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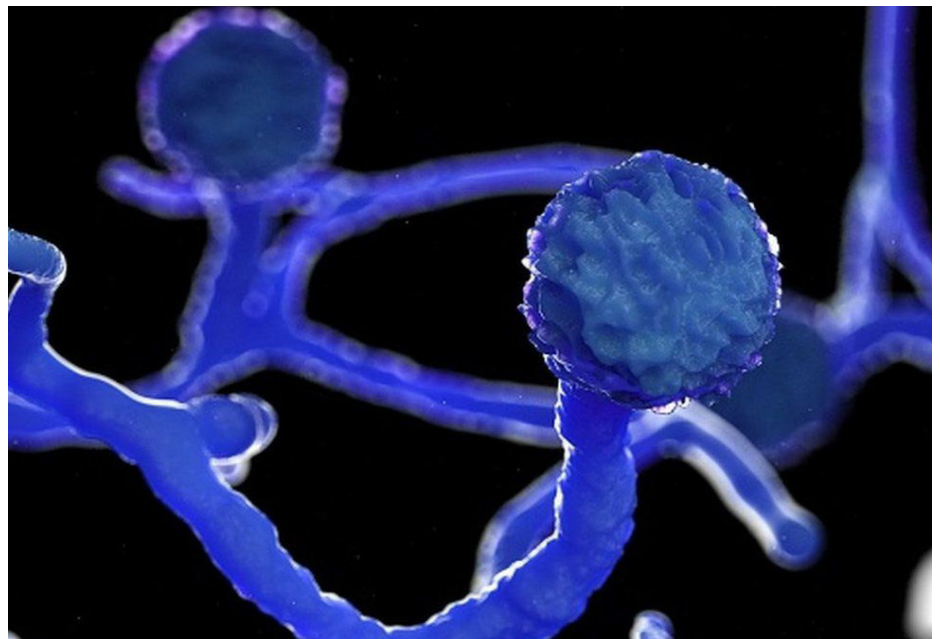
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Intracranial Mucormycosis in COVID-19 Patients Decoded

The recent spike in Mucormycosis or “black fungus” cases in post COVID-19 patients has emerged as a cause for concern, with a number of states in the country declaring it an epidemic. India alone accounts for about 70 percent of the global COVID-associated Mucormycosis cases.

It is important to note that India has high prevalence of diabetes mellitus,



Dr. Pratima Murthy takes the helm as Director of NIMHANS



Dr. Pratima Murthy, Professor and Head of the Department of Psychiatry, NIMHANS took charge as full-term Director of the Institute on 18th June 2021.

Dr. Pratima brings about 30 years of extensive experience and exceptional accomplishments in the field of mental health. A well-recognized leader in addiction psychiatry, she has been instrumental in the successful development of state-of-the-art Centre for Addiction Medicine at NIMHANS.

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the underlying condition that predisposes to Mucormycosis infection. During the “second wave”, indiscriminate use of steroids in COVID patients — specifically those with undiagnosed or latent diabetes mellitus — is said to be one of the major causes of black fungus. The use of industrial grade oxygen, iron and zinc supplements, poor sanitization in ventilators and humidifiers are also some of the controversial contributory factors for the rise in Mucormycosis cases in the country.

Mucormycosis infection is extremely rare in healthy individuals. The first reported case of central nervous system involvement by Mucor species was given by Arnold Paltauf in 1885. Immunocompromised conditions

like post-organ transplants, hematological malignancies, commonly uncontrolled diabetes mellitus, prolonged steroid use, etc. are predisposing factors. Rhino-oculo-cerebral involvement is the commonest pattern of presentation of Mucormycosis and is frequently seen in patients with uncontrolled diabetes mellitus and diabetic ketoacidosis.

Epidemiology of Mucormycosis

Even in the pre-COVID-19 era, the epidemiology of Mucormycosis in India was strikingly distinct from the western world.

