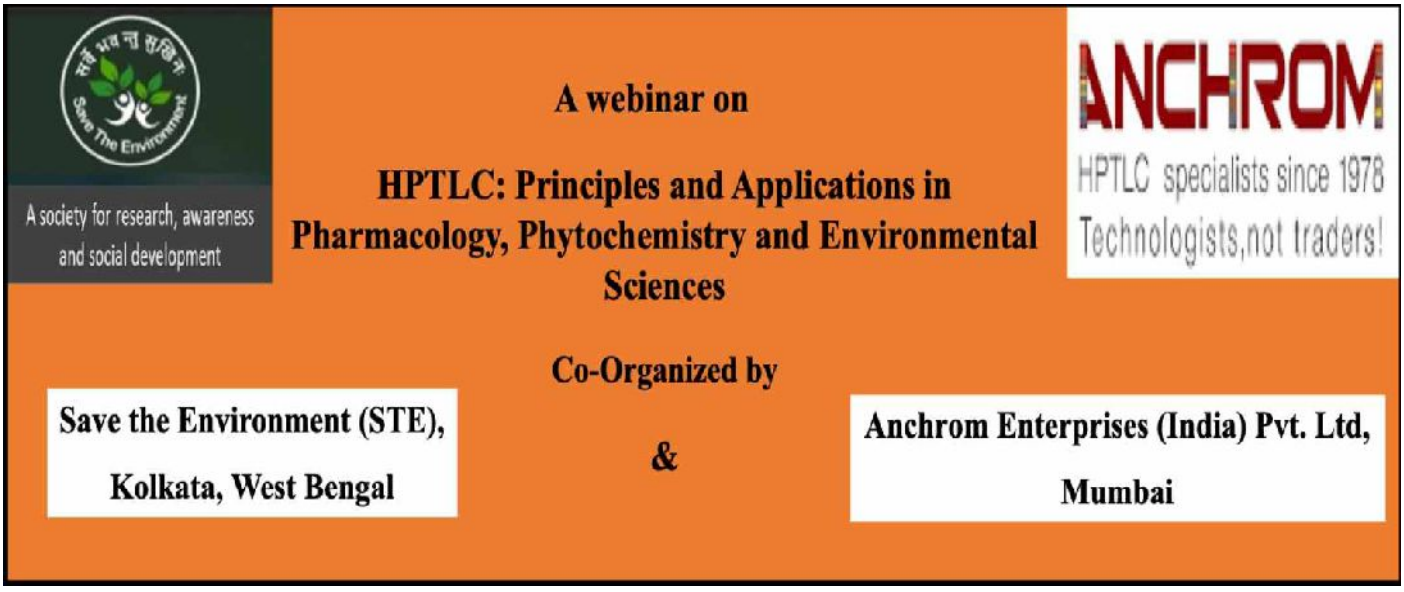

Save the Environment (STE), is an NGO actively organizing various interactive sessions such as conferences (National and International), workshops, seminars and awareness programs including poster competitions, quiz competitions and science exhibitions among the future generations. In the past few months, the COVID-19 pandemic has put several organizations to a halt for organizing such activities. Thankfully, in today's world of technology the webinars have provided us a platform to actualize interactive sessions which could enable dissemination of knowledge and awareness in the fields related to health, water and environment.

With this perspective, STE in collaboration with Anchrom Enterprises (India) Pvt. Ltd., Mumbai, organized a webinar entitled **"HPTLC: Principles and Applications in Pharmacology, Phytochemistry and Environmental Sciences"** on 15th June, 2020. The main objective of the webinar was to highlight the basics of chromatography; the technological advances in High Performance Thin Layer Chromatography (HPTLC) and; its applications in the field of pharmacology, phytochemistry and environmental sciences. Thus, emphasizing the significance of HPTLC applicability in life sciences.

Anchrom Enterprises (I) Pvt. Ltd. is one of India's oldest companies in analytical instruments supply. It is dedicated to the technique of TLC and HPTLC since 1978. The organization has provided HPTLC technology to numerous public/private and Government institutions and research centers including pharmaceutical, agricultural, natural product and environment related. The company voluntarily offers free training on HPTLC and supports researchers with subsidized analysis.

The webinar began with a warm welcome note and brief introduction on the contributions and progress accomplished by STE which were delivered by **Ms. Jigni**

Mishra, organizing member, STE. The event was graced by the presence of our Honorable' panelists: **Dr. Anubhuti Pasrija**, Principal Scientist (DRDC-Analytical) at Dabur India, Pvt. Ltd. and **Dr. Sayeed Ahmad**, Assistant Professor, Department of Pharmacognosy and Phytochemistry, Faculty of Pharmacy, Jamia

Dr. Anubhuti Pasrija

Dr. Sayeed Ahmad

Our Honorable' panelists: Dr. Anubhuti Pasrija, Principal Scientist (DRDC-Analytical) at Dabur India, Pvt. Ltd. and Dr. Sayeed Ahmad, Assistant Professor, Department of Pharmacognosy and Phytochemistry, Faculty of Pharmacy, Jamia Hamdard University, New Delhi.

Dr. Anubhuti Pasrija is currently leading the analytical group (Ayurveda & Healthcare) and constantly providing inputs with regard to standardization & method development for medicinal plants, herbal extracts & herbal formulations at Dabur India, Pvt. Ltd. Her expertise in characterization of lead molecule; standardization of medicinal plants, herbal extracts and herbal formulations based on analytical marker/bio-active compounds analysis or chromatographic fingerprinting using different chromatographic methods with the help of modern sophisticated chromatographic tools like HPTLC, HPLC, GC, UV etc. and spectroscopic techniques. She has various publications on development and validation of analytical methodology for medicinal plants, herbal extracts and herbal formulations by the virtue of her proficiency in Pharmacology and Pharmacognosy processes.

Dr. Sayeed Ahmad has been associated in teaching and research since 2005, in the field of herbal drugs and natural products. His work on chromatography especially on HPTLC is well recognized with more than 70 research papers published on HPTLC only; which is third highest number of publications on HPTLC globally as per SCOPUS data. He has attained the topmost position as a publisher on HPTLC in India.

Ms. Sneha Singh

Mr. Vishwajit Kale

Our speakers for the webinar*:* Our speakers for the webinar: Ms. Sneha Singh and Mr. Vishwajit Kale; both are Application Chemists at Anchrom Enterprises (I) Pvt. Ltd.

The speakers for the webinar were **Ms. Sneha Singh** and **Mr. Vishwajit Kale**, who are Application Chemists at Anchrom Enterprises (I) Pvt. Ltd. The speakers presented the fundamentals of chromatography and the basic components of HPTLC instrumentation while highlighting the science behind the technique. They also emphasized on the advantages of the HPTLC such as its rapidness, simplicity, cost-effectiveness and flexibility. They described the HPTLC technique as a "visible" technique which can analyze in parallel more than 100 samples. The technique of HPTLC was also explained as several times faster, contamination-free and economical than High

Performance Liquid Chromatography (HPLC); another liquid chromatography technique. The speakers very well illustrated the analyses of different samples like pharmaceuticals, APIs, botanicals, forensics, foods, specialty chemicals, etc. for establishing purity, impurities, fingerprint and reverse engineering. They illuminated the application of HPTLC for screening of bioautographic assays such as antibacterial, antioxidant, antifungal and enzyme inhibition. They also introduced the world's first, new generation "HPTLC- PRO" installed in their lab in 2019. Anchrom speakers welcomed all participants in the audience for any technical help and suggested books to the students and others interested in HPTLC applications for future reference.

There were about 290 participants majorly comprising of students from various institutions. Following the presentation, a question and answer session was also managed successfully. Our panelists, speakers along with Dr. Kshipra Misra, President, STE answered all the questions which were critical, logical and mostly technical. The questions put up by the audience clearly displayed their enthusiasm and keen interest in the applicability of the HPTLC technique for their research work which belonged to different fields of pharmacology, natural product chemistry, forensic science and environmental sciences.

The Anchrom Enterprises (I) Pvt. Ltd. team

The concluding of the webinar was marked by a Vote of Thanks delivered by **Dr. Anuja Bhardwaj**, organizing member, STE. The entire STE fraternity is grateful to our Honorable' panelists **Dr. Anubhuti Pasrija** and **Dr. Sayeed Ahmad** for gracing the event with their kind presence. We are also appreciative of **Mr. Akshay Charegonakar**, Director, Anchrom Enterprises (I) Pvt. Ltd. and his entire team for co-organizing the webinar. Our NGO, is also thankful to **Ms. Vaishnavi Gokhle**, Anchrom for her affable coordination with team STE.

Save The Environment team

At webinar on "HPTLC: Principles and Applications in Pharmacology, Phytochemistry and Environmental Sciences".

The Save the Environment *(STE) organizing members*: **Dr. Kshipra Misra** (in the middle), **Ms. Jigni Mishra** (Left) and **Dr. Anuja Bhardwaj** (Right).

It was an immense pleasure for STE to co-organize a webinar with Anchrom as a platform to provide knowledge about the basic principles and applications of HPTLC technique to the students from various institutions and research centers under the presence and guidance of learned panelists and the speakers in the concerned theme of the webinar. Our organization, STE believes that everyone among the audience were benefited and able to extract the knowledge and clear their doubts during the webinar. In future also, it is STE's priority to continue organization and accomplish such interactive sessions in the interest of our future generations.

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AMPHAN CYCLONE RELIEF WORK

Super Cyclonic Storm Amphan hit West Bengal on May 20, claiming eighty-six lives so far and affecting over 10 million people in the eastern Indian state. The powerful storm ripped through eastern India and neighbouring Bangladesh. In West Bengal, it has resulted in massive damage to standing crops, thousands of trees were uprooted, and power and water supply was interrupted in the state capital Kolkata. Many in the state have lost their entire homes as well.

Measures to check the spread of COVID-19 pandemic has compounded efforts to keep people safe from cyclone Amphan even as migrant workers return home to West Bengal.

Considering the adversities of this natural calamity, the Save the Environment (STE) team, Kolkata in collaboration with Milan Samity (Hrishikesh Park), Food Trotters, Anandapur, Kolkata, and St. Paul's School Old Boy's (1980), Kolkata, as a team consisting of 14 members and led by secretary of Milan Samity (Hrishikesh Park) Sri Umapati Dutta, visited Sagar Island, South 24 Pargana, West Bengal on, 14th June, 2020, Sunday. Together with the above stated organizations, STE team handed over dry food (chra/gur) and 100pcs towel to the respected B. D. O. of Sagar Island for affected local people. We also offered 108pcs Towel, 21pcs Tarpaulin (tripal) & Rs 90,000/- (Rupees Ninety Thousand) only by cheque as Donation to Ramakrishna Mission Ashram, Manasadwip who are conducting relief and rehabilitation work (re-construction of affected houses by cyclone) work in the locality.

