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EDITORIAL

Rising trend on cardio-vascular diseases in India after COVID-19

Minu Bajpai[1,*] and Abhijat Sheth[2]

[1]*Dean (Academics), Professor & Head, Department of Paediatric Surgery (Formerly), All India Institute of Medical Sciences, New Delhi - 110029, India*
[2]*Senior Consultant, Cardiothoracic Surgeon & C.E.O., Apollo Hospital, Ahmedabad & President, NBEMS*

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"Post-acute COVID-19," "persistent COVID-19," "post-COVID syndrome," "long haulers," and "long COVID-19." These terms reflect the ongoing health issues experienced by individuals weeks or even months after their initial COVID-19 infection. The potential mechanisms contributing to these long-term symptoms include tissue and cell damage affecting vascular flow, increased blood clotting, the persistence of viral fragments or proteins in tissues, and alterations in the immune system. Furthermore, there are frequent reports of chronic cardiovascular effects of COVID-19, even among individuals with no prior cardiovascular disease (CVD), underscoring the significant impact of the virus on the cardiovascular system. Patients with pre-existing heart conditions are particularly noted to have a worse prognosis during the acute phase of the SARS-CoV-2 infection [1].

There are several ways in which COVID-19 can affect the heart, resulting in temporary or lasting damage to heart tissue, such as lack of oxygen, myocarditis, blood vessel involvement, stress cardiomyopathy, etc. However, there is a lack of specific long-term data regarding the outcomes and impact on individuals with underlying heart diseases who have survived COVID-19 hospitalization. These mechanisms highlight the complex ways in which COVID-19 can impact the cardiovascular system, emphasizing the importance of monitoring and managing cardiac complications in individuals affected by the virus.

*Corresponding Author: Minu Bajpai
Email: bajpai2b@gmail.com

Rising trend on cardio-vascular diseases in India after COVID 19

Non-communicable diseases, which are thought to be responsible for over 60% of all fatalities, include diabetes, chronic respiratory conditions, malignancies, CVD, and more. Cardiovascular diseases (CVDs), including ischemic heart disease and cerebrovascular accidents (strokes), are the primary cause of 17.7 million deaths worldwide. The World Health Organization estimates that India is responsible for one-fifth of all global deaths, particularly among younger people. According to the Global Burden of Disease report, India has an age-standardized CVD death rate of 272 per 100,000 people, which is significantly higher than the 235 global average [2,3].

Indians were affected by CVDs ten years earlier than people in the West. The high death rate, quick progression, and early age of initiation of CVD are very concerning to us Indians. The rates of coronary artery disease (CAD) are highest among Indians, and traditional risk factors are unable to account for this elevated risk. Regarding the cardiac mortality and morbidity for the Indian subcontinent, there are no systematic data collection methods, and the majority of deaths occur at home with the reason of death unknown. Data on CV morbidity and mortality from hospitals could not accurately reflect the whole burden of CV disease. Compared to 15.2% and 6.9%, respectively, in 2015, CVDs accounted for 28.1% of all deaths and 14.1% of all disability-adjusted life years (DALYs) in India [4].

Additionally, elevated blood pressure and cholesterol are most common in these states. Acute coronary syndrome and ST-elevation myocardial infarction (MI) are currently the most common in India. In addition to other CVDs, hypertensive heart disease is a major issue in India, accounting for 261,694 fatalities in 2013 (a 138% rise from 1990). In India, rheumatic heart disease is still considered to be an epidemic, with 1.5–2 cases per 1000 people [5].

The frequency of CAD is three times higher in migrant Asian Indians than in the native population. Indians are liable to get hospitalized 2–4 times more frequently for complications of CAD, in comparison with other ethnic groups, and admission rates are 5–10 times higher for populations younger than 40 years. For Indians living in India, the prevalence of CAD is 11% for those without diabetes and 21.4% for those with diabetes. The prevalence of CAD in rural parts of the country is nearly half that in urban population [5].

