

HCFI Dr KK Aggarwal Research Fund

HCFI Dr KK Aggarwal Research Fund Expert Round Table Meeting on “Health Effects of Environmental Noise Pollution”

2nd October, 2021 (11 am-12 noon)

Key points

- Noise pollution is considered to be any unwanted or disturbing sound that affects the health and well-being of humans and other organisms.
- Exposure to prolonged and excessive noise has been shown to cause a range of health problems such as stress, poor concentration, hearing problem, fatigue, etc.
- We do not know the level at which we should listen to music on our phones.
- Noise is a slow poison going into our body through the auditory route.
- We are surrounded by work environment noise. Some households may be noisy.
- Noise stimulating inner ear has auditory and nonauditory effects.
- Chronic auditory trauma is due to long-term exposure to noise; the upper limit in India is 90 dB. Globally, this has been reduced to 85 and also 80 in some countries.
- Noise-induced hearing loss is a proven fact, which is seen as typical dip at 4000 Hz on audiometry.
- Noise trauma affects every system of the body. It can precipitate hypertension, myocardial infarction, bronchial asthma, hyperacidity, tinnitus, increases anxiety, which directly or indirectly affects the body system. Noise pollution has even been reported to cause premature delivery. It affects the development of children. Noise leads to fatigue and industrial accidents.
- Presbycusis is aging deafness; in India, this is occurring at an earlier age (55 years vs. 70 years globally) due to cumulative effects of continuous exposure to noise and the freedom to take any medicine at any time, even without doctor's prescription, such as aspirin, antimalarials, antibiotics, especially aminoglycosides, which may be ototoxic.
- More than 100 years ago, Nobel Prize winner Bacteriologist Robert Koch had predicted that “one day mankind will have to fight the burden of noise as fiercely as plague and cholera.”
- October is noise pollution month. World Hearing Day is observed every year on 3rd March.
- Four different sources of noise: industries, traffic noise, construction noise and community noise.
- About 20% of industrial workers exposed to high noise levels develop hearing loss.
- The permissible occupational noise exposure limit is 90 dB for all workers for 8 hours.
- One can listen to 150 dB of noise for 15 minutes daily for 6 to 7 years.
- Noise pollution is also affecting the behaviors of birds and animals. They have started communicating in non-peak hours.
- Auditory toughening - when exposed to noise, the temporary threshold shift reduces; it may recover.
- Temporary threshold shift occurs after 2 minutes during hearing tests. In susceptible persons, this shift is more, while in persons with normal hearing, this shift is less.
- For hearing conservation, pre-placement audiogram should be made compulsory in all noisy industries; noisy machinery gadgets should be identified. Gadgets should come with a statutory warning and must be accompanied with head phones, ear muffs. For crackers, upper limit should be 150 dB.
- Noisy areas should have plenty of trees.
- Cattle have a different sensitivity level.
- Many bus drivers have hearing loss. Rear engine buses may protect the drivers from heat and the noise.
- According to the World Health Organization (WHO), 1.1 billion young adults are likely to be exposed to dangerous levels of noise.
- Orthopedic surgeons and plastic surgeons can also face effects of vibrations in instruments, which leads to Dupuytren's contracture. These vibrations can also be transmitted to the ears.
- Diesel vehicles produce more vibrations than petrol vehicles.

- Citizens should be educated about the hazards of noise pollution and its harmful effects on health. Doctors should carry this message to their patients. Hearing is health.
- Noise dose meters are available in India, which give the average noise levels the person is exposed to. There are apps (NIDCD website) to measure noise.
- <https://ngms.delhi.gov.in/> is the noise pollution grievance redressal and monitoring website of Delhi government. A complaint can be lodged here. The Helpline Number is 155271.
- A complete ban on crackers has been imposed in Delhi since 28th September, which will remain in effect up to 1st January, 2022.
- The dangers of recreational noise should be imparted as part of curricula at the school level itself.
- Hearing aids should be made available at a lower cost.
- The 7 Rs of circular economy are Rethink, Reduce, Reuse, Repair, Refurbish, Recover and Recycle. These are the backbone to minimize waste and get wealth from waste. Waste is a misnomer. It is wealth and is full of recoverable resources. This fact is not recognized much. Waste is not waste for the ecosystem.
- There are several different types of waste: e-waste, biomedical waste, solid waste, household waste, etc. Waste can lead to air and water pollution.
- Most of the waste is handled by the unorganized sector, so its exact amount/quantity, including the quantum of people involved, is not known. Waste circular economy has been recognized in the last decade to bring waste into the mainstream economy.
- Resource exploitation increases pollution and waste generation. Optimum levels need to be judged carefully and cautious and conscious decision needs to be taken.