The team STE expresses its deep gratitude to all those who donated to STE relief funds for the Amphan cyclone relief work. We are also thankful to all who have extended their hands to co-operate and actively participated in this noble work. The contributions were reported and praised in a regional newspaper "*News Stardom*" also.

ARTICLES to Read…

COVID-19 pandemic

By **Ms. Sheeren Bajaj**
Assistant Editor, STE

Currently, the most heated topic in the world is COVID-19 which stands for coronavirus disease 2019. On March 11 2020, WHO declared novel coronavirus as a pandemic. Till date coronavirus has spread to 217 countries. A large part of the world is under complete lockdown to prevent the spread of coronavirus. It has affected the economy of all of the affected countries. As of May 28th, according to the World Health Organization (WHO), COVID-19 has so far infected 5,556,679 people and has claimed 351,866 lives globally. In India according to the Ministry of Health and Family Welfare, Government of India (GoI), COVID-19 has 86,110 active cases and has claimed 4,531 lives.

News first broke out on 27th December, 2019 when Wuhan CDC (Centers for Disease Control and Prevention) was notified about a cluster of pneumonia cases in Wuhan, China. On 31st December 2019, the WHO China Country Office was informed about a cluster of pneumonia cases without the cause of disease causation in Wuhan City, Hubei Province of China. On the same day the information was made public and Huanan Seafood Market was suspected as the source of origin. On 8th January, a novel coronavirus strain was identified as the reason for pneumonia. Later, on 30th January WHO declared COVID-19 outbreak as a public health emergency of international concern.

COVID-19 is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The primary route of transmission of virus is via droplets released by coughing, sneezing or talking; or by droplet dropping on the surfaces and an uninfected person touching his face after touching the contaminated surface. Average incubation period is 5 days, but it may vary from 2 days to 14 days. Coronavirus spreads through person to person contact. The virus spreaded from China to all over the world like a wildfire and globalization is a major reason for this outbreak. The frequency of travelling from one nation to another contributed majorly to spreading of COVID-19.

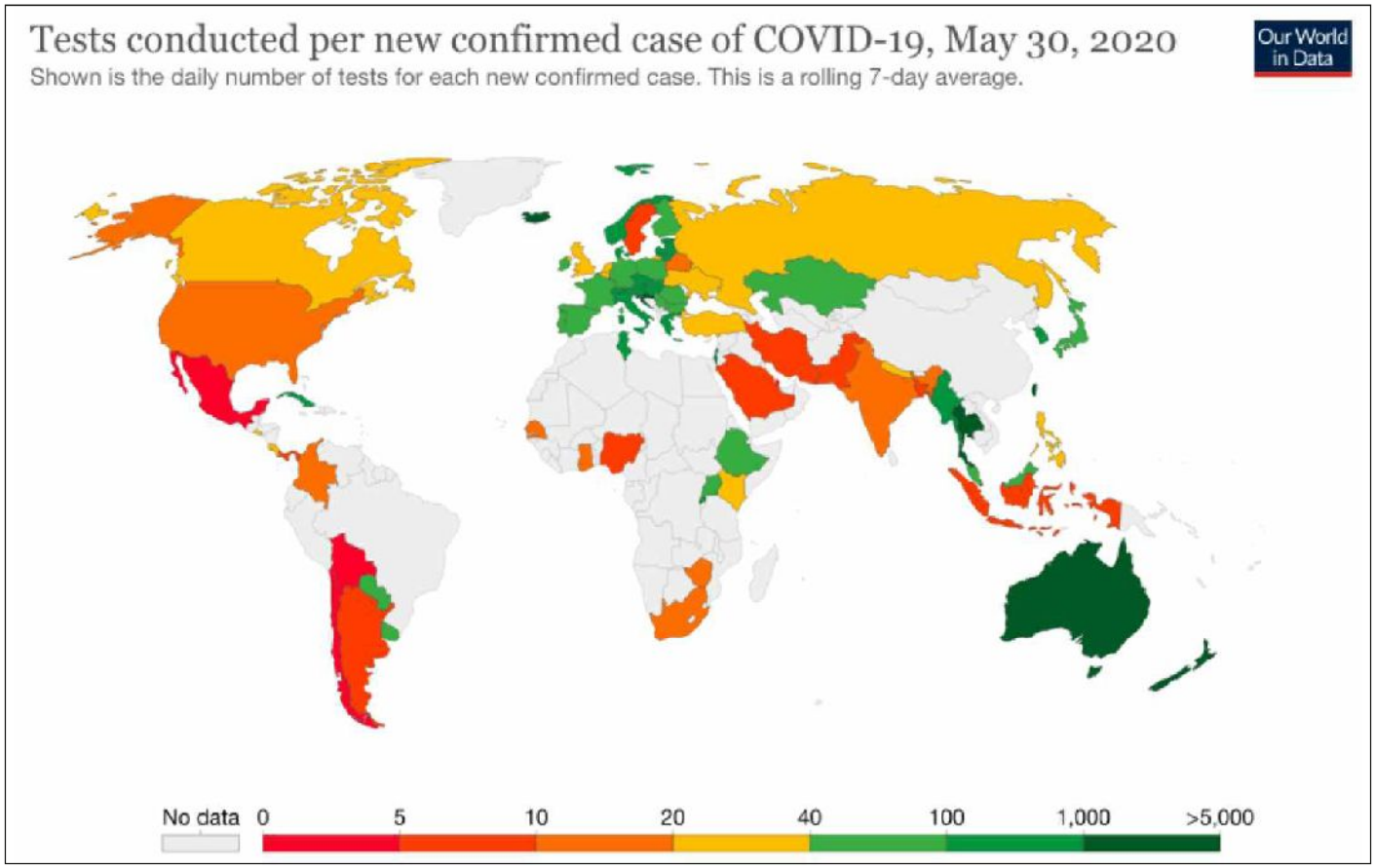

Image 1: The image above shows the daily number of tests done for each new confirmed case of COVID-19 worldwide. The bar below shows number of tests done and is color coordinated with the corresponding countries.
Source: https://ourworldindata.org/coronavirus-testing

Stages of COVID-19 outbreak

There are 4 stages of the coronavirus outbreak.

- **Stage 1:** *Appearance of the disease*- Cases are usually from people with travel history to coronavirus hit countries. The number of cases in this stage are quite low and do not spread locally. India was in stage 1 from the end of January to mid-March.
- **Stage 2:** *Local transmission* - When people come in contact with asymptomatic or coronavirus patients and transfer the infection to others in close proximity such as family, neighbors, colleagues etc. At this stage, tracing of the source and isolation can be done. As of April 9th, India was at stage 2.
- **Stage 3:** *Community transmission* - At this stage, it's difficult to trace the source of transmission and the only way to curb the cases is by lockdown of regions.
- **Stage 4:** *Widespread outbreak* - Cases increase many folds without stopping and it becomes an epidemic.

Social distancing and Self-isolation

Social distancing is the first and foremost preventive measure to tackle coronavirus as everyone and everything is a potential source of transmission of virus. It helps to break the chain and prevent spread of disease. Droplets of virus can stay in air upto 30 mins before settling down. The droplets could be either heavy or light. The lighter droplets (infected with virus) or aerosols can get disseminated upto 20 feet. It was earlier thought that 6 feet distance is enough to prevent transfer of coronavirus, but according to the latest research by a group at University of California, it appears that droplets containing virus can disperse upto 20 feet, and can spread faster in cold and humid climates. Droplets remain suspended in the air which causes airborne transmission. Airborne transmission can be reduced if there is at least 20 feet distance between the individuals. On the other hand, the heavier droplets will travel less distance because of their weight and tend to fall on the ground or any nearby surface. Touching such contaminated surfaces is one of the modes of transmission of the virus. That is why regular washing of hands with soap, sanitizer or hand rub is important. The ability of SARS-CoV-2 to stay on surfaces varies according to the nature of the surface. For instance, it can last on copper for 4hrs, 24hrs on cardboard and upto 72hrs on stainless steel and plastics. Virus can stay for only 24hrs on cardboard probably because of the absorbency fibrous quality. One of the reasons, for COVID-19 being so threatening is because it can be transmitted from people who are asymptomatic. Since, anyone can be a carrier of the virus one must keep oneself at a distance of 20 feet from others, wash hands regularly, cough or sneeze in the elbow pit and not on their hands. Wearing a face mask is also necessary as it will prevent the spread of infected droplets. They should wear medical masks or respirators such as N95, FFP2 or equivalent. The medical workers especially, must wear the masks and personal protective equipment (PPE), when taking care of patients. Importantly, people showing symptoms of COVID-19 must wear masks. Apart from the above measures few other things must be followed to reduce the chances of getting infected by virus. These include avoiding closed areas or areas with common ventilation systems. Areas with natural ventilation can lower the concentration of infectious particles present in the surroundings.

Social distancing is practiced in order to prevent ourselves from being infected, but if one is infected or is showing symptoms of coronavirus then self-isolation comes into play. To self-isolate properly one must stay in a room with a window or natural ventilation, try not to come in contact with any members (even pets) of the house, do not share toilet or bathroom with other members of the family, wash hands frequently especially after sneezing or coughing, spray inanimate surfaces with disinfectants. Stop self-isolation if it has been 7 days since you have had no symptoms.

Symptoms of COVID-19 infection

- *Most common symptoms* - Fever, dry cough, tiredness
- *Less common symptoms* - aches and pains, sore throat, diarrhoea, conjunctivitis, headache, loss of taste or smell, a rash on skin, or discolouration of fingers or toes
- *Severe symptoms* - difficulty breathing or shortness of breath, chest pain or pressure, loss of speech or movement

COVID-19 pandemic in India

The first case of COVID-19 infection in India was reported in Kerala on 30th January 2020. The patient had a travel history to China. The rise in cases was slow during the month of February, a dramatic increase was seen in the month of March, when a group of Italian tourists infected 14 people. From 6th March, screening at airports began. On 12th March, the first death in India by COVID-19 was reported and by March 15th 100 reported cases of coronavirus were confirmed.