Cardiovascular complications are associated with COVID-19, emphasizing that these sequelae can occur not only in symptomatic patients but also in asymptomatic individuals. It notes that up to 20% to 30% of patients hospitalized with severe COVID-19 show evidence of myocardial involvement, which can manifest as elevated troponin levels, venous thromboembolism, heart failure, and arrhythmias. Elevated troponin levels in acutely symptomatic patients have been linked to poor outcomes and higher in-hospital mortality rates. The passage highlights various proposed mechanisms for cardiovascular complications of COVID-19, including direct damage to cardiomyocytes, hypoxia-related damage, microvascular dysfunction, thrombosis, and cytokine storm.

Furthermore, myocardial involvement may initiate an inflammatory process leading to fibrosis, which can be detected through cardiac magnetic

resonance imaging (MRI). Long-term sequelae of COVID-19-related myocardial involvement may include increased cardio-metabolic demands, myocardial fibrosis or scarring, persistent left ventricular dysfunction, heart failure, arrhythmias, inappropriate sinus tachycardia, and autonomic dysfunctions (Figure 1).

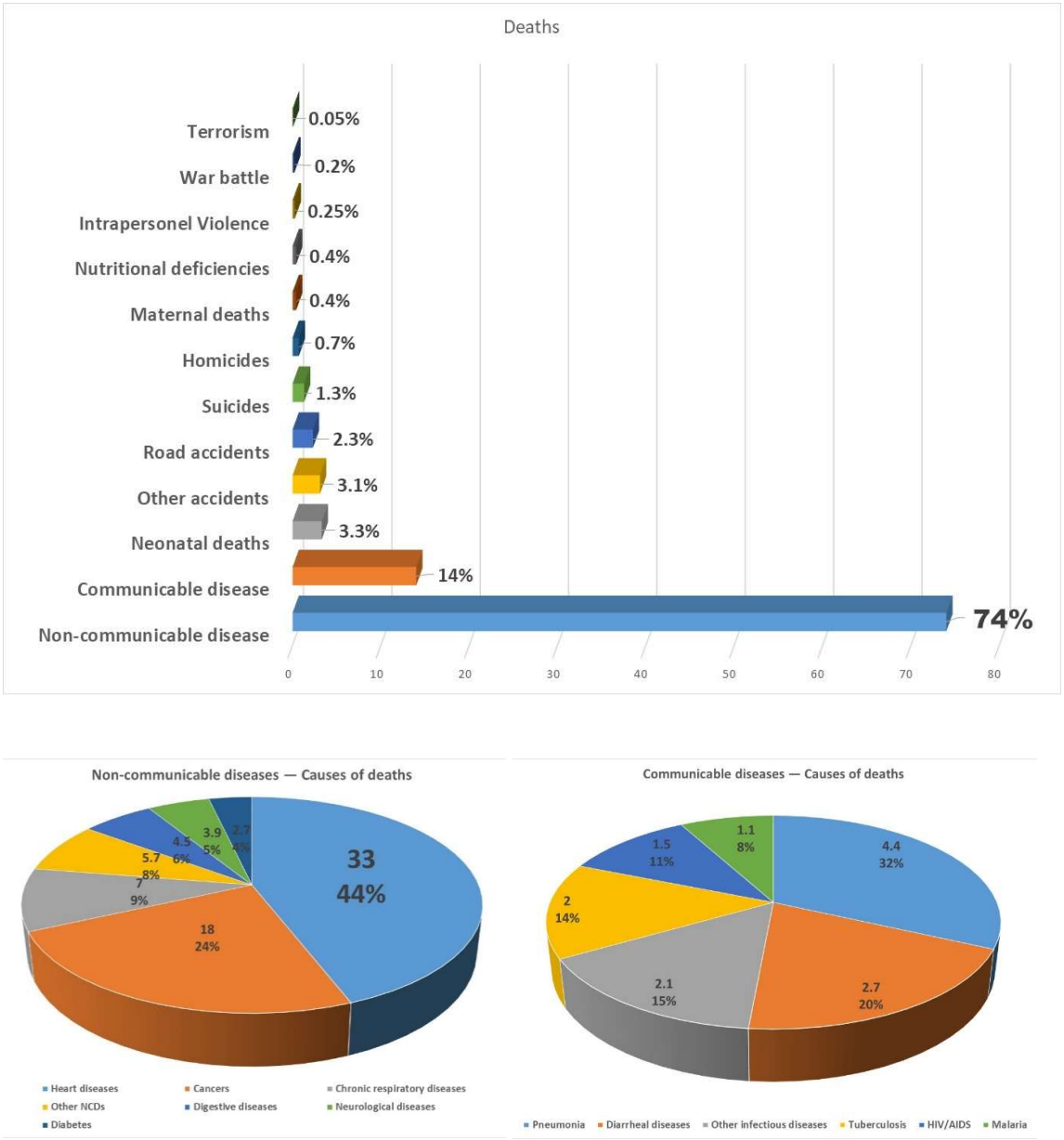

Figure 1. Global burden of disease
Source: IMHE Global Burden of Diseases and Global Terrorism Database

OurWorldData.org – Research Data to Make Progress Against the World's Largest Problems

Global trend on cardio-vascular diseases after COVID-19

Cardio-vascular diseases (CVD) are responsible for nearly one-third of all deaths globally, with over 17 million deaths attributed to them in 2017 alone. The number of deaths from CVD has been steadily increasing, and it is projected to be the cause of more than 23 million deaths worldwide by 2030 [6].

While age-standardized mortality rates for CVD have declined over the last decades, the actual number of deaths has increased significantly. This trend underscores the growing burden of CVD on global health. Although developing countries have historically experienced higher rates of death from CVD, the disease is increasingly prevalent in developed countries as well. Over three-quarters of CVD deaths occur in low- and middle-income countries, indicating a growing epidemic problem in recent years. Several factors contribute to the high burden of CVD, including diabetes, obesity, a lack of physical activity, hypertension, an unhealthy diet, and excessive alcohol consumption. These risk