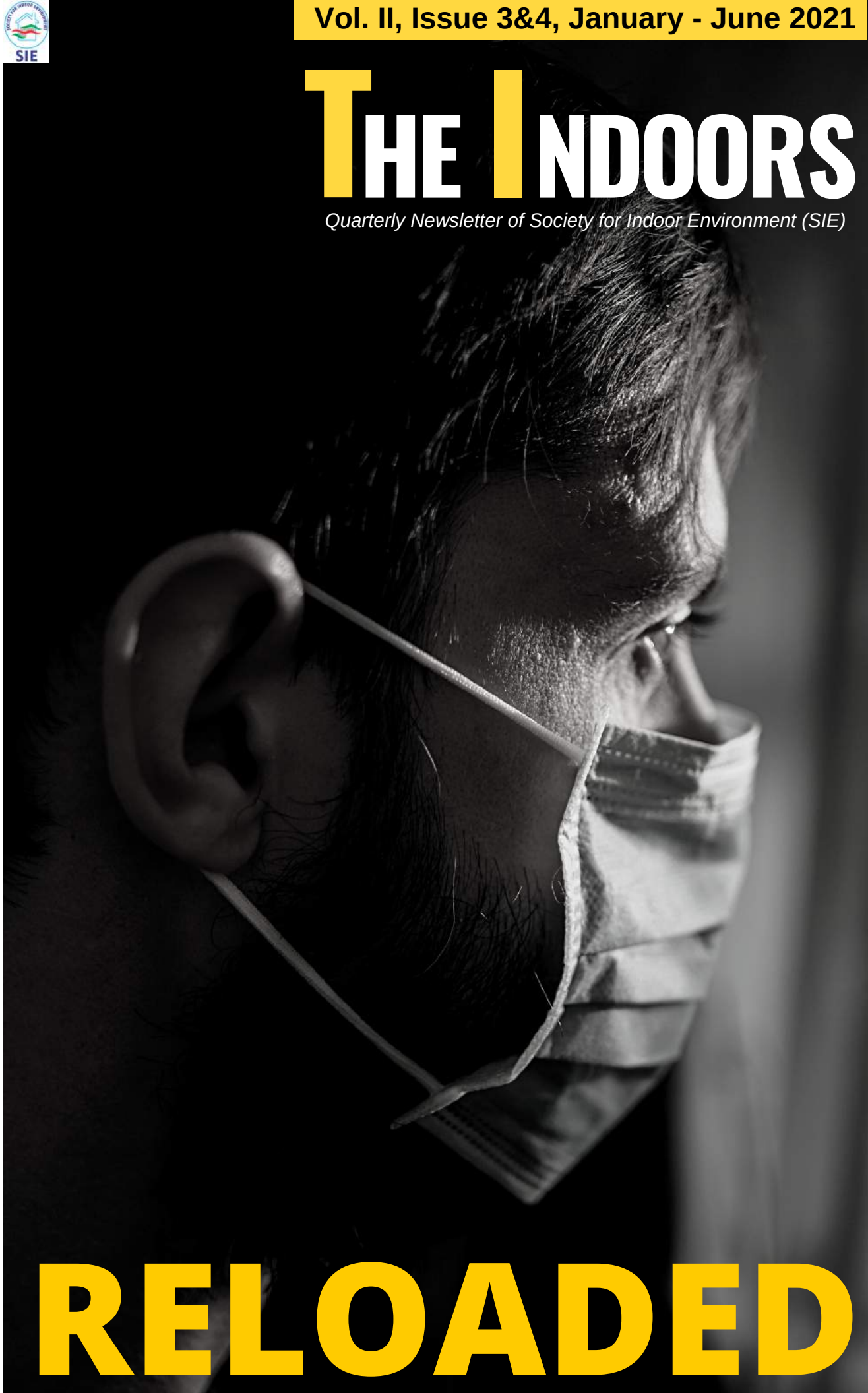
Vol. II, Issue 3&4, January - June 2021

THE INDOORS

Quarterly Newsletter of Society for Indoor Environment (SIE)



PANDEMIC RELOADED

"Faith is the bird that feels the light, when the dawn is still dark"

-Rabindranath Tagore

The second wave of Covid 19 in India washed away the faith that people had on its system. The surge wreaked havoc resulting in 3 crore cases and more than 3.93 lakh deaths in India, with the risk of a third wave hanging at the peril. Its high time that the policy makers take a note of this rampant transmission of virus in the microenvironments indoors. The lifting up of the lockdown and the rush to open the businesses to the public may act as a catalyst for the presumed dangerous third wave. The need of the hour is, to form a National level Task force for Indoor Environmental Quality (NTF-IEQ) comprising of research ,academia and industry which formulates the protocol for IAQ monitoring, modelling and analysis along with the guidelines for the safe opening of the vulnerable institutions like schools, colleges and hospitals. A central coordination committee also needs to be set up for implementation and monitoring of these guidelines. Levying a penalty for the non-conformant is a requirement and regular monitoring of these institutions at regular intervals will ensure a healthy and sanitised microenvironment to the upcoming generations.