Prime Minister Narendra Modi was prompt to take steps against coronavirus. He imposed “Janta Curfew”followed by 5 continuous lockdowns throughout the country for 3 months.

Janta Curfew
On 22nd of March, Sunday, India observed "Janta Curfew"from 7 a.m. to 9 p.m. as asked by the Prime Minister Narendra Modi. No one was allowed to leave their houses except for those working in essential services. The step taken was well in advance considering India's situation and helped to curtail the possible surge in the number of active cases. Janta curfew was the first step towards fighting coronavirus. As of March 22nd, India was still in phase 2 of the COVID-19 outbreak. At that time, there were 361 cases of COVID-19 and 3 deaths from the infection.

Apart from the "Janta Curfew"another major step taken by the Government on the same day was a ban on international flights to India for a week starting from 22nd March. All flights to India were banned from 5 p.m.

Lockdown in India
Lockdown is a situation in which people are not allowed to enter or leave a building or area freely because of an emergency. It is crucial to slow down and break the virus chain, lockdown and social distancing can help us to achieve it. On 24 March 2020, Prime Minister Narendra Modi ordered a nationwide lockdown for 21 days. Lockdown was extended for almost 2 months as there was a constant increase of the COVID-19 cases.

Lockdown phase 1 (25 March – 14 April)
The 21-day nationwide lockdown started from 25th March to 14th April. Funds were distributed for the daily wagers and poor people. The Indian Railway suspended passenger operations till 31st March. Indian Railway took the responsibility to deliver essential foods. Moreover, coaches were converted into isolation wards for COVID-19 patients. On 5th April, a Pan-India light off event took place for 9 minutes at 9 p.m., to cheer and show support to all essential services workers. Towards the end of lockdown phase 1, the rate of coronavirus cases declined sufficiently, from doubling in every one day to doubling in 8 days. This positive result from lockdown results persuaded State Governments to extend the lockdown.

Lockdown Phase 2 (15 April –3 May)
According to the Health Ministry data as of April 15, India stood at 10,815 and the death toll was at 353. Lockdown phase 1 was extended for another 19 days and is expected to end on 3rd May. A condition for relaxation of lockdown was announced- If an area has no new cases till 20th April, the lockdown will be terminated in those areas. But, if new cases emerged after termination of lockdown, it will be imposed again in those areas. On 16th April, areas were classified as "red", "orange"or "green"zones depending upon the number of cases in those areas. The hotspot areas were classified as "red"zones; moderate infection areas were "orange"zones and; areas with no infection were defined as"green"zones. Over the next few days various relaxations were made in several sectors such as agriculture, public work, retail shops with half-staff attendance. Arrangements were managed for people stranded because of the lockdown.

Lockdown Phase 3 (4 –17 May)
Lockdown was again extended for 2 weeks by the Ministry of Home Affairs (MHA) and the Government of India. The green zones included highest number of districts (319 districts). There were no coronavirus cases in this zone for the past 21 days. Limited movement was allowed in orange zones (284 districts) and red zones (130 districts) and; were under complete lockdown. Zone classification was done every week. According to the International Institute for Population the reproduction rate anticipated to fall to 0.975 and a further decrease to 0.945 can be expected if lockdown stays till 31st May.

Lockdown Phase 4 (18 –31 May)
Another 2 weeks extension by the National Disaster Management Authority (NDMA) and the Ministry of Home Affairs (MHA). Red zones were divided into containment zones and buffer zones. Containment zones is the area within 3km radius of the residence or isolation unit of a coronavirus positive case. Buffer zones is the area adjacent to the containment zone. It is upto 5km (in urban areas) radius and 7km radius in rural areas.

Lockdown Phase 5 (1 –30 June)
This phase is more focused towards the economy of the country and lockdown restriction to be followed only in containment zones. First phase of reopening the country "Unlock1"will begin from 8th June. Though curfews will be implemented from 9pm to 5am in all areas. The second phase of reopening will start from July and will be called "Unlock 2".

Coronavirus treatment
Currently, there are no medications or cure available for COVID-19 infection. Hence, alternative treatments that can

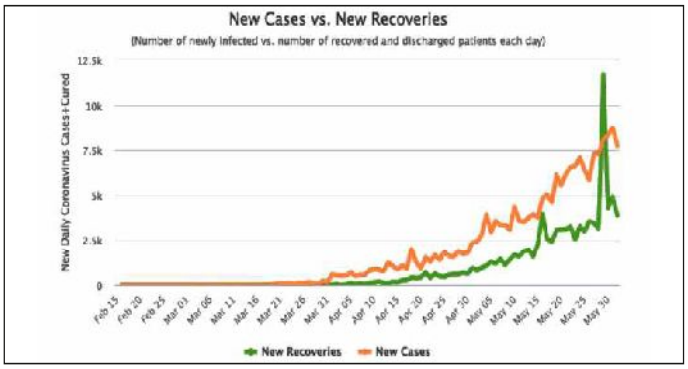

Image 2: The above image shows the number of new cases and the number of recoveries on a particular day from 15 Feb, 2020 to 30 May, 2020 in India.
Source: https://www.worldometers.info/coronavirus/country/india/

be helpful to manage symptoms are being used and vaccine development is underway. Three different kinds of coronaviruses have been identified in the past 100 years- MERS (Middle East respiratory syndrome), SARS (severe acute respiratory syndrome), and SARS-CoV-2. MERS and SARS have higher mortality rates than COVID-19. Symptoms of MERS and SARS are similar to COVID-19 as coronaviruses are responsible for all 3 of them. Currently, various therapies are used according to symptoms shown by the patient. These comprise of breathing support, such as mechanical ventilation, steroids to reduce lung swelling, pain relievers (ibuprofen or acetaminophen), blood plasma transfusions from COVID-19 survivors and antiviral or retroviral medications.

One drug that has been in the news for long is hydroxychloroquine. Hydroxychloroquine is being extensively used for the treatment of coronavirus. It works by hindering the attachment of COVID-19 to its ACE2 receptor, inhibiting its multiplication cycle. However, its efficacy is under suspicion. Various studies with opposing conclusions for the use of hydroxychloroquine plus azithromycin against COVID-19 infection have been reported. Even though WHO has suspended the use of HCQ (hydroxychloroquine) against COVID-19 due to disagreement about the effectiveness of the drug; India has continued to use it. The usage of hydroxychloroquine is accompanied with certain side effects such as headache, dizziness, stomach cramps, nausea, swelling, muscle weakness, vision disturbances. Besides, it is harmful for people with cardiac complications, arrhythmias and heart problems. Potential alternatives to hydroxychloroquine are favipiravir and remdesivir.

Conclusion

COVID-19 has emerged as a threat to human species in the past few months. Although numerous research groups have geared up for unravelling the secrets of the virus; it has several unfolded facts and figures associated with it.The only way to win the battle with this furtive virus is to limit interaction with others. With thousands of new cases everyday COVID-19 has not only bought a health crisis throughout the world but also socio-economic predicament. The year 2020, has definitely pronounced itself as a year to remember in the history!

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The Impact of COVID-19 on Olympic Aspirants

#By **Subhojit Chatterjee**

The novel coronavirus disease 2019 or Covid-19, inflicted by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has manifested itself into an ongoing pandemic; affecting millions of people across the globe and claiming tens of thousands lives worldwide. Covid-19's high contagious rate led to declaration of pandemic status on March 11, 2020 by The WHO, after which drastic control and reformatory measures were taken up on war footing to contain its spread. One severe consequence was the cancellation or postponement of several sporting events, including the most awaited Tokyo Summer Olympics 2020, originally scheduled to be held from 24 July till 9 August.

Image: Tokyo Summer Olympics 2020.
Source: TOI (Sports) e-paper, 25th March, 2020.

This caused widespread distress and mental trauma among the Olympic aspirants also halting their routine rigorous training which happens to be the most essential part of any athlete's lifestyle. So much so, that postponement of Olympics 2020 has caused many participants withdrawing from various sporting events over the past few months. With sports activities being entirely stalled worldwide, strategy and preparations of those gearing up for the Olympic Tokyo 2020 have been brought to an abrupt halt. During this pandemic, athletes have been likely exposed to some level of detraining i.e. the loss of training-induced morphological and physiological adaptations, as a consequence of insufficient training stimuli. Such changes may result in impaired performance and increased injury risk and may also lead to an inappropriate sport-specific reconditioning.

Suspending seasons or cancelling competitions can cause significant increase of stress, anxiety, frustration, and depression for an athlete. Indian participation in 2020 Olympics was highly looked up to with almost 74 sportspersons having girded their energy for about 7 sports. It is obvious that such a wide participant index includes persons of different age groups, hence response to its postponement is different from every age group. Younger athletes who were prospectively debuting their Olympics career are speaking up about their lost interest and vigor. On the other hand, senior players for whom it was the last Olympics season are doubtful about their performance efficiency next year. As a solution to this dilemma, melting away the psychological impact of COVID-19 on a competitive athlete is being potentiated currently by establishing a strong social support set-up and monitoring a 'work at home' training routine, as much as possible. This, for some athletes could be a critical factor of managing depression or anxiety. Under this scenario, it is required that sports scientists and coaches plan an interplay to provide supplementary mental health support for athletes, like, regular virtual contact with athletes, facilitating telephonic consultation with a sports psychologist, and encouraging family and friends by phone or video chat.

Not only sportspersons, but coaches have also received a substantial setback. As a solution to uplift their motivation level, Sports Authority of India (SAI) organized a well-coordinated webinar series from 16 April to 14 May. This

brilliantly conducted webinar saw many eminent sports scientists and researchers, including anthropologists, physiologists, psychologists, nutritionists, coaches, management authorities and even former national champions under one umbrella; delivering relevant talks regarding strategies to discuss upcoming scientific training procedures whenever these resumes.

It is understandable that the year 2020 was supposed to be a golden year for Indian sports scenario from viewpoint of multiple mega events, be it the 2020 summer Olympics or T20 Cricket World Championship. But COVID-19 posed to be the biggest deterrent. The only bright spots are chess and e-sports, which have gained popularity during the pandemic lockdown. There has been no estimate so far of the extent of financial loss that the sports world is facing. However, a back of the envelope calculation suggests enormous havoc. Deferring the Tokyo Olympics till July 2021 has likely cost the International Olympic Committee and Japan a loss of $6 billion. Multiple revenues have been lost and many sponsors cannot plan a way out of this. Apart from sportspersons, promoters and management authorities, thousand others engaged within the ecosystem of a sport/tournament like broadcasters, vendors and those in the hospitality and travel industries have been hit with the blow. As a step towards reserving the planned financial and business strategies, the XXXII Olympiad will keep the title Tokyo 2020 for promotion and branding purposes in spite of being held in 2021.