The estimated prevalence of Mucormycosis in the country (14 cases/ 100,000) is nearly 70 times

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She has served as a consultant to prominent international agencies such as the United Nations Office on Drugs and Crime (UNODC), the International Labour Organisation (ILO) and the World Health Organisation (WHO). She has also served as a resource person for various flagship training programmes in substance abuse prevention and tobacco cessation in the country, and across the globe.

Dr. Pratima is also recognised for her contribution in improving care for persons with mental illness through her work with the National Human Rights Commission on quality assurance in mental health care, both in institutions and in the community.

In recognition of her research and academic excellence, Dr. Pratima has received numerous awards and honours including the prestigious Dr. Raja Ramanna State Award by the Government of Karnataka and Lifetime Achievement Award from Rotary. Recently, she was honoured with the WHO Regional Director's Special Recognition Award on 'World No Tobacco Day 2021' for her remarkable service in tobacco control. A prolific author, she has more than 300 research publications in various international indexed journals and scientific books to her credit.

Dr. Pratima received her MBBS degree from Bangalore Medical College in 1985. She obtained DPM and MD (Psychological Medicine) from NIMHANS in 1987 and 1989 respectively. She joined as a faculty at her alma mater in 1993, and has worked in various academic capacities since then. She is a Fellow of the Royal College of Physicians (FRCP)-Glasgow.

Message from the Director

It is with immense pride and a deep sense of commitment that I begin my service as the Director of NIMHANS. To represent and work for this prestigious Institute is not only a great honour but also a great responsibility that I hope I can discharge to the best of my ability.

Gratitude is indeed the best attitude. I take this opportunity to acknowledge my illustrious predecessors who laid the foundation of this Institute, nurtured its growth to the present stature, and embellished it with many recognitions and accolades over decades.

An institution is made from more than just brick and mortar. It is shaped by committed people and the ways in which they work concertedly for a common cause. Our faculty, nursing and administrative staff as well as students are the bedrock and pillars that hold the Institute together. With ceaseless zeal, they are always in pursuit of excellence—continually pushing themselves to raise the bar in patient care, research and innovation.

We are now at a transitional point. Growth brings numerous challenges, and the COVID-19 pandemic has brought even greater ones. We have been through rather testing times, and such predicaments can periodically

revisit us in different forms. When we reflect back on the unprecedented upheaval we have faced, we will remember the many examples of hope and community spirit. Our people have shown remarkable agility and resilience in these extraordinary circumstances. However, it is vital to remain cautiously optimistic and vigilant by strictly complying with all the health and safety measures.

Our faculty, staff and students have also exhibited astounding tenacity and ability to quickly innovate as we adjust to the new normal. It is crucial to accelerate digital transformation by making appropriate use of current technology. Efficacious use of digital resources can improve teaching, stimulate learning and transform the way we provide care.

As we gear up for new and exciting chapters in the Institute's history, let us all join hands to pursue our vision for the Institute and forge a bright future. I hope the next few years will bring more developments, greater scientific accomplishments, higher standards in all the areas of our work, and contentment in ourselves and those we serve. Together, we will take our Institute to new heights without compromising what makes us, uniquely, NIMHANS.

Dr. Pratima Murthy



World No Tobacco Day: Quitters are Winners

“Quitters never win” goes the adage, but when it comes to tobacco, quitters are the real winners. NIMHANS, by holding various meaningful events to mark World No Tobacco Day under the theme “Commit to Quit”, reiterated its commitment to push ahead on tobacco control.

A month-long social media campaign called “Own your power - I am the champion of my story” was taken up by the Department of Mental Health Education. The campaign called forward the champions who have



Various IEC materials developed by the Department of Mental Health Education and National Tobacco Quit Line services were released at the valedictory ceremony of World No Tobacco Day

Conversation with Health Minister

Dr. K. Sudhakar, Hon'ble Minister for Health & Family Welfare, Government of Karnataka, shared his discussion with Dr. Pratima Murthy on tobacco usage and importance of quitting through his podcast 'Nanna Maatu' and tweeted about the same. The discussion video reached thousands of people through the minister's social media handles—empowering tobacco users to make a quit attempt, and creating awareness on services proven to help tobacco users quit successfully.



successfully quit tobacco to share their stories. The campaign received an overwhelming response from across the country. Their touching stories along with their undying resilience to quit tobacco would have unequivocally inspired a lot of people. The stories were posted on Instagram, Facebook and Twitter on a daily basis, which were further shared and reposted by a lot of people.