The collateral damage caused by Covid 19 in the form of "black fungus" can also be not neglected. SIE has been working to building capacity regarding air quality in built environment and put up a National Workshop in collaboration with CSIR NEERI in Feb 2021. Project MAQUID was another milestone that SIE completed together with CERCA IITD and brought its findings in public domain. There are very limited resources, in India, regarding relevant information of IAQ with respect to Covid 19, which should not be mistaken as an isolated event. Time is running out and the stakes are too high for humanity. Its NOW or NEVER!

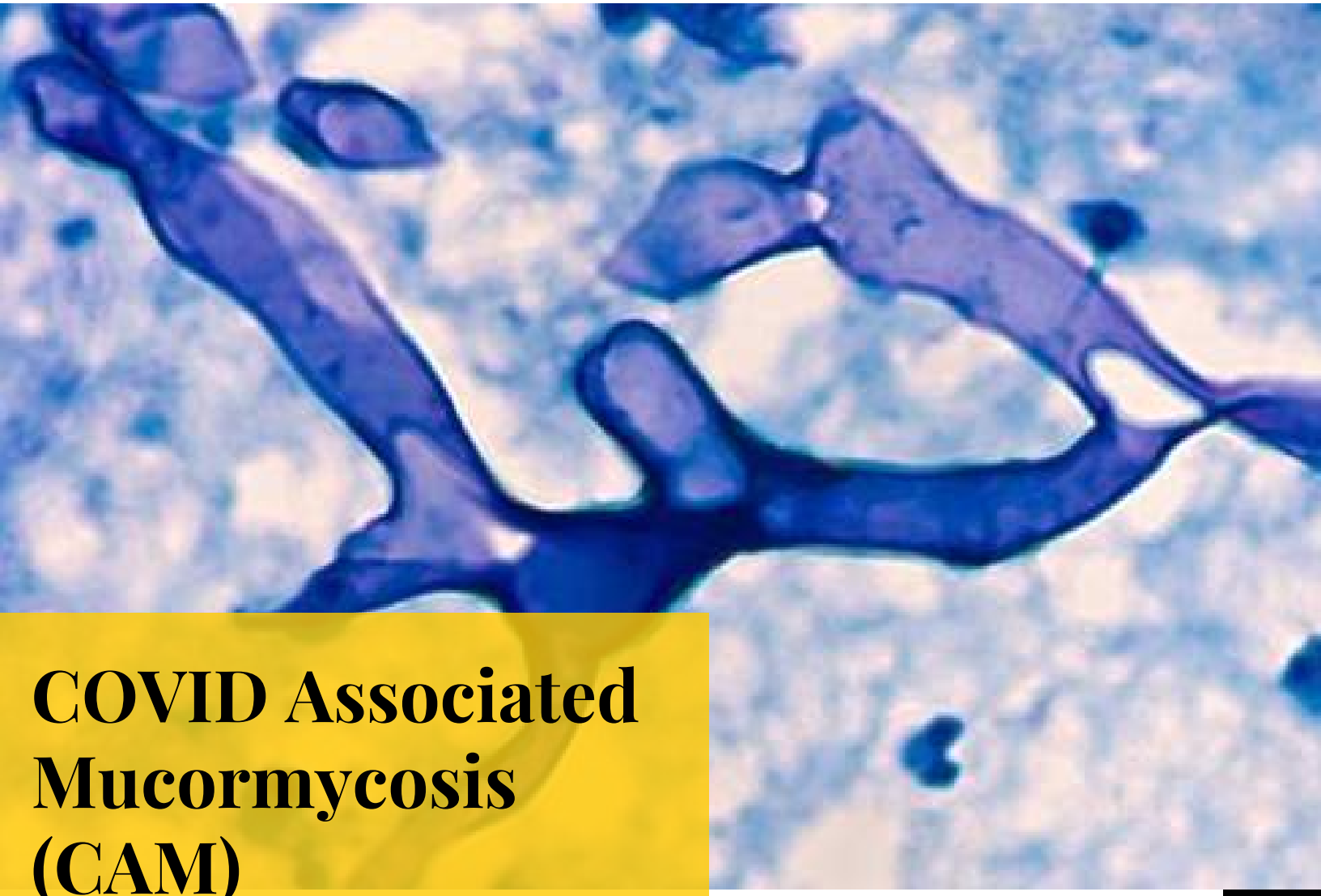
-Prof. Mukesh Khare

Patron

Society for Indoor Environment (SIE)