With normality in life creeping in slowly, it is sincerely hoped that the post pandemic world emerges stronger and India, in a literal sense, gets to keep the golden badge- be it our COVID-19 survival strategy or 2020 (read: 2021) Olympics.

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Should Plasma levels of Prothrombin Fr 1+2 be tested to assess the risk of COVID-19?

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COVID-19, refers to 'coronavirus disease-2019', the term used to describe 'pneumoniae like symptoms' which were first identified in group of people in Chinese city of Wuhan, in December 2019. Later on, the pandemic has expanded rapidly and still progressively spreading worldwide (Zhou, et al., 2020). The pathogenic agent for this pandemic is Severe Acute Respiratory Syndrome Coronavirus 2, (SARS-CoV2) which was earlier named as novel coronavirus 2019 (2019nCoV) (Wu, *et al.*, 2020). SARS-CoV2 belongs to a large group of coronaviruses which are enveloped positive-sense RNA containing viruses, named so, as morphologically envelope glycoproteins exhibit a crown like appearance containing a genome of about 27–32 kb (Kim, et al., 2020), showing in figure 1. Earlier than 2019nCoV outbreak, two other species of coronaviruses, SARS-CoV and MERS-CoV, have been held responsible for global pandemics viz. SARS (Severe acute Respiratory Syndrome) and MERS (Middle East Respiratory syndrome) which took place in 2003 and 2012 respectively.

Guided by the recent scientific updates, which suggest that, the 2019nCoV, shows close similarity with SARS-CoV and MERS-CoV, we have tried to compile the key information related to the three important pathologies (viz. SARS, MERS & COVID-19) and present it in a tabulated manner (Table 1). The information presented in this manner, shall prove beneficial in understanding the overlapping & discrete features of the three pathologies and thus, may clue a direction in development of diagnostic & therapeutic agents to control the ongoing COVID-19 spread (whose pathological mechanism still remains a great challenge).

Table 1: Features of SARS, MERS & COVID-19.

Disease	SARS Severe Acute Respiratory Syndrome	MERS Middle East Respiratory Syndrome	COVID-19 Corona Virus Disease	References
Occurrence	November, 2002	April, 2012	December, 2019.	Van Den Brand, *et al*., 2014, Memish, *et al*., 2020, Zhu, *et al*., 2020
Place first detected	Southern China	Saudi Arabia	Central China	van den Brand, *et al*., 2014, Memish, *et al*., 2020, Zhu *et al*., 2020
End of outbreak of viral pathogen	July 2003	According to WHO, till the end of January 2020, cases of MERS were reported.	The outbreak of COVID-19 is still continued.	WHO, SARS, 2020, Helmy, *et al*., 2020, WHO, COVID-19, 2020.
Viral pathogen	SARS-CoV	MERS-CoV	SARS-CoV-2	Memish, *et al*., 2020
Global outbreak	Total 8,096 people became sick worldwide during March, 2003. Out of which 774 were dead.	2519 were the confirmed cases including 866 deaths since April, 2012 till the end of November, 2019.	3595662 are the confirmed cases and 247652 are the deaths reported worldwide so far till 5th May, 2020 as per WHO reports.	Helmy, *et al*., 2020, WHO, MERS, 2020, WHO, COVID-19, 2020
Target receptor	SARS-CoV enters in its host cell by binding to the angiotensin-converting enzyme 2 (ACE2), as a receptor.	MERS-CoV virus enters in its host cell by binding to the DPP4/CD26 receptor.	As like SARS-CoV, SARS-CoV-2 also binds with ACE2 receptor. However, it was found that ACE2 binding affinity of SARS-CoV-2 was 10−20-fold higher than that of the SARS-CoV for this receptor.	Van Den Brand, *et al*., 2014, Memish, *et al*., 2020, Baig, *et al*., 2020
Genome Size	Over 30 kb.	Approximately 30.1kb long.	29.8 kb to 29.9 kb.	Khailany, *et al*., 2020, ECDC, MERS-CoV, Factsheet, 2020.
Sign & symptoms	SARS symptoms begin with high fever. It is also some time associated with chills, nonproductive cough, headache, body aches. Some people also experience mild respiratory symptoms and while others may suffer from diarrhea also.	MERS includes fever, cough, and shortness of breath. Pneumonia is common. Diarrhea has also been reported. Some people are asymptomatic also. Severe cases of MERS have shown respiratory failure and some people have had organ failure such as kidneys or septic shock.	The common symptoms of COVID-19 are fever, dry cough, nasal congestion, sore throat and difficulty in breathing. Sometimes there is body-aches or diarrhea.	CDC 24/7, 2004, WHO, MERS-CoV, January, 2019, WHO, Corona viruses, new-room, 2020
Incubation period	In case of SARS, the incubation period is of 2 to 7 days, although it may be as long as 10 days in some cases. It has also been reported up to 14 days in very small proportion of cases.	The incubation period of MERS is 2-14 days.	The incubation period for COVID-19, is on average 5-6 days. However, it can be up to 14 days.	CDC 24/7, 2004, WHO/MERS/SUR/15.2 Revision 1, June, 2018, WHO, COVID-19, Situation Report – 73, 2020

Vaccine	Till date no vaccine is developed. It is under experiment.	No vaccine or specific treatment is currently available for MERS till date. However, several vaccines are in development for MERS and treatment is totally depend upon the person's clinical condition.	WHO is coordinating for the development of vaccines and medicines for the prevention and treatment of COVID-19 and will provide the updated information as soon as results of research become available. However, no specific vaccines is available so far for COVID-19.	WHO, SARS-CoV, Vaccine, 2020, WHO, MERS-CoV, 20 December, 2018, WHO, Corona viruses, new-room, 2020
Method of spreading	SARS-CoV is transmitted through respiratory droplets either in the form of salivary droplets or nasal droplets. These droplets produces when an infected person coughs or sneezes. It also transmitted from an infected person's mucus membrane of eyes.	From the infected animals, it can be spread through nasal secretion, eye discharge, faeces and may also be present in their milk and urine. The virus may also be found in the raw meat of an infected animal. Whereas, very limited human to human transmission has been reported mainly in health care system.	It spreads through saliva droplets and discharge from the nose when an infected person coughs and sneezes. It is also thought to be spreaded from the mucus of the eyes of infected person.	CDC 24/7, 2004, WHO/MERS/RA/AUGUST18, 2018, WHO, Corona viruses, new-room, 2020
Source of Transmission	It is thought to be emerged from an animal reservoir, may be from bats that again spread to civet cats and finally spread among humans.	MERS-CoV is transmitted by dromedary camels. It does not passes easily from person to person unless there is close contact. So, human to human transmission is very rare.	According to the evidences, it is suggestive that SARS-CoV-2 has a zoonotic source. However, the transmission of this virus to human happened through animal species, one that is more likely to be handled by humans. Therefore, this zoonotic source could be a domestic animal, a wild animal, or a domesticated wild animal and, as of yet, has not been confirmed.	WHO, SARS, 2020, WHO/MERS/RA/AUGUST18, 2018, WHO, COVID-19, situation report–94, 2020
Laboratory Testing	• A reverse transcription polymerase chain reaction (RT-PCR) technique • Serological Testing • Viral culture testing (It can only be performed in a laboratory which has biosafety level III facility but not for routine diagnosis)	• RT-PCR Technique • Serologic testing • Viral culture testing • The MERS-CoV virus has been known to grow in various cell lines. However, culture testing of this virus is not carried out for routing diagnosis and is not attempted outside the specialized laboratories with appropriate biosecurity level 3	• RT-PCR testing • Serological testing • Viral culture testing (It is not recommended for routine diagnosis).	CDC 24/7, 2004 & Richardson, et al., 2004 WHO/MERS/SUR/15.2 Revision 1, June, 2018, COVID-19, Interim guidance, 2020
Clinical specimens for testing	• Serum, nasal secretions • Urine & faeces • Infected tissue or fluid: To grow in appropriate cells in which it can grow or survive for viral culture testing (but not employed for routine diagnosis).	• Lower respiratory tract (LRT) specimens: Broncho-alveolar lavage, sputum and tracheal aspirates. • Upper respiratory tract (URT) Specimens: a. Nasopharyngeal/ oropharyngeal swabs. b. Nasopharyngeal wash/nasopharyngeal aspirate.	• Lower respiratory specimens: Sputum if present, endotracheal aspirate and broncho-alveolar lavage. • Upper respiratory tract specimens: Naso-pharyngeal and oropharyngeal swab. • It can be detected in blood & stool as in case of SARS & MERS.	CDC 24/7, 2004 &Den Brand *et al.*, 2014, WHO/MERS/SUR/15.2 Revision 1, June, 2018, COVID-19, Interim guidance, 2020