The counsellors of the National Tobacco Quit Line services (NTQLs) recorded a two-minute video content explaining the harmful effects of tobacco usage and simple ways to overcome it and opportunities to avail professional help. The videos were developed in Kannada, Telugu, Tamil, Malayalam, Hindi and English by the counsellors, with the technical support from the photography section of the Department of Mental Health Education. The videos were uploaded on NIMHANS website and YouTube channel, and widely circulated on other social media platforms.

IPS officer TP Shivakumar, noted actress Milana Nagaraj, and other celebrities also joined the campaign, encouraging the public to avail the services of the National Tobacco Quitline and motivating people to commit to quit tobacco through their video messages.

One-day webinar was organised by the Department of Psychiatric Social Work and Centre for Addiction Medicine, NIMHANS in association with Navodaya Dental College and Hospital, Department of Public Dentistry and NSS, Raichur on 31st May, the eve of World No Tobacco Day. A video message by Dr. Pratima Murthy sharing her views on the theme “Commit to Quit” was released on the occasion.

The valedictory of the month-long anti-tobacco programme was held on 29th June. Dr. Kiran Kumar M, Joint Director (Medical) and Member Secretary, State Tobacco Control Cell, Directorate of Health & Family Welfare Services, Bengaluru took part in the virtual programme as the Chief Guest. Dr. YC Janaradhana Reddy, Professor & Head, Department of Psychiatry delivered the welcome address. Dr. Pratima Murthy, Director, NIMHANS presided over the event and Dr. BS Shankaranarayana Rao, Registrar, NIMHANS proposed the vote of thanks. Various IEC materials developed by the Department of Mental Health Education and National Tobacco Quit Line services were released by the dignitaries. A panel discussion on “Commit to Quit: Sharing facts and saving lives” was also held in collaboration with Jyoti Nivas College, Bengaluru, on the occasion. ■

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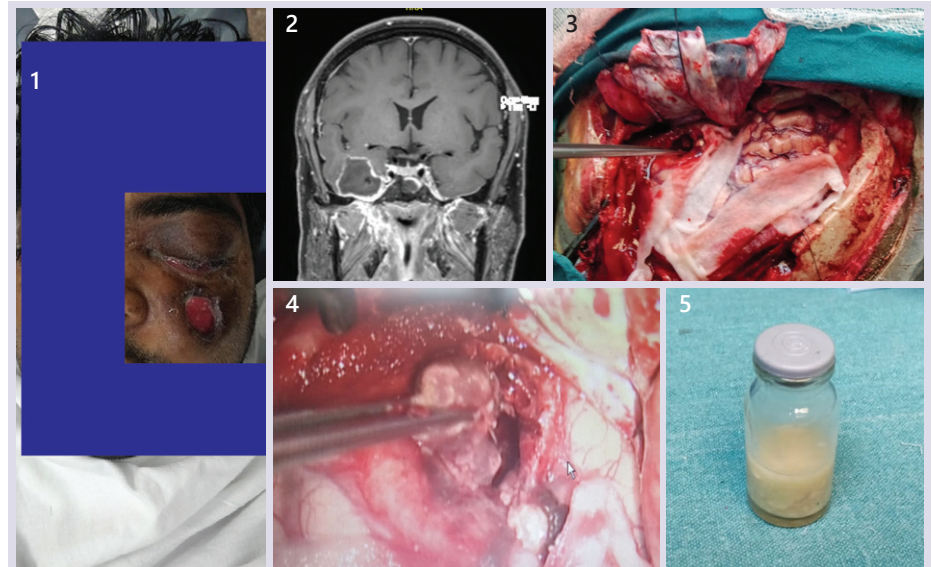
higher than the global prevalence rate (median of 0.2 cases/ 100,000 persons). The predominant risk factor in Indian population of Mucor was uncontrolled diabetes mellitus which overshadowed all other risk factors including hematological malignancy and organ transplantation which are more commonly associated with Mucor in developed countries.