Vol. II, Issue 3&4, January - June 2021

CONTENT

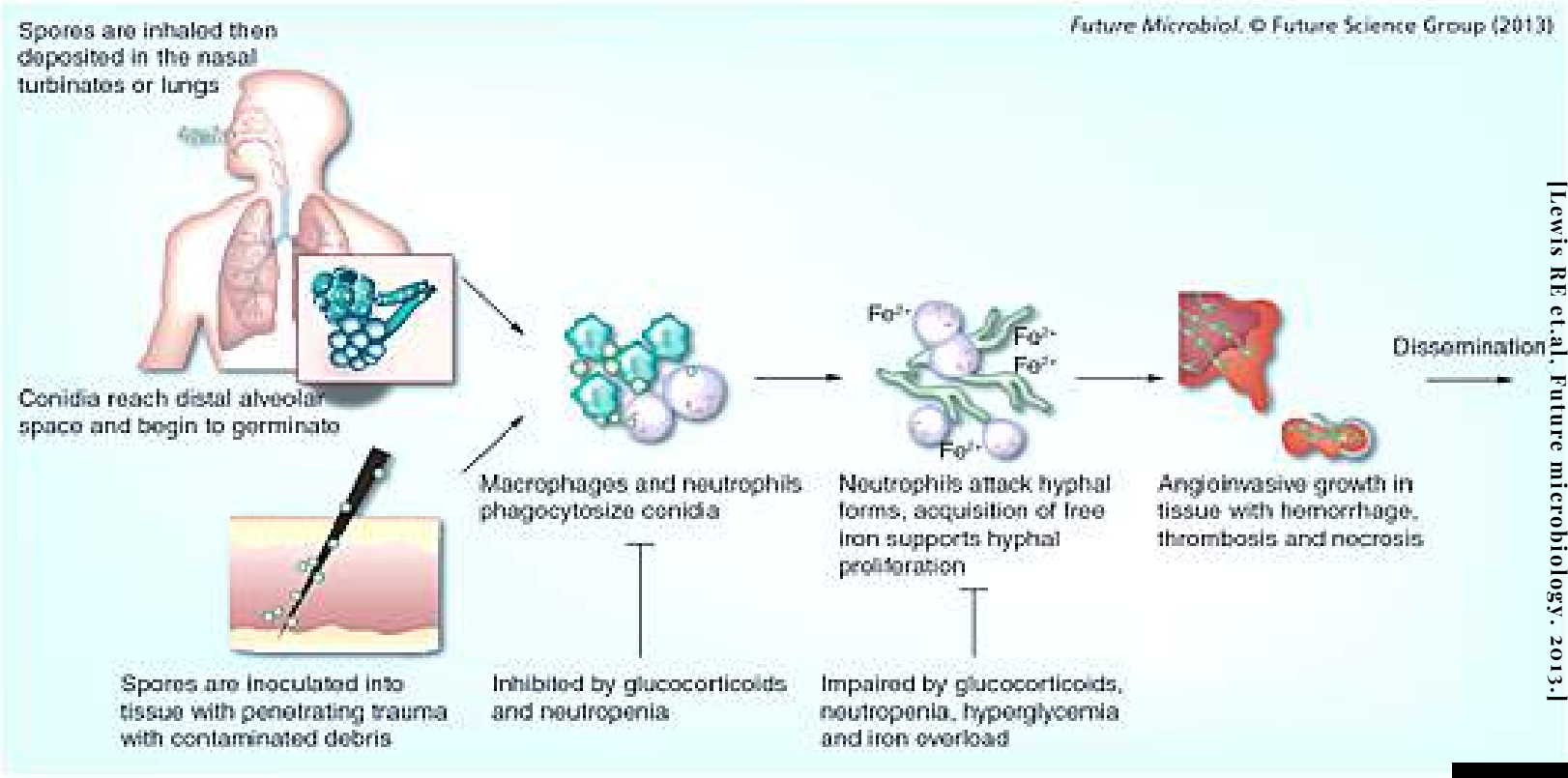


COVID Associated Mucormycosis (CAM)

BY DR. SHUKLA DAS & MS. GARGI RAI

INTRODUCTION

COVID-19 is an infectious disease caused by severe acute respiratory syndrome Coronavirus 2 (SARS-CoV-2) and it is affecting a large population globally. There have been a variety of complications reported during and post COVID infection. While several therapeutic approaches have been examined, none except systemic glucocorticoids have been shown to improve survival in COVID-19. Unfortunately, the frequent use of high doses of glucocorticoids can lead to secondary bacterial or fungal infections (Arastehfar A et al., 2020). There have been several reports documenting a high prevalence of mucormycosis among COVID-19 infected patients worldwide. Invasive mucormycosis is a severe fungal infection that affects patients with various clinical conditions and it is particularly occurring in patients having diabetes mellitus, those who have taken corticosteroids and immunosuppressive drugs, immunodeficiency, in conditions like hematological malignancies, iron overload, prolonged neutropenia (Song G et al., 2020). The rising incidence of rhino-orbital-cerebral mucormycosis (ROCM) and pulmonary mucormycosis in the context of COVID-19 has become a matter of concern in India and elsewhere. COVID 19 induced immune dysregulation is an important underlying factor allowing the proliferation of pathogens like in mucormycosis. The damaged blood vessels and widespread thrombosis may also be responsible for the survival of the fungus.



[Lewis RE et.al. Future microbiology. 2013.]

Figure 1: Pathogenesis of mucormycosis

SYMPTOMS AND DIAGNOSIS

Patients with mucormycosis have presented with symptoms of nasal blockage/ congestion, nasal discharge (bloody or brown/ black, therefore the name of black fungus given), facial pain/swelling, headache, orbital pain, loosening of maxillary teeth, toothache, paresthesia, fever, thrombosis & necrosis in ROCM. Whereas in pulmonary mucormycosis symptoms are cough, fever, chest pain, pleural effusion, hemoptysis, worsening of other respiratory symptoms (Sharma S et al., 2021). Ironically the fungus has been stated as "black fungus " although the fungal growth is not black but the necrotic debris collected in the nasal cavity of patients becomes black in color which is commonly referred to as "eschar" formation. Hence it is incorrect to state mucormycosis as a black fungus. Clinical inspection for mucormycosis includes radio-imaging study: MRI - PNS with brain contrast study for ROCM, plain CT thorax for pulmonary mucormycosis. The diagnosis is based on laboratory investigation of clinical specimens such as sputum, bronchoalveolar lavage fluid (BALF), skin lesion or endoscopically collected tissue/biopsy in normal saline and formalin for mycological and histopathological findings. Mucor, typically appears as non-septate or pauci-septate, ribbon-like hyphae. Histopathology and molecular identification by PCR and DNA sequencing are the other methods for diagnosis (Song G et al., 2020).