		• Serum for RT-PCR. • Urine and stool (However, concentration of virus in these samples is found to be very low and cannot be used for diagnosis purpose)		
Key pathophysiological features (Based upon autopsy findings)	**Diffuse alveolar damage** with various degrees of acute exudate features including hyaline membranes formation, organization and fibrosis. Desquamation of alveolar spaces, macrophagic or mixed cellular infiltration including multinuclear giant cells, atypical reactive pneumocytes. Edematous lungs showing extensive consolidation. Squamous metaplasia of bronchial and alveolar epithelial cells, subpleural proliferation of fibrogranulative tissue in small airways and airspaces, loss of cilia of bronchiolar epithelial cells, hemophagocytosis in mononuclear cells residing in pulmonary tissue, apoptosis in epithelial cells, monocytes/macrophages, lymphocytes, pneumocytes, **Vascular injury**, presence of fibrous thrombi with or	Pneumonitis, respiratory failure, less commonly occurring symptoms include, hemoptysis & diarrhoea without any hint of fever, probably because MERS-Cov2, can alter antigen presentation, host immune response & modulate apoptotic pathway & mitogen-activated protein kinase pathways thus escapes the host immune system. Anemia, thrombo-cytopenia, leucopenia, liver function abnormalities (elevated AST, ALT, CK). MERS exhibits wider tissue tropism than SARS Necrotising pneumonia, acute kidney injury, portal & lobular hepatitis, myositis with atropic changes. Localization of viral particles in pneumocytes, pulmonary macrophages, renal proximal tubular epithelial cells & macrophage	Diffuse alveolar damage, chronic inflammation, airways inflammation, edema in bronchial mucosa, lymphocytopenia, injury to alveolar epithelial cells, hyaline membrane formation. Secondary changes such as liver may exhibit mild lobular infilteration, focal mild fibrosis, mild fibrosis in heart & myocardial hypertrophy. Asymptomatic or very mild to severe illness, sepsis and death. Infected patients show thrombocytopenia, risk of developing DIC, increased D-Dimer levels, increased fibrin degradation product levels, prolonged prothrombin time, Overt DIC, systemic inflammatory response, excessive activation of coagulation and platelets.	Gu, J. and Korteweg, C., 2007 Wong, *et al*.,2003; Ding, Y *et al*.,2003; Tse, G.M., *et al*.,2004; Nicholls, *et al*.,2003; Franks, *et al*.,2003 Xiang-hua, *et al*.,2010; Giannis, *et al*.,2020; Li, *et al*.,2016; Al-Abdallat, *et al*.,2014; Singh, S.K., 2016; Drosten, *et al*., 2013; Assiri, *et al*.,2013; Yang, *et al*.,2003; Lippi, *et al*., 2020; Wang, et al.,2020; Dolhnikoff, *et al*.,2020; Giannis, *et al*.,2020; Huang, *et al*.,2019; Chan, *et al*.,2006; Choudhry, *et al*.,2019; Jose, R.J. and Manuel, A., 2020; Alsaad, *et al*.,2018; Connors, J.M. and Levy, J.H., 2020; Cui *et al*.,2020; Oxley *et al*.,2020; Levi, M., 2007;
	without pulmonary infarction. **Autopsy indicated fibrin balls within airspaces** and features of organizing pneumonia. Dysregulation of cytokines, chemokines, deficiencies in innate immune response, direct infection of immune cells, direct viral cytopathic effects, downregulation of lung ACE2, injury to immune cells. Rise in alanine aminotransferase (ALT), lactate dehydrogenase (LDH), thrombocytopenia, lymphopenia, Depletion of lymphocytes in spleen and lymph nodes, Acute tubular necrosis, Edema and degeneration of neurons, myofiber necrosis, Destruction of follicular epithelial cells, Cardiac edema, and atrophy.	infilteration in skeletal muscles. May lack production of innate antiviral cytokines, delayed pro-inflammatory response, attenuates innate immunity, more lethal than SARS-CoV. Patient suffering from MERS show progressive pneumonia, large number of macrophages & neutrophils found in fluids present in the lungs. With limited/scarce data available, features are, thrombotic complications & hematologic manifestations. Thrombocytopenia, Disseminated intravascular coagulation (DIC) in fatal cases (non-survivors), intracerebral haemorrhage, multiorgan failure, ventricular tachycardia & cardiac arrest.	Endothelial dysfunction, elevation of vWF, Toll-like-receptor activation, tissue factor pathway activation. Procoagulant effect induced by viral infections due to activated interactions between monocytes, macrophages, endothelial cells, platelets and lymphocytes.	Yao, *et al*.,2020; Klok *et al*.,2020;

	Direct correlation between extent of fibrosis and duration of illness observed, Expression of proinflammatory cytokines, by ACE2 positive cells infected with SARS-CoV. (MIP-1α, RANTES, IP-10, IL-1, IL-6, IL-8, TNF-α, TGF-β & MCP-1. Observance of viral particles in macrophages in lungs,Increase in immunosuppressive soluble factors prostaglandin E2 & transforming growth factor-β in serum detected attributed to prolonged severe clinical course. Contrary to other viruses, SARS-CoV, does not induce significant interferon-α or β gene expression in infected macrophages, PBMC's or infected dendritic cells. Occurrence of an autoimmunity state, autoantibodies against pulmonary epithelial cells, endothelial cells cause of systemic vasculitis. Compromised immune response may lead to aggravation of SARS-CoV-induced lung injury. **Prominent vascular injury, systemic circulatory disturbance,Thrombotic complications, Hematologic manifestations:** Edema & fibrin Microthrombi in pulmonary, bronchial, and small lung veins, affecting pulmonary vasculature, deep vein thrombosis, multi-organ failure. Multiple organ thrombosis associated with polyangiitis and microcirculation disturbances, with ischemic stroke in few cases. In cases of fetus occurs intervillous and subchorionic fibrin deposition, avascular and fibrotic villi formation & prothrombotic tendency. Perturbed coagulation variables, prolonged prothrombin time, Activated Partial			

	Thromboplastin Time (APTT), elevated D-dimer and thrombocytopenia. Presence of anticardiolipin antibodies in patients with post-SARS osteonecrosis & with positive lupus anticoagulant test in children.			

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Based upon the above enlisted information, it is speculated that the pathologies of SARS-CoV, MERS-CoV & CoVID-19 although show major clinical manifestations in the form of respiratory failure but their complex etiologies involve additionally associated coagulation abnormalities, their consequences and interplay. It is of immense importance to understand that the autopsy findings clearly indicate that Disseminated Intravascular Coagulation (DIC) remains a common cause of death in SARS-CoV & in cases of CoVID-19 infected non-survivors, which however, could not be established as a prominent pathogenic factor in case of MERS, plausibly due to scarcity of data for autopsy studies. However, it is imperative to understand that in both the cases of SARS and COVID-19, non-survivors exhibit occurrence of DIC which remains an indispensable component of etiology associated to them. DIC which refers to Disseminated Intravascular Coagulation is a syndrome, which is rare but a serious condition that involves hyperactivation of coagulation cascade (Levi, M., 2007; Levi, M. and Ten Cate, H., 1999). More importantly, DIC is an outcome of an underlying disorder (which presumably remains inflammation, infection or vessel injury in case of CoVID-19 also), and leads to the activation of coagulation cascade. Hyperactivation of this coagulation is eventually compensated by the counteracting fibrinolysis which if persists ultimately leads to bleeding and multiorgan dysfunction. The elevated levels of peripheral markers viz. D-Dimers are fibrin degradation products (FDPs) reflect this phenomenon of microthrombi formation and then degradation. However, it is important to note that DIC may develop quickly over hours, days or more slowly. Since, early stages of DIC are characterized by hypercoagulation hence, it is advisable to target 'coagulation variables' as one of the markers for assessing the risk of development / progression of disease. More specifically, Prothrombin fr 1+2 which is used as a marker for coagulation activation (thrombus forming stage) should be involved in testing rather than only D-Dimer, FDPs which are formed as a result of fibrinolysis (thrombus dissolution stage) (Haeberli, A., 1999), to assess the risk of disease and screening of individuals. Further, there are studies to show that a systemic activation of coagulation produces an alteration in plasma levels of Prothrombin Fr 1+2 and thus help in understanding the pathophysiological state (Gupta et al., 2017).

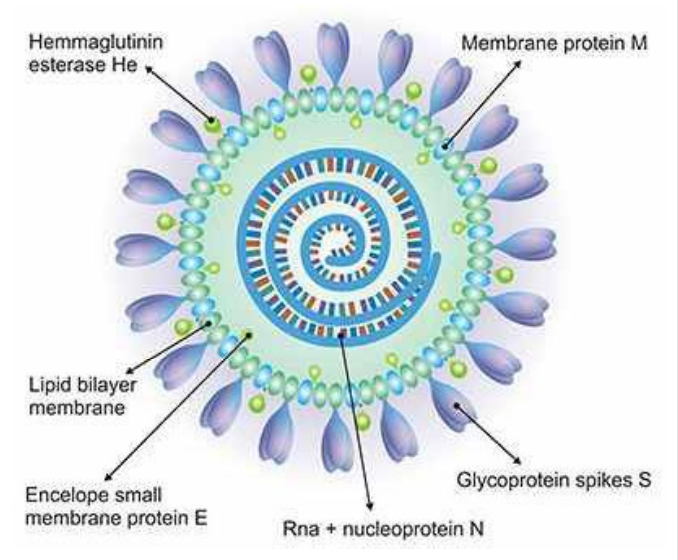

Figure. 1: The structure of Coronavirus
Source: https://www.cusabio.com/2019-novel-coronavirus.html.

In view of the present information, it is suggested that alongwith testing the genome of COVID-19, detection of elevated levels of coagulation variable 'Prothrombin Fr 1+2'in plasma samples, shall constitute a better approach to assess the risk of developing COVID-19 and will be helpful in screening large number of suspected cases.

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A POEM…

Every Day is Earth Day

Every Day is Earth Day
An opportunity to find a new way
To save and protect our beloved Earth
For all that she is worth.

Her beauty is spellbinding
With trees towering above the skies
And birds filling it with their melodious cries.
The fiery sun casts everyone with its ethereal light
While the mountains stand tall in all their might.

Mother Earth gives its gifts for all to share
For she is the one who truly cares.
Be it rich juicy fruits in summer
Or quenching water that sparkle and glimmer.

She is kind, selfless and wise
Giving her gifts to all creatures, be it elephants or mice
But hold on a minute, do we humans really care
Whether Mother Earth is treated fair?

Humans have returned their gratitude
By dumping garbage into the blue seas
By mercilessly killing animals for food
And exploiting natural resources until there's no good.

Forests have been burnt with precious biodiversity lost
And all of this for what greater cost?
So that mankind can live lavishly in peace
Forgetting the very fact that Mother Earth's fury never cease.

This recent pandemic is just a way to make us realize
How we humans are powerless against nature's fury.
So today, my dear friends, take a step but think twice
Lest in the future, it's too late to feel sorry.

The time of action is NOW
To restore what's been damaged somehow.
"Plant a tree, plant a life"
Is what should be our everyday strife.
Let us cleanse our garbage-clogged oceans
And put a standstill to air pollution.
This is the time to adopt a new life, a new way
For Every Day is Earth Day.

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YOGA: An Ancient Indian Therapy

Dr. Anuja Bhardwaj
Editor, Newsletter, STE

Definition

India owing to its eternal culture, spiritual eminence and Yogic excellence prevails as a unique nation throughout the world (Sitharamiah, 1980). Yoga is one of India's most invaluable contributions to the world culture (Gokhale, 2020). It is a practical discipline integrating varied forms of practices which aim to develop a state of mental and physical health, inner harmony, well-being and ultimately "a union of the human individual with the universal and transcendent existence" (Jeter *et al*., 2015). The term "Yoga" is derived from Sanskrit word "*Yuj*" meaning to join or to yoke (Sitharamiah, 1980). It is a path of self-discipline which emphases on practices such as postures (*asana*), breath-regulation (*pranayama*), control over the senses (*pratyahara*), meditation (*dhyana/samadhi*) or austerity (*tapas*) (Gokhale, 2020; Jeter *et al*., 2015).