The direct association between COVID-19 infection and Mucor is not established yet. The multifactorial causal association of the increase in Mucor cases in the current pandemic has been stressed upon. In patients recovering from COVID-19 infections, the presence of endothelialitis, lymphopenia, reduction in CD4⁺ and CD8⁺ level and thrombosis, can theoretically predispose to secondary or opportunistic infections. The decreased immune response by steroids (phagocytic activity, bronchoalveolar clearance, etc.) coupled with hyperglycemia and low pH in DM provide a fertile breeding ground for the fungal infection. Apart from the above, Mucormycosis also thrives with increased free iron availability. Decreased iron-binding due to glycosylation of transferrin and ferritin in hyperglycemia causes increased free iron. Concomitant acidosis and increased ferritin levels in Covid-19 patients accentuates the iron availability for Mucor growth.

Clinical presentation & disease progression

Studies have shown that found that 93% patients had Diabetes, 95% had a severe form of COVID-19 infection and 88% received steroids during the treatment. Rhino orbital cerebral mucormycosis is the commonest presentation (76%) with 34.1% having cerebral involvement.

Rhino orbital cerebral mucormycosis starts with the paranasal sinuses and nasal turbinates and the symptoms



1) Patient preoperative photograph: With Ulcer and orbital swelling; 2) MRI showing a right temporal Mucormycosis; 3) & 4) Intraoperative photograph with pus; 5) Pus being sent for analysis

may be indistinguishable from common sinusitis. Any necrotic eschars on the oro-nasal mucosa, especially with a background of past COVID-19 infection, DM and/or steroid use should alert clinicians to the possibility of Mucormycosis. The progression from sinusitis to invasive disease is very rapid. Proptosis, ophthalmoplegia and visual deterioration is suggestive of orbital extension with optic nerve invasion. The cavernous sinus invasion is usually the first manifestation of intracranial Mucormycosis. Cavernous sinus thrombosis presents with III to VI nerve palsy, while seizures, altered sensorium and motor-sensory deficits are suggestive of cerebral invasion and/or infarction.

Microscopic evaluation

Extensive angioinvasion, thrombosis and eosinophilic tissue necrosis is the pathological hallmark of Mucormycosis. Visualization of the broad ribbon-like fungal hyphae with absent or minimal septae, at acute or right branching angle, and pigmentation, helps in the microscopic confirmation of Mucormycosis. Histopathological examination reveal neutrophilic infiltrates, angioinvasion and

perineural spread in the majority of samples. Apart from angio-invasion, peri-neural spread is the cause of contiguous spread of the infection through cribriform plates into the fronto-basal lobes. Peri-neural spread through trigeminal nerve into pons has also been reported.

Surgical Management

Early microbiological diagnosis and initiation of Amphotericin-B based anti-fungal treatment is the key in the treatment of central nervous system (CNS) Mucormycosis. Disseminated disease (cerebral extension), shorter duration of symptoms, incomplete antifungal therapy, were found to be independent risk factors of mortality. Intracranial involvement of Mucormycosis has a very high fatality rate. It can be said that even a day's delay in the initiation of therapy can prove to be fatal in the cases of invasive disease. The mortality of isolated cerebral Mucormycosis could be as high as 65%. The disease has 100% fatality without treatment; surgery followed by Amphotericin B can reduce the mortality rate by almost 70%. ■

*Dr. Dwarakanath Srinivas
Professor & Head
Department of Neurosurgery*

India and COVID-19 vaccines: The path to self-reliance

Steep rise in COVID-19 cases and deaths during the second wave prompted the public to reach out for vaccines that were not abundantly available. There was a sudden scramble across the country to get inoculated, posing a challenge to the Government of India to ensure equitable vaccination coverage within a short time.