SOURCE OF INFECTION

Mucormycetes, that cause mucormycosis, are present in the environment, mainly in soil and in decomposing organic matter and are more common in soil than in air. Most human population are exposed to microscopic fungal spores on daily basis, therefore avoiding mucormycetes is probably impossible. The majority of people are unaffected by these fungi, however, those breathing in mucormycetes spores with weakened immune systems may cause an infection in the lungs or sinuses which can spread to other regions of the body. The size of the sporangiospores vary from 3.5-11um, the larger spores are retained in the nasal cavity while the smaller one reaches the alveoli. Mucor is becoming more prevalent in ICU patients. Inhalation of aerosolized, thermotolerant spores is

the most common route of infection , while percutaneous exposure such as surgical or traumatic wounds and burns has also been recorded.

Private and public buildings (e.g. offices and nursing homes) should be vigilant of dampness which allows moulds to survive. Similar observations are applicable in hospitals with high-risk patients and exposure to molds may be possible. Dampness is more likely to occur in houses that are overcrowded and lack of appropriate heating, ventilation and insulation can be attributable factors.

In hospitals, although there are no reports of the spread of Mucorales from humidifiers, the infection control measures should be universally followed. The humidifiers should be changed (tubing, nasal prongs or mask), washed in mild soapy water, rinsed with clean water and dried in the air before reuse and the humidifiers which are not in use should be cleaned and kept dry. It is desired that exhaust vents, window sills to be cleaned with cloths and mop heads that have been pre-moistened with disinfectant. Preferably a wet dusting to prevent aerosolizing dust. No carpeting to be installed inside the ward. Water leaks, if any, to be cleaned up and repaired as early as possible (within 72 hours) to prevent the proliferation of fungus.

Bio aerosol :

- Fungi represent 1.5 million spp in the environment. Many are associated with allergic & respiratory diseases The allergen of respirable size are deposited in the lungs.
- Outdoor bioaerosol, the level of fungi is high in summers, during floods when spore count can be > 1000/m3.
- The airborne content of fungi like Alternaria, Aspergillus, Mucor, Rhizopus increases during spring-summer compared to autumn

To return to a normal routine after Covid infection is a gradual process. Diabetic Patients should be careful and monitor blood sugar levels, environmental hygiene should be maintained and wearing of masks should be continued as precautionary measures.

Treatment includes surgical debridement, depending on the extent of the disease and antifungal drugs like liposomal Amphotericin B and posaconazole (Song G et al., 2020).

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Potential of Indoor Plants in Improving Indoor Air Quality and Human Health

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CSIR- NATIONAL ENVIRONMENTAL ENGINEERING RESEARCH INSTITUTE
RESEARCH AND INNOVATION CENTRE, MUMBAI

Indoor air quality has degraded over time with more confined and compact construction design of buildings with reduced ventilation resulting into accumulation ofpollutants. This has posed a great threat on human health as people around the world spend majority of their time indoor. It has resulted into major health issues, most prevalent of them are sick building syndrome, building related illnesses and multiple chemical sensitivity. Thiscauses loss in productivity, regular absenteeism, distraction from work, depression, low morale, confusion which effects both professional and personal life of an individual.Psychological wellbeing and health are two important domains of 'happiness index'. Modern lifestyle and infrastructure are designed in a way that these two domains are compromised. This impact calls for a sustainable solution that blend in with human behaviour and physical well-being.Using plant is an attractive and cost-effective way to improve indoor air quality.Presence of plants not only enhance aesthetic of surroundings but are also known to treat many health problems both psychological and physiological.

Naturalexperience provided by plants in alimited space relaxes our body and mind.By taking care of the plant or just by getting exposed to plant enhances satisfaction in individual and reduces stress(Toyoda et al.2020).

Gazing at green and colourful plant leaves or flowers improves focus thereby increasing productivity at work. This theory is very well supported in a study by Ulrich etal. 1979 and Honeyman 1990 that urban setting havingexposure to vegetation results into positive change in emotional state accompanied by attention.Ulrich 1984 further stated that patients show faster recovery if their window overlooked garden or trees rather than brick walls. Plants when added to windowless workplace had shown increased productivity (12%), reduced stress (systolic blood pressure lowered) and more attentiveness in employees than people in the room with no plants (Lohr et al. 1996).

According to Ulrich et al. 1991, as human has evolutionary relationship to nature, therefore individuals are more connected to natural environment than urban settings. Natural view or just presence of few indoor plants helps in recovery from mental or physical stress, high blood pressure, heart problems and fatigue (Shibata and Suzuki 2004).Taylor et al. 2001 stated that indoor plants have more positive impact on children with attention deficit order by increasing focus and enhancing cognitive abilities.In schoolindoor plants create anenvironment conducive for students to learn with interest. It is observed that health and discomfort symptoms in children are reduced to 21-25% in presence of plants (Field et al. 1998).