Origin &Establishment of Yoga

The science of Yoga originated thousands of years ago (https://mea.gov.in/in-focus-article.htm?25096/Yoga+Its+Origin+History+and+Development). It is believed that the practice of Yoga begun during the Indus-Sarasvati civilization in Northern India over 5,000 years ago. In the yogic sagacity, Lord Shiva, also called ***Aadinatha Bhairava***, is recognized as the primordial founder and proponent of all techniques of Yoga (Sitharamiah, 1980; https://mea.gov.in/in-focus-article.htm?25096/Yoga+Its+Origin+History+and+Development). Yoga was first mentioned in Rig Veda, and is a collection of texts that consisted of rituals, mantras, and songs which was mainly used by Brahmans, the Vedic priests. Yoga was slowly developed by Brahmans who eventually documented their practices and beliefs in the Upanishads that has over 200 scriptures (https://www.replenishliving.com/a-short-history-of-yoga-in-india/). The historical evidences for the existence of Yoga practices and the related literature are

available in Vedas (4), Upanishads (108), Smritis, teachings of Buddhism, Jainism, Panini, Epics (2), Puranas (18) etc. (https://mea.gov.in/in-focus-article.htm?25096/Yoga+Its+Origin+History+and+Development). Yogic practices have perpetuated throughout the history and have marked their impacts in the modern era also. Accordingly, the history of Yoga has been categorized into six main epochs of practice, development and reference. These are: pre-vedic (about 3300 to 1300 BCE), vedic (1700 to 500 BCE), pre-classical (500-200 BCE), classical (200 BCE to 800 A.D.), post classical (800 A.D. - 1700 A.D) and modern (1700 - 1900 A.D.) (https://www.learntoloveyoga.co.uk/a-brief-history-of-yoga/). Today, Yoga is practiced in various forms and is progressively gaining popularity throughout the globe (https://www.un.org/en/observances/yoga-day). Everybody in the contemporary times, has conviction about yoga practices towards the maintenance, preservation and promotion of health (https://mea.gov.in/in-focus-article.htm?25096/Yoga+Its+Origin+History+and+Development). Globally, several Yoga therapy centers; the inclusion of Yoga programs in hospital cancer programs and affiliated alternative medicine centers have been set up. A new class of clinicians called Yoga therapists, for which there are yoga therapy training programs have also emerged. There are now also several dozen books available specifically on the topic of yoga therapy in general, and even in yoga therapy for specific disorders (Jeter *et al*., 2015).

TYPES OF YOGA

Yoga is diversified into various types, forms or paths depending upon the focus or goal of that particular Yogic practice (Gokhale, 2020). There are as many ways to practice Yoga. However, current practice involves four primary types of Yoga: Karma, Bhakti, Jnana, and Raja (Image 1) (Gokhale, 2020; https://us.humankinetics.com/blogs/excerpt/the-four-primary-types-of-yoga).

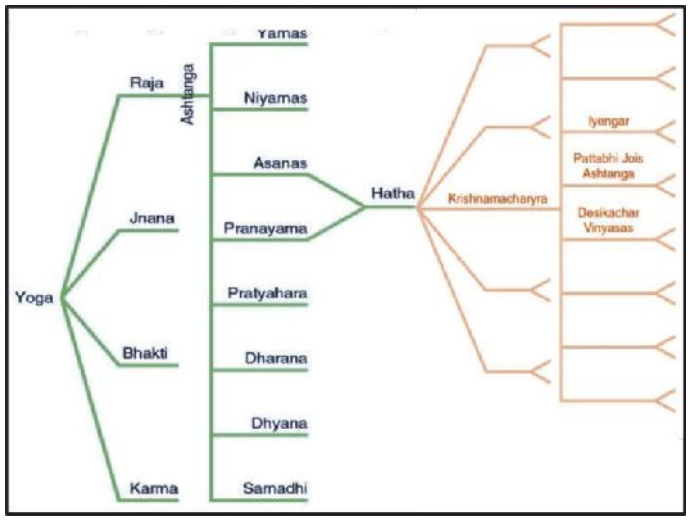

Image 1: The Yoga Lineage.
Source: https://us.humankinetics.com/blogs/excerpt/the-four-primary-types-of-yoga

Karma Yoga is the path of service through selfless action for the good of others.

Bhakti Yoga cultivates the expression and love of the Divine through devotional rituals. Forms of this path include regular prayer, chanting, singing, dancing, ceremony, and celebration.

Jnana Yoga is the path of intellect and wisdom, and its components include study of sacred texts, intellectual debates, philosophical discussion, and introspection.

Raja Yoga, also known as the "royal path," refers to the journey toward individual enlightenment. This path consists of balancing the three main Yoga types just described - Karma, Bhakti, and Jnana - while integrating the eight limbs, or stages of Yoga (The Eight Limbs of the Royal Path).

Hatha yoga is represented as a combination of the third and fourth limbs of the royal path - that is, *asana* and *pranayama* (Image 1).

Hatha yoga is the type generally practiced in modern (and especially Western) society. The word hatha is usually translated from Sanskrit as "sun and moon," with **ha** signifying sun energy and **tha** signifying moon energy. Balancing the active **ha** energy and the more calming **tha** energy is the ultimate aim of hatha yoga practice. Hatha is also translated as "forceful", and this translation is included in the *Hatha Yoga Pradipika* - a classic text used by those who study hatha yoga. Some practitioners have expounded that this translation is appropriate because hatha yoga requires great physical effort. On a symbolic as well as a physical level, then, hatha refers to a balancing of energies or forces. Besides Hatha Yoga, Raja Yoga includes: Kundalini Yoga, Laya Yoga, Mantra Yoga, Kriya Yoga, Tantra Yoga and Yantra Yoga.

The Eight Limbs of the Royal Path (or stages of Yoga**)** (Image 2) are a set of Yogic practices outlined in the text of the *Yoga Sutras*. It was sage Patanjali who is known as the "father of yoga," offered a re-interpretation of Yoga in an organized, written documentation illustrating the theory and Yogic pathways which he called "the eight limbs" towards self-knowledge and enlightenment (https://www.zenagoy.com/blogs/the-blog/history-of-yoga-timeline).

INTERNATIONAL DAY OF YOGA

"Yoga is an invaluable gift from our ancient tradition. It embodies unity of mind and body; thoughts and actions; restraint and fulfillment; harmony between man and nature; and is a holistic approach that is valuable to our health and well-being. Yoga is not just about exercise; it is a way to discover the sense of oneness with yourself, the world and the nature." These were the words delivered by Shri Narendra Modi, Prime Minister of India during the opening of the 69th

session of the General Assembly. He was the first one to propose a draft resolution establishing the International Day of Yoga (IDY) on behalf of India and was endorsed by a record 175-member States. The resolution noted "the importance of individuals and populations making healthier choices and following lifestyle patterns that foster good health." Acknowledging its universal appeal, the United Nations on 11 December 2014, proclaimed 21st June as the International Day of Yoga by resolution 69/131. The International Day of Yoga aims to raise awareness worldwide of the many benefits of practicing yoga (https://www.un.org/en/observances/yoga-day).

International Day of Yoga Celebrations in India (2020)

In its 'Common Yoga Protocol' from 2019, the Ministry of Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homoeopathy (AYUSH) lists *Yama, Niyama, Asana, Pranayama, Pratyahara, Dharana, Dhyana, Samadhi, Bandhas* and *Mudras, Satkarmas, Yuktahara, Mantra-japa, Yukta-karma* among popular Yoga '*Sadhanas*'. The AYUSH protocol has presented and described the logo for the International Day of Yoga which has been accepted globally (https://indianexpress.com/article/explained/explained-why-is-international-yoga-day-observed-on-june-21-6469756/). The description is given in the image below (Image 3).

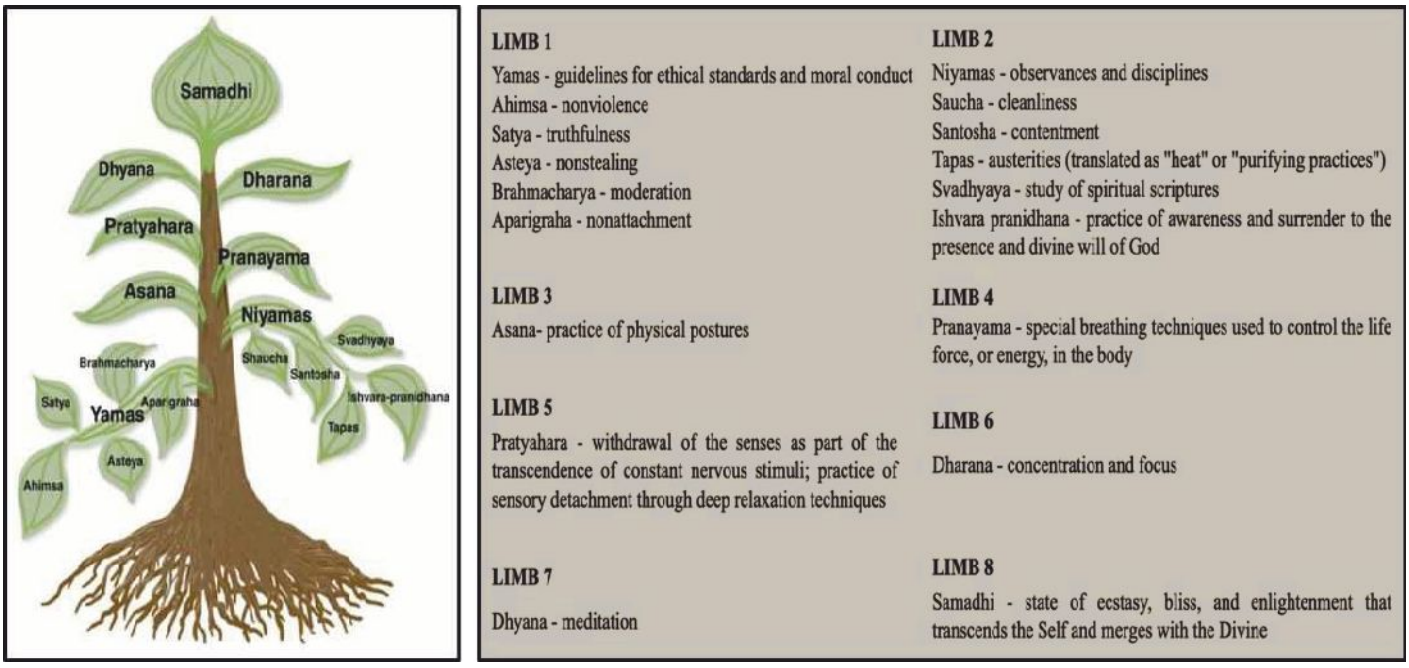

Image 2: The Eight Limbs of the Royal Path.
Source: https://us.humankinetics.com/blogs/excerpt/the-four-primary-types-of-yoga