Speakers: Prof AK Aggarwal and Prof Rangasayee R

Participants: Dr AK Agarwal, Dr Rangasayee R, Dr Arun Jamkar, Dr Ashok Gupta, Prof Bejon Misra, Dr DR Rai, Dr KK Kalra, Dr Anil Kumar, Ms Balbir Verma, Mrs Upasana Arora, Ms Ira Gupta, Mr Saurabh Aggarwal, Dr S Sharma

Prof AK Aggarwal, President - Sound Hearing 2030, Medical Advisor - Innovation, Education and Clinical Excellence, Apollo Hospitals, Ex-Dean, Professor of Excellence Department of ENT, MAMC, Ex-President - DMC, Ex-Additional DGHS

Prof Rangasayee R, Chairman of the Audiology Committee of International Association of Communication Sciences and Disorders (Malta), Technical Director and Professor at Dr S R Chandrasekhar Institute of Speech and Hearing, Bangalore, Ex-Director and Prof Ali Yavar Jung National Institute for the Hearing Handicapped (AYJNIHH)

Round Table - Expert Group on Environment Meeting on "Circular Economy – Its Importance and Actions Needed in Present Scenario-General"

29th August and 5th September, 2021 (12 noon-1 pm)

Key points

- Circular economy is emerging as an economic model for its environment and economic benefits.
- Benefits of circular economy include reducing pressure on the environment, improving security of supply of raw material, increasing competitiveness, stimulating innovation, boosting economic growth and job creation.
- Careful integrated planning can result in resource recovery, conservation of resources and can lead to sustainable development, which is the need of the hour.
- Circular economy is more focused towards five Sustainable Development Goals (SDGs): SDG 6 (Clean water and sanitation for all), SDG 8 (Promote inclusive and sustainable economic growth, employment and decent work for all), SDG 11 (Make cities and human settlements inclusive, safe, resilient and sustainable), SDG 12 (Responsible consumption and production), and SDG 13 (Take urgent action to combat climate change and its impacts).
- Half a trillion dollar worth of economic value can be unlocked through circular economy business models in India by 2030 (FICCI).
- Examples of circular economy include use of sugar industry waste in paper industry, conversion of biodegradable wastes into manure/biogas, etc. Valuable resource and material can be recovered from all waste products if approached in a scientific manner.
- Four processes are very important for circular economy: Circular supply chain (provide renewable energy or fully recyclable input materials in place of single life-cycle inputs), recovery and recycling, product life extension (by repairing, upgrading and reselling) and sharing platform.

- In linear economy, a product reaches end of life and ultimately becomes waste. Whereas, a circular value chain operates by employing reuse, sharing, repair, refurbishment, remanufacturing and recycling to create a closed-loop system and minimizing waste generation and pollution.
- There is no consensus yet on a set of central circular economy performance indicators applicable to organizations and individual products.
- More than 8 million tonnes of steel can be extracted from different categories of end-of-life vehicles in 2025, which represents a 2.7-billion dollar opportunity.
- Household gadgets also have a huge potential for extraction of metals. Gold can be extracted from electronic waste. This is called urban mining from e-waste. There is ~\$1 billion of value that can be realized from the extraction of gold from e-waste in India.
- There is significant value realization potential from plastic dumped in landfills. Around 40% of plastic waste in India remains uncollected for recycling. If properly managed, this can create around 14 lakhs jobs and could potentially represent a \$2 billion opportunity.
- Three sectors have been identified: National initiative to set up a conducive ecosystem, material level and sector level action plan and proof of concepts, pilots and scale up. Many more sectoral action plans will come up for different sectors, including state level action plans.
- A vehicle scrapping policy was launched by the Hon'ble Prime Minister of India in August this year to phase out unfit and polluting vehicles in an environment-friendly manner.
- Implementation is the problem; it requires collective effort from all stakeholders and not just from the governments or the regulatory authorities.
- The way forward is optimization in thinking, planning and policy as 5Ps play a major role: People, Policy, Planning, Population and Politics.
- There should be mechanisms in place to account for environmental damage, control of emissions and sustainable management of waste in imports and exports. International cooperation is required for transfer for low-cost technology.
- NITI Aayog has 11 focus areas on circular economy and committees have been formed for these areas.

- A simple lifestyle itself caters to circular economy as we do not have a use and throw culture in India. There is a need to create public awareness and motivate them.