Indoor plants play an important role in achieving all the parameters required for suitable indoor air quality and comfort. Plants refresh stale air in a room by absorbing $CO_2$and releasing oxygen.This is evident from the study by Tarran et al. 2007that in presence of plants, there was 10% reduction in CO_2 levels and about 25% in naturally ventilated buildings. Evapotranspiration from plants helps lowering the temperature and one can save energy by avoiding use of air conditioning. Indoor plants control relative humidity ranging between 30-60% suitable for human health and comfort (Lohr et al., 1992). In a study by Su and Lin 2013green-wall having 189 pot of birdnest fern resulted in reduction of $CO_2$from 2000 to 600 ppm in5.37 hours, decrease in temperatureto 2.5°Cand increase in relative humidity to about 2-4%. Plants can act as noise barrier specially in green living walls by absorbing or reflecting sound of different decibel level.

Plantsalong with medicinal properties also possess purification capabilities. Two decades of researches have clearly shown plants ability to remove pollutants from indoor air and has been named as potential green solution. Spider plant are reported to reduce PM10oby accumulating water soluble particulates in waxes (Agarawal et al. 2019). Indoor air containsVOCs about 7-10 times more than outdoor air (Kim et al.2014). Presence of indoor VOCs is due to combination of various activities, less ventilation and high indoor temperature.Number of authors have reported, and several indoor species have been screened for its ability to reduce different VOCs(Cruz et al. 2014). Common indoor plants (like spiderplant, snake plant and golden pothos)most effectively reducesNO2, O3and CO(Coward et al.1996; Heather et al. 2009). Peppermintplantabsorbs nicotine from indoor air contaminated withtobacco smoke(Selmar et al. 2015).Plants also reduce airborne microbes present in the indoor air.With the reduction of accumulated pollutants by plants many health problems such as bodyache,headache, dizziness,irritation of the eyes, runningnose, drythroat, cough, nauseaskin rashes, itching of scalp disappear.

Potted Plant

Botanical Filters

Green Living Wall

Use of indoor plantshave evolved from potted plant to green living walls and botanical filter. Interior landscaping using plants have become an integral part in interior designing. Many countries have adopted this technology and have installed at different locations such as households, offices, restaurants, airports, commercialbuildings, malls, shopping centre etc. Consortium of different species of plant reduce indoor pollution, improve indoor air quality and increases energy level of an individual. Some individuals are allergic to pollens produced from plants and in some cases, pets are allergic to plant if ingested accidentally so care should be taken while selection of indoor plants.

Siam Paragon, Shopping center, Bangkok

Terminal 3, Changi Airport, Singapore

Longwood Gardens, Pennsylvania,US

DevocionCafé, Brooklyn, New York

Chatarpati Shivaji International Airport, Mumbai, India

BAYER office, Mumbai, India

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Background of the Study

- The deteriorated Indoor Air Quality (IAQ) with high levels of air pollutants can have much more severe impacts on the health of the people as almost 80-90% of our total times are spent in such buildings. World Health Organization (WHO) has designated indoor air pollution (IAP) as one of the four most critical global environmental problems in developing countries.
- This contributes ~28% (i.e. 2 million) of all deaths and 39 million disability adjusted life years each year due to unvented burning of biomass for heating and cookingpurposes.
- However,afarlessattentionhasbeenpaidtotheIAPissuesinurbanareasduetocomplex nature and types of indoor environments, though an equally important issue. Apart from biomass fuel burning, multiple sources of IAPs can co-exist in urban buildings, such as tobacco smoking, building materials, indoor occupant activities and poorly maintained ventilation systems, which can contribute to worse the levels ofIAP.
- The pollutants, which are of prime concern could be particulate matter (PM), gases, biological aerosols and volatile organic compounds (VOCs) according to the existing studies on different buildings across the world, which can affect the health and well being of the occupants. But due to lack of compliance for indoor air pollution in India, the matter of IAP is not yet taken soconsciously.
- However, sensing the importance of IAP studies in India, an effort has been made by the group of researchers from Centre of Excellence in Research on Clean Air (CERCA), IIT Delhi and Society for Indoor Environment (SIE), India in association with Kaiterra, an air quality instrument company to map the indoor air quality in different indoor environments in the city of Delhi, which is on the top of the list of 20 most air polluted cities across the globe.

Description of the Study

- The study was conducted on total 37 buildings across Delhi including the schools, colleges, hospitals, shopping malls, restaurants, offices and cinema halls (considered to be the priority indoor environments, where chances of exposure to indoor air pollutants are maximum) during the critical winter period for the city starting from 15th October 2019 - 30th January2020.
- Twenty four hour monitoring was conducted in most of the selected buildings for indoor air pollutants, including PM10, PM2.5, TVOC along with comfort parameters (Temperature, Relative Humidity and CO_2 concentrations) using Sensedge® air quality monitors fromKaiterra®, which is a medium cost sensor based monitor designed specifically for monitoring of Indoor air quality.
- The physical characteristics, such as number of doors and windows, air purifiers, air conditioning systems, carpets, furniture, photocopiers and printers inside the building, running of diesel generator sets, distance of the buildings from the road sides with heavy traffic are also recorded during thestudy