factors highlight the importance of preventive measures and lifestyle interventions in reducing the incidence and impact of CVD. The CVD imposes significant costs on healthcare systems worldwide, affecting quality of life, life expectancy, and healthcare expenditures in various countries. To counter the increasing trend of CVD, it requires comprehensive strategies aimed at prevention, management, and treatment to improve public health outcomes and reduce healthcare costs.

Hon'ble Health Minister Mr. Mansukh Mandaviya's statement on the finding from the Indian Council of Medical Research (ICMR) highlights a concerning trend of rising heart attacks among young individuals who have recovered from severe COID-19 infection

The ICMR conducted a detailed study that revealed a rise in heart attacks among young individuals who had recovered from severe COVID-19 infections. The study recommended that individuals who had severe COVID-19 should avoid extra labor and strenuous activities such as laborious running and exercise for a specified period, typically one to two years, to prevent heart attacks. There has been an increasing number of incidents of young individuals in their twenties and thirties experiencing fatal heart attacks, with some attributing these fatalities to COVID-19 or its treatment. This trend is concerning and underscores the need for further research and awareness about the cardiovascular implications of COVID-19. Recent reports have documented heart attack deaths among young individuals during cultural events such as garba nights in Gujarat. Despite medical teams being on standby at venues, there have been instances of fatal heart attacks during these events. The reported heart attack deaths during garba events include individuals as young as 17 years old, highlighting the severity of the issue and the impact on the younger population [7] (Figure 2).

Figure 2. Hon'ble Health Minister Mr. Mansukh Mandaviya, Minister of State for Health & Family Welfare- Dr. Bharti Pravin Pawar & Minister of State for Health & Family Welfare- Prof. S.P. Singh Baghel and Dr. Abhijat Sheth, President- National Board of Examinations in Medical Sciences

Cardiovascular diseases (CVDs), the world's leading cause of death, claim as many as 17.9 million lives each year, globally. According to a study by the Indian Council of Medical Research and the Registrar General of India, India accounts for approximately 60 percent of the world's heart disease burden [8].