The government, along with the vaccine manufacturers, is striving to ramp up the supply of COVID-19 vaccines in the country. Various measures have been initiated to increase the stock of vaccines from both international sourcing and domestic production.

India rolled out the world's largest vaccination drive on 16th January, after Central Drugs Standard Control Organization granted emergency use approval to two vaccines – Covaxin and Covishield. Health care workers received vaccinations in the first phase of the drive. The elderly population and those with comorbidities were included in the second phase. However, the enthusiasm from health care professionals was not encouraging initially. False information circulated in various forms of media dented the drive with nearly half of the health care professionals declining the vaccine. News of occasional breakthrough infections among vaccinated people were blown out of proportions. The initial hesitancy among health care professionals vastly eroded the confidence in the benefits of vaccination among the general population. Public education should have been more effective to overcome this misinformation effects. Essentially, the citizens failed to accept the outweighing benefits over feared adverse effects.

It is no doubt a task of Himalayan proportions to meet the demand



of supplying sufficient vaccine doses for the whole country in a short time. Now with most experts predicting the pediatric group to be mostly affected during the following months, it is imperative to vaccinate this population at the earliest. Nevertheless, even after all the eligible population in the country is vaccinated, it is crucial for the people to stringently follow the COVID-19 appropriate safety protocols until the World Health Organization (WHO) declares the official end of the pandemic, which may take many months, if not years.

Silver lining

Amidst the grim situation, the country's endeavor of successfully developing an indigenous COVID-19 vaccine offered a beacon of hope. Given the short time and the requirement for varying kinds of technology and infrastructure and the massive numbers of vaccine doses to be made available even for export, this progress caught the imagination of the world. Historically, despite being the epicenter for many infectious diseases, the introduction of vaccines in independent India took

many years to decades even after being developed and introduced in other parts of the world.

Thanks to the encouragement from the health department and the leadership provided by ICMR to take up the daunting challenge of making COVID-19 vaccines for India and other countries. This endeavor presented an immense opportunity to the Indian vaccine industry which has made giant strides towards gaining expertise in indigenous vaccine development and mass production. As early as in July 2020, the world's largest vaccine manufacturing private company, Serum Institute of India (SII), Pune swung into action. It had both the expertise and experience in mass-production of vaccines and exporting these to about 170 countries. SII entered into a technology transfer agreement with Oxford-AstraZeneca to produce the Covishield vaccine in partnership with Indian Council of Medical Research (ICMR). At the same time, Bharat Biotech, another private vaccine manufacturing company based in Hyderabad,

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The vax-scene

The table depicts the journey of independent India towards becoming a self-reliant republic to develop and produce its own vaccines, as well as for other countries, including the COVID-19 vaccines. The vaccines highlighted in red showcase the expertise and infrastructure available in India to successfully develop indigenous vaccines. These landmark accomplishments have paved the way for the two major private vaccine

companies in India to venture into making COVID-19 vaccines successfully under a public-private partnership with the Government of India. Such historical milestones can only bode well and inspire the country to progress towards attaining self-reliance in every area pertaining to health services and provide equitable and affordable access to health care for all sections of the society.

Vaccine	Developed in	Introduced anywhere in the world	Introduced in India	Available in India after
Tetanus	France	1924	1978	54 years
Japanese Encephalitis (a) SA-14-14-2 (b) JENVAC (Indigenous, Bharat Biotech)	China India	1989 2014	2006 2014	17 years Immediately
Polio	USA	1955	1978	23 years
Pneumococcal (a) Polysaccharide vaccine (b) Conjugate vaccine (c) Conjugate vaccine (Indigenous, SSI)	USA USA India	1977 2000 2020	2007 2008 2020	10 years 8 years Immediately
Hepatitis B	USA	1982	2002	20 years
COVID-19 (a) Covishield (SSI, India) (b) Covaxin (Bharat Biotech)	UK India	Dec 2020 Jan 2021	Jan 2021 Jan 2021	<1 month Immediately