PROJECT MAQUID

FINDINGS

Findings of the Study

- The concentration of particulate matter (both PM10 and PM2.5) are recorded 2-5 times higher than the permissible limits set by Central Pollution Control Board for ambient airquality,100µg/m3forPM10and60µg/m3forPM2.5(NAAQS,2009)inIndiaand10-15 timeshigherthantheWHO24hoursaveragelimits(50µg/m3and25µg/m3PM10andPM2.5 respectively) for all the monitored buildings(WHO,2016).
- The educational institutes (Schools and colleges) top the list for high PMconcentration.
- Despite ban on tobacco smoking in public spaces, it was observed that people were rampantly smoking in offices, hospitals andcolleges.
- The TVOC levels are also recorded high with highest in hospitals and restaurants due to rampant use of chemical cleaning agents, floor cleaners and cookingoils.
- The CO2 levels are also recorded high in hospitals, colleges, offices as well as in restaurants due to higher occupancy and inadequate ventilation. Though schools too have higher occupancy but all the selected schools are naturally ventilated so CO2 levels are within the permissible limits except one or 2 schools as defined byASHRAE.
- The indoor/outdoor (I/O) ratios are calculated for PM10 and PM2.5 in the selected microenvironments. The schools fared the worst with the PM2.5 I/O ratios being reported more than one in all the selected six schools. I/O ratio more than one indicated thepresence of a potential sourceindoors.
- After schools the microenvironments which followed were the colleges, offices, restaurants, hospitals and shoppingmalls.

The highlighting factors from the findings of the study for research on IAQ research in India are:

- Concentrations of outdoor air pollutants penetrating to the indoor environment
- Building materials with high TVOCcompounds
- Indoor agents, like paints, glues, polishing materials perfumes, spray propellants and cleaning agents,
- Building characteristics such as the air tightness andventilation
- Building occupancy and livingspace
- Equipment used within the buildings (e.g. photocopiers, printers,heaters)
- The customs, habits and traditions of the residents

SIE Workshop and Training programme
on

BUILDING CAPACITY ON INDOOR AIR QUALITY MANAGEMENT (IAQM)

In collaboration with CSIR-NEERI
on

Feb 11-13th,2021

Society for Indoor Environment has organized a Joint workshop on “Building Capacity on Indoor Air Quality Management (IAQM)”, in collaboration with CSIR-NEERI on Feb 12-13, 2021. The programme was organized by Dr.S.K.Goyal (CSIR-NEERI), Dr.Nitin Goyal (CSIR-NEERI) Dr.Radha Goyal (SIE), Dr.PriyankaKulshreshta (SIE), Dr.Pratima Singh (SIE),Dr.SunilGulia (CSIR-NEERI), Dr.Chinthala Sumanth (SIE/NITW) and Dr.Satinder Kaur (CSIR-NEERI),

The programmewas initiated with a welcome note from Dr.Satinder Kaur and was moderated by Dr.PriyankaKulshreshtha. The technical session began with a Keynote Lecture by Dr. Prasad ModakExecutive President, Environmental Management Centre LLP and Director, Ekonnect Knowledge Foundationon “Indoor Air Quality Standards”. The talk focused on the policies needed to achieve acceptable indoor air quality standards. Further, Dr.Modak also stressed on the need for identifying the sources and their effects in the Indian scenario. The lecture was followed by a Panel discussion involving eminent panelists including Er.Padma Rao(Senior Principal scientist CSIR-NEERI), Dr. Arun Kumar Sharma (President, SIE and Professor, University College of Medical Sciences, University of Delhi). Mr. Richie Mittal (President, Indian Society for Heating Refrigerating and Air conditioning Engineers and Director, Overdrive Engineering, Pvt Ltd), Mr.ParthaBosu (Environmental Defense Fund, India) and Dr. (Ar.) Roshni Udyavar Yehuda (Practicing Architect and academician)

On this occassion, Dr.Arun Sharma highlighted the deplorable state of indoor spaces in terms of ventilation and pollutants and stressed the need to conduct more research in the area of IAQ . Dr Sharma alsohighlighted how the simple household and hospitality activities are increasing the concentration of indoor air pollutants due to resuspension. He emphaised the importance of monitoring the bioaerosols as they are contributing to the infectious diseases to humans in the indoor environments. With a precarious Covid 19 situation ,it is all the more imperative to concentrate on the real time monitoring of bioerosols like viruses, bacteria, molds and fungi.

The panel discussion continued with insightful views from Er.Padma Rao, who highlighted the issue of monitoring in the indoor spaces and gave insight into the pathway to be followed to monitor indoor spaces at local and regional levels.Mr.RichieMittal mentioned about various aspects of Indoor air pollution with respect to mechanical ventilation , highlighting the gaps and defining the wayforward. Further, Mr.Mittal stressed on introducing indoor environmental quality standards apart from indoor air quality standards and has given a holistic picture of indoor environmental quality including the air quality in the indoor environments

Dr Roshni emphasized on the requirements for good indoor air quality including good quality and quantity of light and many building design related factors associated with the indoor environments. Additionally, Dr.Roshni stressed on the interventions of using plants to control the level of VOCs in indoor environments and she has strongly suggested introducing plants in the educational institutions i.e especially in class rooms. Additionally, ParthaBasu emphasized on the policy need to highlight the issue of indoor air pollution. He also felt that the inclusion of Indoor Air Quality (IAQ) guidelines under the National Clean Air Programme (NCAP) was a welcome step towards this policy formulation.