The Hon'ble Prime Minister's flagship Ayushman Bharat programme guarantees impoverished and deprived classes free medical care up to Rs 5 lakh

The National Board of Examination in Medical Sciences has geared up for providing expert care in the public sector, thus impeding the development of the rural cardiology system's infrastructure.

NBEMS - Joint Accreditation scheme

To utilize the available resources of hospitals and to provide them with an opportunity to provide PG training, joint accreditation of the hospitals has been approved by the Governing Body, NBEMS, in its meeting dated 25.11.2022 [9].

The aim is to deploy cardiologists and thoracic and cardiovascular surgeons at the grassroots to attend to sudden emergencies. Most of the casualties occur due to a lack of skills to deal with in golden hours, which could be easily handled by using non-conventional cardiac skills.

Community Health Centres/ Primary Health Centres across UP and even in some other parts of the country would receive a support system to deal with growing cases of CVD [10].

Figure 3. Hon'ble Health Minister Mr. Mansukh Mandaviya, Minister of State for Health & Family Welfare- Prof. S.P. Singh Baghel, Minister of State for Health & Family Welfare- Dr. Bharti Pravin Pawar and Dr. B.K. Rao-Senior Consultant in Institute of Critical Care Medicine, Sir Ganga Ram Hospital, New Delhi, during the online demonstration session of CPR programme conducted by NBEMS, to the nation.

A team of experts led by Parul Naib from Delhi University, Pulkit Kumar from Tata Institute of Social Sciences, Sudha Chandrashekar from the London School of Hygiene and Tropical Medicine at the University of London, and Owen Smith from Harvard University in Cambridge, Massachusetts, USA, examined **"Trends in Cardiac Care Utilization under Ayushman Bharat."**

The team examined every cardiac claim submitted under the Pradhan Mantri Jan Arogya Yojana (PM-JAY) for a span of 17 months, starting in September 2018 and ending in February 2020. It was discovered by 26%, suggesting that a substantial amount of the program was used to give people from the lowest socioeconomic groups free cardiac treatment [11].

According to a study that was published in the medical journal "The Lancet Global Health," the number of fatalities in India in 2015 that were attributable to cardiovascular disease was rising, accounting for more than 25% of all deaths in the nation. According to the survey, young people and those living in rural areas are the groups most affected. According to the data, between 2000 and 2015, the death rate from ischemic heart disease rose significantly among Indians aged 30 to 69 living in rural areas, surpassing that of urban areas [10].

This has virtually compelled a process of brain drain to other countries as most of the trained non-conventional clinical cardiologists left the country and started practicing in countries like Europe, USA and UAE—where they are much in demand. The private sector is also engaging them, like Medanta, Narayana Hrudayalaya Bangalore, Escorts Heart Institute, U.N.

Mehta Heart Hospital in Gujarat, Asian Heart Institute Mumbai and many more. These MBBS doctors learned clinical cardiology under the best experts and are capable of saving lives during the initial moments after a heart attack.

Government steps to strengthen the cardio-vascular services in the country

The government of India has taken several steps to tackle the shortage of cardiologists and improve cardiovascular healthcare in the country, such as increasing medical education, specialized training programs, encouraging public-private partnerships, telemedicine and telecardiology services, capacity building, public awareness and prevention programs, regulatory measures and incentives for rural services.

These steps demonstrate the government's efforts to address the shortage of cardiologists and improve cardiovascular healthcare in India, with a focus on increasing access to specialized care, promoting preventive measures, and strengthening the healthcare infrastructure.

Role of NBEMS to increase the workforce of cardiologists in the country

The National Board of Examinations in Medical Sciences (NBEMS) plays a crucial role in generating and strengthening cardiologists in India through various initiatives related to medical education, training, and certification. By accrediting training programs in cardiology, NBE ensures that these programs meet the required standards of education and training, thereby producing competent cardiologists. The NBE conducts various postgraduate medical examinations, including Diplomate of National Board (DNB) examinations in various specialties, including cardiology. These examinations provide a pathway for medical graduates to specialize in cardiology and obtain certification as cardiologists. The NBE sets standards for medical education and training in cardiology, including curriculum development, assessment methods, and training guidelines. By establishing and maintaining high standards, NBE contributes to the quality of cardiology education and training in India.