Participants: Dr Anil Kumar, Mr Vivek Kumar, Dr SK Gupta, Dr Dipankar Saha, Mr Pradeep Khandelwal, Dr Dwaraka Nath, Mr Neeraj Tyagi, Mr Ankit Sethi, Mr Ashish Jain, Dr Ravindra Kumar, Mr Vikas Singhal, Mr Virendar Gupta, Mr Varun Singhal, Ms Ira Gupta, Dr S Sharma

HCFI Expert Round Table Meeting on “Hematological Changes in Prevalent Viral Fevers”

9th October, 2021 (11 am-12 noon)

Key points

- Platelets are vital from diagnosis, prognosis and monitoring point of view.
- Hematological changes are good navigational tools to diagnose viral infections.
- Hematology is now restricted to cell counters and flow cytometers. Cell counters are 3-part differential cell counters, 5-part differential cell counters and 7-part differential cell counters. The latest 7-part differential cell counters use laser technology.
- Electronic cell counters are rapid and shorten the time of tests and complete a large number of tests quickly. They also reduce the cost of test, and maintain and improve the accuracy of tests.
- About 33 parameters of complete blood count or CBC (red blood cell [RBC], white blood cell [WBC] and platelet parameters) can be generated with the most sophisticated counters.
- CBC is the most frequently done, easily available, and the most informative investigation.
- Accurate interpretation of CBC can avoid costly and invasive investigations.
- Daily monitoring of automated data must be manually validated. A peripheral smear crosscheck is always warranted when reporting.
- Transfusions of all blood products warrant rational use with the help of newer parameters.
- The immature platelet fraction (IPF) or reticulated platelets is a newer platelet parameter. It contains RNA and can be detected using nucleic acid dyes like new methylene blue. They are the larger strong-staining subset and are typically expressed as a percent of total platelets.

- IPF differentiates between consumptive versus productive reasons for thrombocytopenia. IPF increases in consumptive reasons but not in the latter. This parameter is increased in the setting of platelet destruction or consumption and decreased with bone marrow failure. IPF decides the status of the marrow, whether it is functioning/responding or not. High IPF means that the marrow is responding and in such a situation, one need not panic even if there is thrombocytopenia. In dengue, platelet transfusion is not needed even if platelet count is 10,000. If IPF is low, this means that the bone marrow is not working.
- IPF can better differentiate between the causes of thrombocytopenia. It is a reliable parameter even with very low platelet counts and is valuable for effective risk assessment and therapy monitoring of coronary artery disease (CAD).
- Another new parameter is the platelet-large cell ratio (P-LCR) is indicator of larger (>12 fL) circulating platelets (mega platelets, which have very good hemostatic activity). The normal size of platelets is 7.2-11.7 fL. Their normal percentage range is 15% to 35%. It increases in destructive thrombocytopenia in severe sepsis. P-LCR is inversely related to platelet count and directly related to platelet volume distribution width (PDW) and mean platelet volume (MPV).
- An old but ignored parameter is MPV. The normal MPV ranges from 7.2 to 11.7 fL. When platelet production is increased, young platelets become bigger and more active and MPV levels increase. Increase in MPV during platelet activation is due to change in shape of platelets from biconcave discs to spherical and formation of a pseudopod.
- IPF, P-LCR and MPV must be considered along with platelet count in the clinical condition of the patient to decide if platelet transfusion should be given or not.
- In viral diseases, there will be changes in the WBCs, platelets, RBCs and coagulation and fibrinolytic systems. COVID patients have local or systemic coagulation, as was revealed in few autopsies. Changes in the procoagulant and anticoagulant mechanisms may be caused by the virus.
- RBCs are destroyed by the direct attack of the virus on the heme and similarity of spike protein of the virus and hepcidin which dysregulates the iron metabolism leading to reduction of hemoglobin or hemoglobinopathy.
- WBCs are destroyed due to the direct effect on bone marrow, sepsis, direct effect of the virus on angiotensin-converting enzyme 2 (ACE2) of lymphocytes, virus attack on lymph organs, metabolic products such as lactic acid. These mechanisms cause reduction in total leukocyte count (TLC), apoptosis of lymphocytes.
- Several mechanisms have been postulated for altered coagulation: antiviral anti-inflammatory response, injury due to neutrophil extracellular traps (NETs) and activation of different complement pathways. D-dimer is elevated, as is the prothrombin time.
- There is a definite impact of viruses on thrombocytes.
- Platelets are now regarded as part of the immune system in addition to being capable of forming blood clots.
- Except for viral hemorrhagic fevers and rarely, severe disseminated viral infections, virus-induced thrombocytopenia does not lead to significant bleeding and requires judicious platelet transfusions.
- In viral infections, platelets are reduced because of the direct effect on the bone marrow, immune damage (cytokine storm) and thrombosis (endothelium damage), resulting in decrease in platelet production and increase in platelet consumption (consumptive coagulopathy), leading to low circulating platelets.
- The early nonspecific immune responses limit multiplication of the virus during the acute phase of the infection. The later specific humoral immune responses help eliminate the virus at the end of the acute phase and subsequently to maintain specific resistance to reinfection.
- Platelets influence the innate immune response through regulation of both the maturation and activation of such innate immune cells as macrophages, neutrophils and dendritic cells.
- Almost every viral disease causes thrombocytopenia. The most frequently associated with thrombocytopenia are dengue, measles, chicken pox, Epstein-Barr virus, mumps and rubella. Herpes simplex, hepatitis B, human T-lymphotropic virus type III (HTLV III), and COVID-19 may also cause thrombocytopenia.
- Platelets play a major role in fighting against pathogens, including viruses, in addition to their hemostatic function. The interaction between the virus and platelets through their receptors activates the platelets.