This year the sixth edition of International Yoga Day amidst the adversities of the ongoing coronavirus pandemic was celebrated with the theme, '***Yoga at Home and Yoga with Family***' (https://www.hindustantimes.com/more-lifestyle/international-day-of-yoga-2020-when-was-it-first-celebrated-why-and-the-theme-of-international-yoga-day/story-vIgG1ejG4fIrHXEmk1Cg3K.html). International Day of Yoga was celebrated on digital media platforms and Prime Minister Narendra Modi joined the Nation virtually while performing Surya Namaskar at Purana Qila and sent his message, highlighting the significance of the occasion. The minister also posted a video message on social media and urged all to share their Surya Namaskar videos with ""#10MillionSuryaNamaskar & #NamasteYoga" hashtags on social media platforms so that it could become a public movement and create health awareness among fellow citizens (https://economictimes.indiatimes.com/news/politics-and-nation/hoping-10-million-people-will-join-me-in-performing-surya-namaskar-on-yoga-day-union-culture-minister/articleshow/76482016.cms?from=mdr). Individuals and families

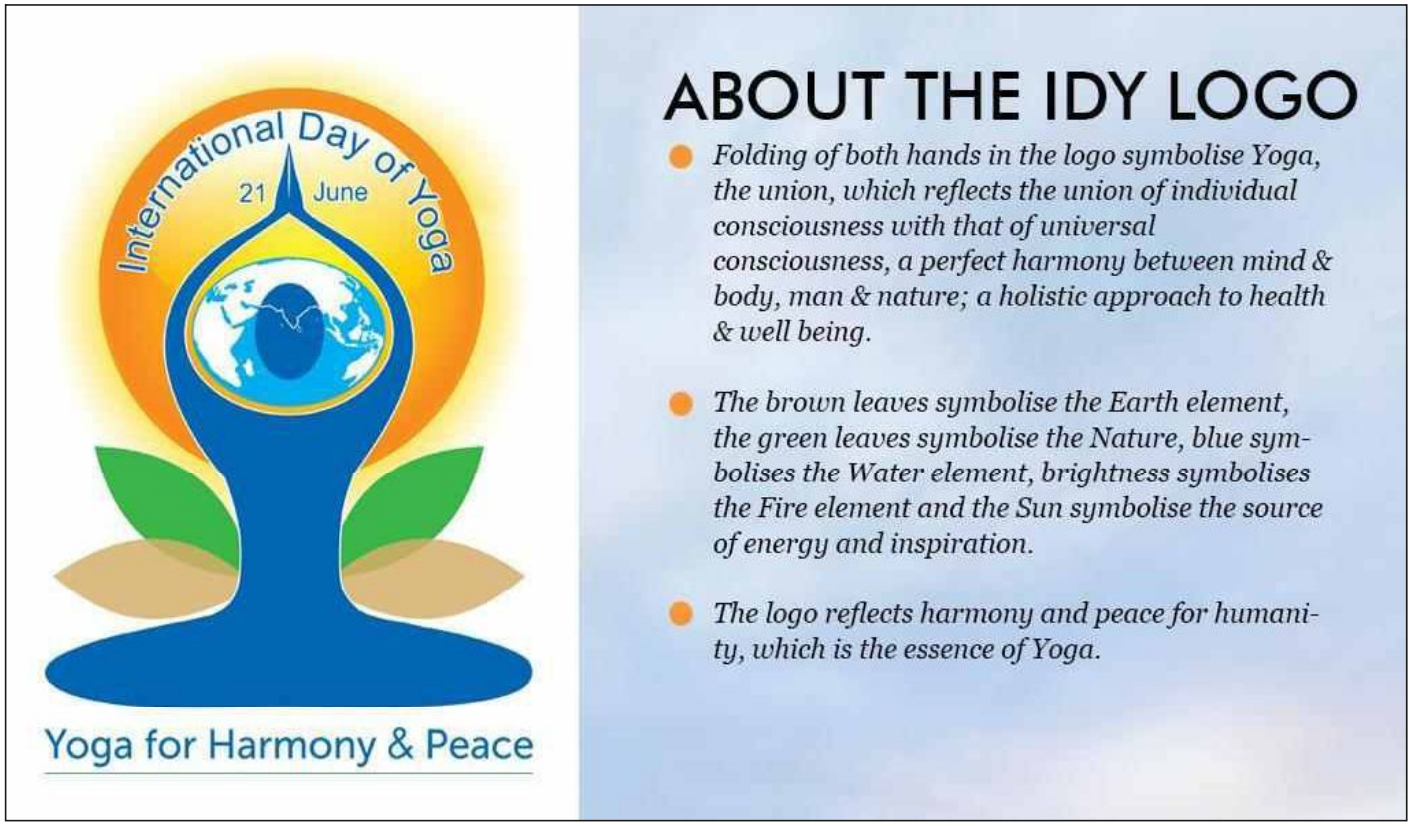

Image 3: Logo of International Day of Yoga (IDY).
Source: https://www.jatinverma.org/explained-why-international-yoga-day-is-observed-on-june-21

syndrome, migraine, menopausal symptoms, stress and many more (Manchanda, 2014). It has also shown to have important psychological benefits such as improved mental balance and; development of positive feelings and decrease in negative feelings of aggressiveness, depression and anxiety (Stephens, 2017).

Recently, the incidence of COVID-19 disease has highlighted several health-related facts associated with its severity. It has been reported that immunocompromised individuals including aged people above 60 years and children below 10 years and; patients with co-morbid conditions such as cardiovascular conditions, renal complications and diabetes, etc. are more prone to the infection (Chadha, 2020). Besides, limited social interactions due to lockdown and as a preventive measure against the COVID-19 infection along with economic crisis leading to lay-offs and unemployment has resulted in stress, depression and anxiety. Thus, it is imperative to mention that Yoga is one of the best preventive and curative therapy to curb the health issues associated with COVID-19 infection. Certainly, the continuation of promoting Yogic practices by the Governing authorities even during the COVID-19 predicament is a driving force for people around the globe for a healthy life in a holistic manner.

How Yoga Works?

Hitherto, we have mentioned the significance of Yoga and its relevance to mankind at physiological, mental and spiritual levels. However, it is important to understand that how Yoga works to develop a healthy mind, body and soul holistically.

The Science Behind Yoga

Parasympathetic nervous system

Yoga brings the autonomic nervous system (ANS) into healthy balance by stimulating the parasympathetic nervous system (PNS). The ANS has two main divisions: sympathetic nervous system (SNS) and parasympathetic nervous system. Several internal physiological processes such as blood pressure, heart and breathing rates, body temperature, digestion and metabolism, etc. are controlled by ANS. The SNS is called as “emergency response system” and in contrast the PNS is known as “rest and digest” mechanism of our nervous system. The PNS stimulates blood flow to the brain, digestive system, extremities and sexual organs (Stephens, 2017). The yogic practices

comprising of posture (asanas) and movement; meditation techniques along with the breathing exercises improve the parasympathetic tone (Stephens, 2017; Wheeler et al., 2019). This facilitates in reducing heart rate and blood pressure, increasing heart rate variability (HRV) and eases one's respiration. These consequences further promote release of prolactin and hormone oxytocin and reduces circulating levels of cortisol and hence, norepinephrine which are released in response to stress. The release of prolactin and oxytocin helps to foster feelings of friendship, calmness and bonding with others. A reduction in norepinephrine output helps the body to relax and quiet down with reduced respiratory rates and heart rates. The diminishing levels of cortisol, upon reaching a given threshold exhibits a negative feedback on the hypothalamus and pituitary gland. Consequently, adrenocorticotrophic hormone (ACTH) from the pituitary gland and corticotrophin-releasing factor (CRF) from hypothalamus are not released which are otherwise, released during "fear and flight" or what is called as "sympathetic drive". This entire process helps in balancing different bodily processes including digestive, immune function and energy expenditure and storage (Stephens, 2017).

Neurotransmitters

Yogic practices can increase multiple neurotransmitters and hormones such as gamma-aminobutyric acid (GABA), serotonin and dopamine which function as natural anti-depressants (Stephens, 2017; Wheeler et al., 2019). These have been shown to initiate sleep, improve sleep quality and regulate it by increasing melatonin levels, besides, elevating the levels of the bonding hormone, i.e., oxytocin, thus, helping with the feelings of connectedness and "being seen and heard" (Stephens, 2017).

Telomeres

Yoga and meditation keep our minds and bodies from withering with age by potentially stabilizing, and even lengthening telomeres. Telomeres are small, repetitive, chromosomal sequences found at the end of the chromosome which keep them stable and protect from deterioration and cell death (Stephens, 2017).