The technical session on the second day began with a lecture from Prof. Mukesh Khare IIT Delhi on Fundamentals of Indoor Air Quality to sensitize the participants about the course. The lecture was followed by a talk on IAQ monitoring of carbon monoxide, carbon dioxide and thermal comfort parameters by Dr.Jyotirmaya Mathur, NIT Jaipur.

The talk was followed by a lecture on Indoor Air Quality Modeling by Dr.Shiva Nagendra. Later, Dr.Satinderkaur, NEERI has delivered a talk on Indoor VOCs problem in urban residential areas including their sources, monitoring and control.

After lunch, the session continued with a talk from Dr.Anubha Goel, IIT Kanpur focusing on Indoor Particulate matter along with their sources and monitoring techniques. The session further continued with a talk by Dr.Shukla Das , UCMS on Indoor Bioaerosol sources and its monitoring. Later, the technical session on the second day ended with a joint talk by Dr.Pratima , DU and Dr.Radhagoyal (SIE) on sick building syndrome and its management.

The technical session o the third day began with a lecture on health exposure assessment linking with indoor air quality by Dr.AmitaAthavale, KEM Hospital Mumbai. The session was followed by a lecture on household emissions from domestic kitchen by Dr.RavindraKhaiwal, PGI Chandigarh. The session was followed by a lecture from Dr.Arun Sharma discussing the way forward from Covid-19. The morning session ended with a representation of instrumentation being used for IAQ studies by ENVIROTECH Pvt Ltd,India.

In the afternoon session, Dr.RadhaGoyal presented a case study on IAQ in public buildings in India. The lecture was followed by a joint lecture on IAQ and building materials related learnings from ECOSEE project by Dr.Chinthala Sumanth (SIE/NITW) and Dr.Sunil (NEERI). After this lecture, the participants have actively participated in a Quiz based on the content that was delivered in the training programme. Dr.Rakesh Kumar, Director. CSIR-NEERI delivered the closing remarks urging the youth to take up this environmental concern as a project/dissertation and find the cost-effective solution to the problem of IAQ in India.


Online National Workshop and Training Programme on Building Capacity for Indoor Air Quality Management (IAQM)
NEERI
SIE
11th February-13th February 2021
Day 1 (11.02.2021)
• Keynote Lecture on Indoor Air Quality Management
• Panel Discussion on Indoor Air Quality Management In India
Envirotech
Dr. Prasad Modak
Executive Director, EMC LLP
Patron SIE
Dr. Rakesh Kumar
Director,
CSIR-NEERI
Dr. Prashant Gargava
Member Secretary,
CPCB
Dr. Roshni Udvayar
Director, Roshni Udvayar & Associates
Dr. Arun Sharma
Professor ,UCMS,
President SIE
Mr. Partha Basu
Lead Advisor,
EDF
Mr. Richie Mittal
Predent, ISHRAE
Dr. Priyanka Kulshreshtha
Moderator,
Joint Secretary SIE
Organizing Committee
Dr. S K Goyal, Head, CSIR NEERI Zonal Lab, Delhi
Dr. Priyanka Kulshreshtha Joint Secretary, SIE
Dr. Sunil Gulia CSIR-NEERI, Member SIE
Dr. Satinder Kaur CSIR-NEERI
Dr. Sumanth Chinthala, NIT Warangal , Member SIE
Dr. Pratima Singh IIHE, Delhi University , Member SIE
Dr. Nitin Goyal CSIR-NEERI
Dr. Radha Goyal National Secretary SIE

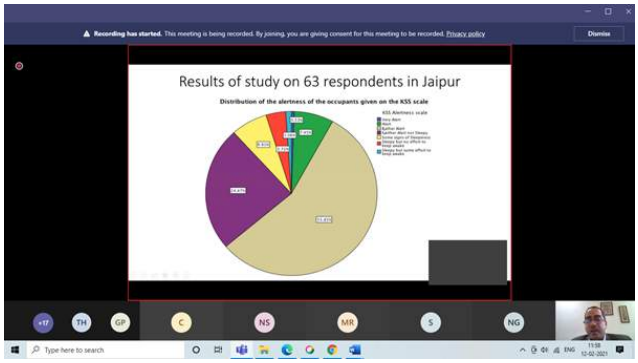

Online National Workshop and Training Programme on Building Capacity for Indoor Air Quality Management (IAQM)
NEERI
SIE
11th February-13th February 2021
Our Eminent Speakers
Prof. Mukesh Khare, IIT Delhi
Dr. Satinder Kaur CSIR-NEERI
Dr. Jyotirmaya Mathur MNIT Jaipur/ IIT Chennai
Dr. Anubha Goel Associate Professor, IIT Kanpur Member SIE
Dr Shukla Das UCMS, New Delhi Member SIE
Dr. Shiva Nagendra Professor , IIT Chennai National Vice President, SIE
Day 2 (12.02.2021)
10:30– 11:20 | Fundamental of IAQ | Prof. Mukesh Khare Professor, IIT Delhi
11:20–12:00 | IAQ Monitoring: CO2, CO and thermal comfort parameters | Dr. Jyotirmaya Mathur, / M.P. Maiya, MNIT, Jaipur/ IIT Chennai
12:00-12:40 | Indoor VOCs problem in Urban Residential area: Sources, Monitoring and Control | Dr. Satinder Kaur Senior Technical Officer Research and Innovation Centre, Mumbai
12:40-13:00 | Industry Speakers |
13:00 –14:00 | LUNCH |
14:00 -14:40 | Indoor Particulate Matters: Sources and Monitoring techniques | Dr. Anubha Goel Associate Professor, IIT Kanpur Member, SIE
14:40 –15:20 | Indoor Bio-aerosol: Sources and Monitoring | Dr. Shukla Das UCMS, New Delhi Member, SIE
15:20-16:00 | Indoor Air Quality Modelling | Dr. Shiva Nagendra Professor, IIT Chennai National Vice President, SIE
16:00-16:30 | Summation of the Day 1 | Dr. Sumanth Chintala Assistant Professor, NIT Warangal SIE Member