- Viruses cause a decrease in platelet production by infection of megakaryocytes leading to their apoptosis, decreased maturation and ploidy of megakaryocytes or decreased expression of thrombopoietin receptor. The systemic inflammatory response due to viral infection leads to platelet activation. Also, platelets bind to neutrophils forming platelet-neutrophil aggregates, which in turn trigger the phagocytosis of platelets.
- Various mechanisms that contribute to thrombocytopenia in viral infections include aggregation, impaired hemostasis, sequestration and intravascular destruction, platelet expression of pattern recognition receptors (PRR), platelets can induce inflammation and secrete antimicrobial proteins and act as antigen presenting cells.
- Sequestration and intravascular destruction are the primary mechanisms, which leads to correction of thrombocytopenia with the use of low-dose steroids in post viral cases.
- Platelet expression of PRRs is the mechanism which justifies the use of steroids in low platelet counts following viral infection as autoimmunity is suppressed.
- It is important to know the technical points as proper management can only be defined when one knows the why of it. Knowing the how and why of thrombocytopenia helps to draft a proper management plan.
- Isolated platelet transfusions do help in acute crisis management but correcting the underlying cause helps in the long-term management of the situation.
- Hematological analysis is the most easily accessible and helpful tool in assisting the diagnosis of COVID-19. Computed tomography (CT) scan and molecular diagnosis are expensive.
- In COVID-19, CBC is the primary method to screen suspected COVID-19. TLC can be normal or decreased in the early stages of infection; lymphocytopenia and eosinopenia are often seen; increased C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR); D-dimer is increased in severely ill patients; alteration of T-cell subpopulation can also be observed with CD4+ reduction.
- CRP increases within 4 to 6 hours of inflammation; the level doubles every 8 hours and peaks at 36 to 50 hours, which is 100% to 1000% higher than the normal value.
- CRP level and duration is proportional to the severity of infection. Most studies have shown that CRP was markedly raised in all patients, especially in the severe and critically ill patients.
- There are morphological changes in neutrophils; apoptotic and immature granulocytes are seen in PS. Cytokine storm and hyperinflammation are implicated as the possible factors causing these changes.
- Neutrophil-to-lymphocyte ratio (NLR) is a new prognostic indicator. It is an easy-to-use parameter. The cut-off value of NLR is 3.13 (sensitivity 0.875 and specificity 0.717). If NLR is >3.13 and age is >50 years, the patient should be transferred to intensive care unit (ICU).
- NLR is a useful parameter for prognostic evaluation and risk stratification of COVID-19 patients. It predicts severe illness in COVID-19 patients in the early stage.
- An elevated platelet-to-lymphocyte ratio (PLR) may be a prognostic marker in COVID-19. The cut-off value is 180. It is elevated in severe compared to nonsevere COVID-19 patients.
- Presence of widespread microvascular thrombi in both pulmonary and extrapulmonary vessels indicates a systemic prothrombotic state.
- A low to low-normal platelet count is present during peak symptomatic illness, with increased MPV and PDW.
- Desensitization of bone marrow is also a mechanism for thrombocytopenia in COVID-19.
- Platelet-monocyte complexes are formed in severe COVID-19.
- Hematology analysis is helpful in guiding COVID-19 treatment. Along with NLR and CRP, it is of significant clinical value in evaluating disease outcome.
- The requirement of transfusions is low in COVID-19 patients, including in severe cases.
- The hematological parameter of utmost importance in dengue is platelet count. Decrease in platelet count and rise in hematocrit are predictive and recovery parameters of dengue hemorrhagic fever/dengue shock syndrome (DHF/DSS).
- CBC in dengue shows high hemoglobin and hematocrit from D3-D10 (highest on D7) due to plasma leakage, lower WBC on D2-D10 (lowest on D4) and lower platelet count D3-D10 (lowest on D6).