Inflammation

Inflammation is the body's natural immune response to infection, injury and stress. However, prolonged and chronic inflammation can cause development of chronic clinical conditions such as type II diabetes, atherosclerosis,

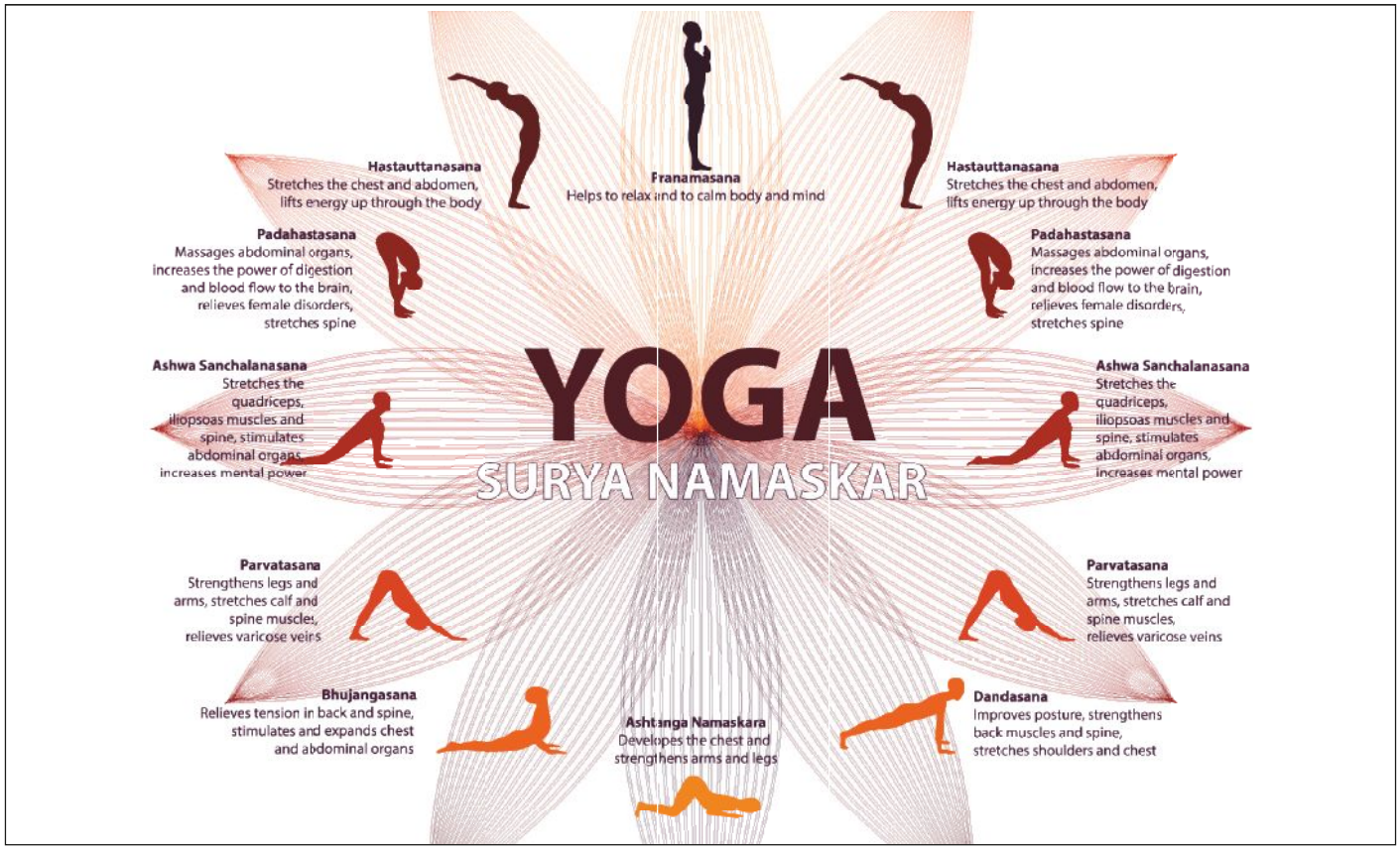

Image 4: Benefits of Suryanamaskaror Sun Salutation.
Source: https://www.boldsky.com/health/diet-fitness/2017/how-surya-namskar-works-like-a-full-body-workout-110403.html

cardiovascular diseases (CVD), autoimmune diseases and age-related diseases. In various investigations, Yoga has been reported to reduce inflammatory markers such as C-reactive protein and other inflammation cytokines in the blood, while increasing levels of multiple immunoglobulins and natural killer cells, which are important components of immunity (Ross and Thomas, 2010; Infante et al., 2014; Bhargav et al., 2012). It has also been reported previously that those who practice Yoga regularly have higher levels of leptin and adiponectin in their bodies, both natural chemicals that work to alleviate inflammation in the body. Adinopectin has been found to be a key component of endothelial function and is cardioprotective (Stephens, 2017).

Joint diseases

In particular, Yoga incorporates important elements of body awareness such as proprioception, coordination, balance and postural alignments, all of which are particularly important in individuals with joint diseases. In fact, Yoga therapy has been shown to improve pain, back function, spinal mobility, depression and anxiety in patients with chronic low back pain to a greater degree than physical therapy (Tilbrook et al., 2011; Tekur et al., 2012).

Cardiovascular diseases

Cardiovascular diseases (CVD) encompasses a broad spectrum of syndromes including atherosclerosis, stroke, arrhythmia, hypertension, hyperlipidemia, heart disease and peripheral vascular disease, and is the leading cause of mortality, morbidity and disability worldwide. Multiple risk factors are known to cause oxidative stress, leading to endothelial disruption and dysfunction. These include dyslipidemia, diabetes, hypertension, obesity, smoking and psychological stress, which can in turn start a cascade of events involving inflammatory and vasoactive mediators in particular, interleukin-6, fibrinogen, C-reactive protein and tumor necrosis factor-alpha, that lead to the development of CVD. According to the American Heart Association, Yoga practices can help to lower blood pressure, increase lung capacity, improve respiratory function and heart rate, improve circulation and improve muscle tone (http://www.heart.org/HEARTORG/HealthyLiving/PhysicalActivity/). As previously, discussed, Yoga can reduce stress both by balancing the ANS with increased parasympathetic and reduced sympathetic activities, respectively, thus, optimizing and restoring body's homeostasis as well as decreasing the reactivity of the hypothalamic-pituitary-adrenal (HPA) axis. The HPA axis regulates and enables to control many different bodily processes such as response to stress, immune function, digestion and energy expenditure and storage. By decreasing both of these pathways, Yoga can interrupt multiple different inflammatory events on the cascade towards CVD and enhance cardiovagal function (Innes et al., 2005).

Pediatrics

In today's world due to various new demands and standards such as overstimulation through technology, internet and social media; ever-growing peer pressure and pressure to succeed academically has resulted in a “stresses-out” generation. This stress among children is progressively in an uncontrollable manner with fewer ways to cope up and manage the stressors. As with adults, when children internalize stress, it is often manifested physically, resulting in health issues such as insomnia, chronic abdominal pain, headaches, depression, anxiety and mood swings (Krishna and Pal, 2014; http://www.todaysparent.com/family/family-health/yoga-for-kids-how-to-calm-little-minds/). According to the National Institute of Health, children who practice Yoga have an increased sense of self-awareness and self-confidence. Concentration skills are enhanced (Thiyagarajan et al., 2015; Stephens, 2017). These learned mind body skills can also help a child to reexamine a difficult or even a painful experience into one that bolsters their sense of resiliency (Gard et al., 2014; Rosen et al., 2015). This in turn may contribute to improved attention, self-esteem, empowerment and good mental health (Hagen and Nayar, 2014; Khalsa, 2013; Khalsa and Butzer, 2016).

Conclusion

Yoga is a holistic intervention aimed at emotional, physical, mental and spiritual health. Several studies have reported efficacy of Yogic practices in regulating blood glucose levels, improving musculoskeletal ailments and regulating the cardiovascular system. Moreover, the practice of Yoga has affirmed augmentation of mental energy and positive feelings; and decrease in negative feelings of aggressiveness, anxiety and depression. Therefore, it is important that Yoga must be incorporated as part of our daily routine for a healthy life. It should be included in the curriculum of students at schools and colleges as well as people at work. Ancient India has rewarded mankind with the technology of Yoga for living a healthy and soulful life. The Yogic practices should be disseminated worldwide for its practical health benefits and should be well promoted for that matter.

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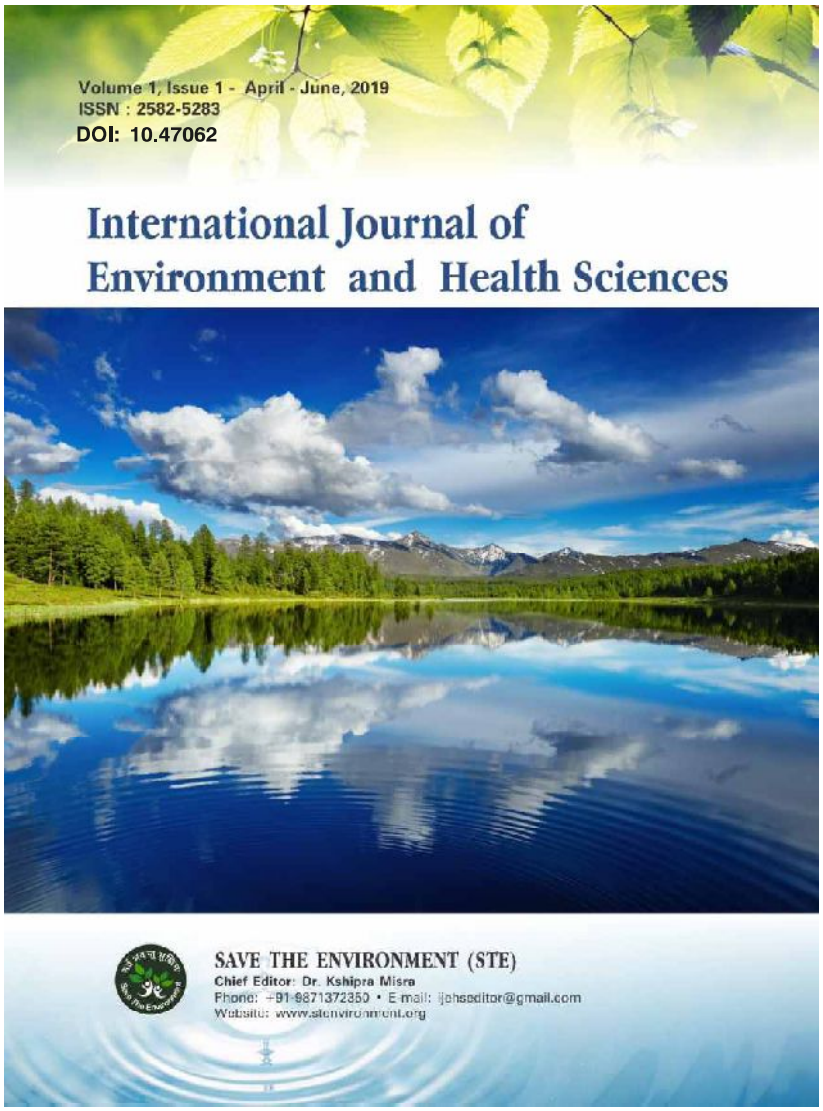

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