Online National Workshop and Training Programme on Building Capacity for Indoor Air Quality Management (IAQM)
NEERI
SIE
11th February-13th February 2021
Eminent Speakers
Dr. Amita Athavale Professor & Head (TB & Chest), KEM Hospital, Mumbai/ IIT Bombay
Dr. Ravindra Khaiwal Professor, PGI Chandigarh President, Chandigarh chapter, SIE
Dr. Arun Kumar Sharma Professor, UCMS, Delhi National President, SIE
Dr. Sumanth Chinthala NIT, Warangal
Dr. Radha Goyal National Secretary, SIE
Dr. Sunil Gulia CSIR-NEERI, New Delhi
Dr. Priyanka Kulshreshtha Joint-Secretary, SIE
Dr. S.K. Goyal Head, CSIR-NEERI Delhi Zonal Head
Day 3 (13.02.2021)
10:30– 11:20 | Indoor Air Pollution and Health Exposure Assessment | Dr. Amita Athavale Professor & Head (TB & Chest), KEM Hospital, Mumbai
11:20–12:00 | House hold Emission from Domestic Kitchen | Dr. Ravindra Khaiwal Professor, PGI Chandigarh President, Chandigarh chapter, SIE
12:00-12:40 | Way forward from Covid 19 | Dr. Arun Sharma Professor, UCMS, New Delhi National President SIE
12:40- 13:00 | Industry Representation | ENVIROTECH
13:00 –14:00 | LUNCH |
14:00-14:40 | Case studies on IAQ in public buildings in India | Dr. Radha Goyal Secretary, SIE
14:40-15:20 | Indoor Air Quality and Building Materials, Learning from ECO-SEE Project | Dr. Sumanth Chinthala / Dr. Sunil Gulia NIT Warangal/CSIR NEERI, New Delhi
15:20-16:00 | Quiz session | Dr. Priyanka Kulshreshtha Joint Secretary, SIE
16:00 – 16:15 | Closing Remarks | Dr. S.K. Goyal CSIR NEERI Head, Delhi Zonal lab
Supported by
Envirotech

Keynote Address by Dr. Prasad Modak

Panel Discussion in progress on 11th Feb 2021

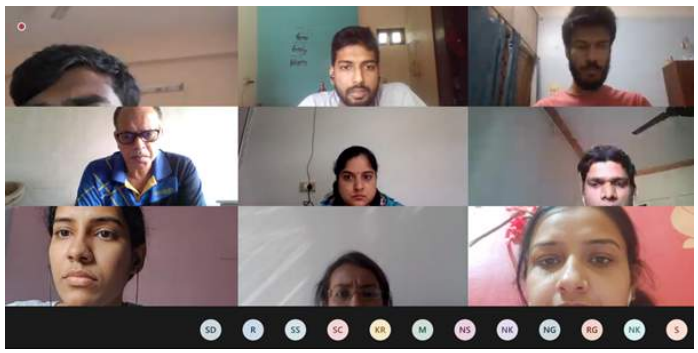
Prof. Mukesh Khare (IIT Delhi) setting the tone for the programme with his presentation on Fundamentals of IAQ



Presentation on linkage between IAQ and economics being explained by Prof. Jyotirmay Mathur, MNIT Jaipur

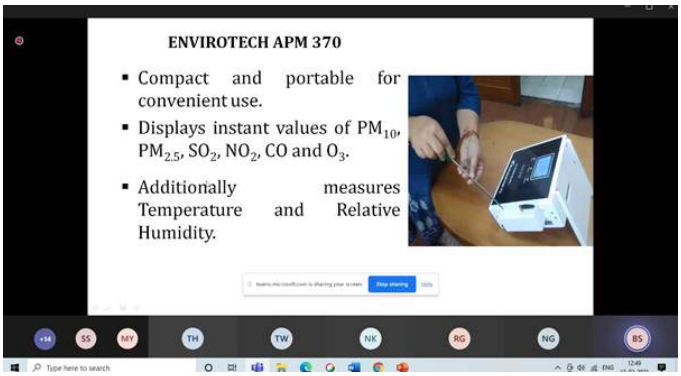
IAQ Modeling being explained by Prof. Shiva Nagendra, IIT Madras

Prof. Amita Athavale (KEM Hospital Mumbai) explaining the results of real time studies done by her team



Participants engrossed in the Quiz Session

Prof. Arun Sharma (President SIE) explaining the intricacies of IAQ and health



Presentation on instrumentation by ENVIROTECH

Dr. Rakesh Kumar, Director CSIR-NEERI , presenting the closing remarks

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