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again in partnership with ICMR developed, Covaxin, the first indigenous COVID-19 vaccine. The Bharat Biotech venture to make a COVID-19 vaccine was backed by its many years of specialized experience in successfully developing and producing vaccines against human

and veterinary pathogens. Both Covishield and Covaxin vaccines received the Emergency Use Authorization by the government of India on January 3rd 2021. The two big private vaccine-manufacturing companies backed by the government contributed enormously towards the country's battle against the pandemic.

For the first time, independent India was on par with the rest of the world in introducing COVID-19 vaccines for its citizens. ■

Dr. Manjunatha M V

Associate Professor of Neurovirology

COVID Bytes: 'JAB' WE MET

By

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Education



Nurses: A Voice to Lead – A Vision for Future Healthcare

International Nurses Day (IND) is celebrated across the globe every year on 12th May — the birth anniversary of Florence Nightingale, who is widely regarded as the founder of modern nursing — to honour nurses for their dedication and service to society. IND was celebrated on 12th May at NIMHANS in a befitting manner under the theme “Nurses: A Voice to Lead- A Vision for Future Healthcare”.

The International Council of Nurses had launched the IND kit and

posters based on this year’s theme. A global photo contest was also held to highlight the critical role of nurses and how they are shaping the future of healthcare in different contexts and places around the world. It is to be appreciated that an Indian nurse, Ms. Aiswarya, won a prize under the community nursing category of the contest.

There is an increased emphasis on innovation and improvements to elevate nursing practice and define what it means to provide

compassionate, connected care. As carers, healers, educators, leaders and advocates, nurses are fundamental to the provision of safe, accessible and affordable care. On this day, both the United Nations (UN) and the World Health Organisation (WHO) take the opportunity to focus attention on the critical task of recruiting and training nurses worldwide. Estimates project a shortfall of 18 million health workers by 2030, if serious action is not initiated to recruit and train more nurses.

COVID-19 has changed our lives, deeply affecting those who have been infected and those who have lost loved ones as a result of this devastating virus. The pandemic greatly impacted the lives of nurses and the health systems they serve. Although daily life may have changed, the core character of nursing has not. Now more than ever, health, economies and societies are heavily influenced by nurses who are on the frontlines battling COVID-19 whilst continuing to improve access to quality and affordable healthcare. Today, nursing is more challenging than ever, a profession fraught with a stressful, dangerous work environment and nursing shortage.

As a result of the COVID-19 pandemic, health systems, healthcare and the economic sector are under enormous strain. In response to this pressure, healthcare is on the brink of large-scale disruption and innovation. As the largest provider of healthcare services, nurses are leading this revolution of the healthcare system.

At NIMHANS, the Department of Nursing in collaboration with the Department of Clinical Psychology, the WHO-India and the Ministry of Health & Family Welfare (MoHFW) had developed and implemented 10 ToT (Trainer of Trainers) programs from August 2020 to February 2021 and trained 200 master trainers with psychiatric nursing qualification to

Awards for exemplary service

Various awards were presented to the nurses, who have demonstrated exemplary service, on the occasion of International Nurses Day. The Head Injury Ward at Neurocentre, Pavillion IV in the Psychiatry Wing and the Casualty Block bagged Best Ward’ awards.



Three Senior Nursing Officers (SNO) – Mrs. Vijayalakshmi CV (Neurocentre OT), Mrs. Poornima Gopal Shetty (Pavilion III) and Mrs. Vasuki John Wilfred (Casualty) received the Best Nurse Awards. This year, several commendation honours were bestowed on COVID nursing warriors in recognition of their dedicated and courageous service during the pandemic:

1. **COVID -19: High Risk Zone (Sub Specialty Block)**
Mrs. Sujatha C, *Assistant Nursing Superintendent (I/C)*
Mrs. Mahalakshmi DH, *Senior Nursing Officer*
2. **Vaccination Drive Team**
Mrs. Malar Vezi CA, *Assistant Nursing Superintendent (I/C)*
Mrs. Dakshayani Das, *Assistant Nursing Superintendent (I/C)*
Mr. Suresh V, *Hospital Assistant*
3. **COVID Task Force**
Mrs. Jessy Jacob, *Assistant Nursing Superintendent (I/C)*
Mrs. Banu MR, *Senior Nursing Officer*
4. **Infection Control Team**
Mrs. Rebecca K, *Senior Nursing Officer*
Mrs. Asha Vijayan NV, *Senior Nursing Officer*

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promote their own as well as their colleagues' mental health. A facilitator and trainee self – help manual were submitted to the MoHFW. These have received the approval of the Union Minister for Health and Family Welfare and will be made available to every nurse in the country soon. Today, there are 200 master trainers with psychiatric nursing qualification in India. These master trainers have

trained another 2000 nurses in mental health promotion in the country.

The COVID-19 pandemic has made nurses very visible as a caring force. This is the right time to bring about a sea-change in the nursing profession through innovations for the future health care. While healing the world to health, nurses need to stay safe, stay healthy and continue their

compassionate and dedicated services to the sick. The rainbow at the end of this pandemic depicts many success stories of recovered patients who were on the brink of death and nursed back to life. A vibrant salute to all COVID warriors in this world! ■

Dr. Sailaxmi Gandhi
Professor & Head
Department of Nursing

International Day of Yoga celebrated with enthusiasm

The 7th International Day of Yoga (IDY) was celebrated with great enthusiasm and fervour at NIMHANS on 21st June. The COVID-19 crisis failed to dampen the spirit of the Yoga enthusiasts who observed the day while maintaining all the safety protocols

The Department of Integrative Medicine organized various events to mark IDY. This was the second year in a row that IDY was commemorated in a virtual format due to the pandemic. Mass tele-yoga sessions were conducted for the general public. A total of 168 adults and 78 children participated in separate virtual yoga sessions. A combined direct yoga session was organized at the Yoga Centre for the patients practicing yoga on a regular basis at NIMHANS. Online session was hosted for outpatients who were unable to visit the centre owing to COVID-19 restrictions.

Online seminars and special sessions were organised to highlight how yoga can help boost immunity in times of COVID-19 pandemic. A guest lecture on 'Relevance of Isha Yoga techniques in the current pandemic' by Dr. Balachundhar Subramaniam, Professor of Anaesthesia, Harvard Medical School was organised on



21st June. A webinar on 'Protective value of traditional health care approaches for children' was conducted by the Department of Integrative Medicine, NIMHANS in association with Visvesvaraya Industrial & Technological Museum, Bengaluru and Indian Academy of Paediatrics. Smt. K. A Sadhana, Director of Visvesvaraya Industrial & Technological Museum, Bengaluru graced the program as the Chief Guest. The webinar was interspersed with three insightful talks eminent speakers – Dr. Preeti Galagali, Consultant Adolescent Physician & Medical Director, Bangalore Adolescent Care & Counselling Centre, Dr. Aziz Arbar, Ayurvedic Pediatrician and Neonatologist, Professor and Head, Dept of Kaumarabhritya, KLES

Ayurveda Hospital, BMK, Ayurveda Mahavidyalaya, Belgavi, and Dr. Hemant Bhargav, Assistant Professor of Yoga, Department of Integrative Medicine, NIMHANS, Bengaluru.

A painting competition was also held for the children of NIMHANS staff. As many as 31 children actively took part in the event. Jaahnvi, Yukti and Saday Sheejith won first, second and third prizes respectively in the under-10 group, while Varsha S, V Deepika and Rohan Gowda bagged the top three places in the 10-16 category. Prizes were presented to the winners of the competition by Dr. Muralidharan K, Medical Superintendent and Professor of Psychiatry at a function organized on 23rd June at the Department of Integrative Medicine. ■

A NIMHANS information initiative.

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