High monocytes on D1-4 (highest on D2), which can be used to predict severity of dengue infection.

- High atypical lymphocytes between D5 and D9 (highest on D7); predict severity of dengue infection – high in DHF than in dengue fever.
- High eosinophils on D9-D10 (highest on D9).
- NLR is >1 during the first 5 days of the infection and then is reversed on D6-D9.
- Thrombocytopenia and platelet dysfunction go hand in hand during dengue infection.
- Leukopenia in dengue may be due to virus-induced destruction or inhibition of myeloid progenitor cells.
- Thrombocytopenia results from destruction of peripheral platelets and bone marrow megakaryocytes by viruses, which consequently reduce the platelet production.
- Influenza infection is associated with thrombocytopenia which depends on severity of infection. In adults, severe influenza is accompanied by an increased risk of pulmonary thromboembolism and cardiovascular events suggesting that platelet activation occurs during infection.

Excerpts from a presentation “Hematological Changes in prevalent viral fevers” by Prof Dr DP Lokwani, Founder Vice Chancellor - MP Medical Sciences University, Consultant Pathologist - Jabalpur Hospital & Research Center, Ex-Prof and Head - NSCB Medical College Jabalpur, MP

Participants: Dr Ashok Gupta, Dr DP Lokwani, Dr KK Kalra, Dr Suneela Garg, Dr Arun Jamkar, Dr B Kapoor, Ms Ira Gupta, Mr Saurabh Aggarwal, Dr S Sharma

Coronavirus Updates

WHO clinical case definition of post-COVID-19 condition

The WHO has developed the first version of a clinical case definition of post-COVID-19 condition as follows: “Post-COVID-19 condition occurs in individuals with a history of probable or confirmed SARS-CoV-2 infection, usually 3 months from the onset of COVID-19 with symptoms that last for at least 2 months and cannot be explained by an alternative diagnosis. Common symptoms include fatigue, shortness of breath, cognitive dysfunction but also others which generally have an impact on everyday functioning. Symptoms may be

new onset, following initial recovery from an acute COVID-19 episode, or persist from the initial illness. Symptoms may also fluctuate or relapse over time. A separate definition may be applicable for children.” This definition may change as new evidence emerges, says the WHO... (Source: WHO)

Increase in antithyroid antibody titers with interferon treatment for COVID-19

A new study from Hong Kong presented at the virtual 90th Annual Meeting of the American Thyroid Association (ATA) has suggested that even short-term treatment of COVID-19 patients (no known history of previous thyroid disorders) with interferon beta-1b is associated with potentially important adverse effects on thyroid function. A significant rise in antithyroid antibodies including antithyroglobulin (anti-Tg) and antithyroid peroxidase (anti-TPO) was seen at 3 months compared to patients not treated with interferon ... (Source: Medscape)

Orphaned children, the hidden US COVID-19 pandemic

One US child loses a parent or caregiver for every four COVID-19-associated deaths, a new modeling study published in *Pediatrics* reveals. The findings illustrate orphanhood as a hidden and ongoing secondary tragedy caused by the COVID-19 pandemic and emphasize that identifying and caring for these children throughout their development is a necessary and urgent part of the pandemic response – both for as long as the pandemic continues, as well as in the post-pandemic era. From April 1, 2020 through June 30, 2021, data suggest that more than 1,40,000 children under age 18 in the United States lost a parent, custodial grandparent, or grandparent caregiver who provided the child’s home and basic needs, which include love, security, and daily care... (CDC)

Myocarditis and mRNA COVID-19 vaccines

In a large study from Israel of patients in an Israeli healthcare system who had received at least one dose of the BNT162b2 mRNA vaccine, the estimated incidence of myocarditis was 2.13 cases per 1,00,000 persons; the highest incidence was among male patients between the ages of 16 and 29 years. Most cases of myocarditis were of mild or moderate severity... (Source: NEJM)

With inputs from Dr Monica Vasudev

■ ■ ■ ■