The NBE also promotes continuous professional development among cardiologists by offering certification and recertification programs, continuing medical education (CME) activities, and other initiatives to update their knowledge and skills. NBE supports research and innovation in cardiology by encouraging research activities among trainees and providing platforms for presenting and publishing research findings. This contributes to the advancement of knowledge and practices in the field of cardiology. The NBE ensures quality assurance in cardiology training programs and examinations through rigorous evaluation processes, including regular inspections, assessments, and feedback mechanisms. This ensures that cardiologists trained through NBE-accredited programs meet the required standards of competence and professionalism.

Role of Wellness centres in the Hon’ble Prime Minister's flagship Ayushman Bharat programme: Preventive care and frequent health checkups

Preventive care and frequent health checkups can play a significant role in controlling the prevalence of CVDs in India, as they can help identify and manage

risk factors early, prevent the onset of CVD, and reduce the burden of the disease. Regular health checkups can help identify risk factors for CVD, such as high blood pressure, high cholesterol, diabetes, obesity, and smoking. Early detection of these risk factors allows for timely interventions to manage and control them. Preventive care visits provide an opportunity for healthcare providers to educate individuals about healthy lifestyle choices, including a balanced diet, regular exercise, smoking cessation, and stress management. These lifestyle modifications can help reduce the risk of developing CVD. Health checkups may include screenings for CVD, such as electrocardiograms (ECGs), echocardiograms, and stress tests. These screenings can help detect early signs of heart disease or abnormalities in heart function, allowing for timely interventions and treatment.

Regular health checkups and preventive care can help prevent complications associated with CVD, such as heart attacks, strokes, and heart failure. By managing risk factors and addressing early signs of CVD, individuals can reduce their risk of developing these complications. Implementing preventive care measures and promoting frequent health checkups at the population level can have a broader impact on reducing the prevalence of CVD in India. By improving access to preventive care services and promoting health awareness, the burden of CVD can be reduced across the population.

Emergency, critical care services and cardiopulmonary resuscitation (CPR)

Strengthening emergency medicine and critical care services is indeed crucial for effectively addressing the burden of CVDs in India. Emergency medicine and critical care services are essential for providing timely and effective management of acute cardiovascular events such as heart attacks (acute myocardial infarction) and strokes. Prompt initiation of treatments like thrombolytic therapy, percutaneous coronary intervention (PCI), and clot-busting medications can significantly improve outcomes and reduce mortality rates. Strengthening emergency medicine services can help reduce the time from arrival at the hospital to the administration of life-saving interventions like thrombolytic therapy or PCI (known as door-to-needle and door-to-balloon times, respectively). This requires well-equipped emergency departments, trained staff, and efficient systems for triage and patient management. Improving pre-hospital emergency care services, including ambulance systems and emergency medical services (EMS), is critical for ensuring the timely transport of patients with acute cardiovascular emergencies to hospitals equipped to provide appropriate care. This includes training paramedics and emergency medical technicians (EMTs) in the recognition and initial management of cardiac emergencies.

Increasing the capacity and capabilities of critical care units, including coronary care units (CCUs) and intensive care units (ICUs), is essential for managing critically ill patients with complex cardiovascular conditions. This involves ensuring the availability of specialized equipment, such as ventilators, cardiac monitors, and defibrillators, as well as a skilled multidisciplinary team of healthcare providers. Providing specialized training and education programs for healthcare professionals in emergency medicine, critical care, and cardiology is essential for

building a skilled workforce capable of managing acute cardiovascular emergencies. This includes continuous medical education (CME) programs, workshops, and simulation-based training sessions.

Leveraging telemedicine technologies can help extend the reach of emergency medicine and critical care services to underserved areas, enabling remote consultation, triage, and decision-making support for healthcare providers managing cardiovascular emergencies. Investing in research and quality improvement initiatives focused on emergency cardiovascular care can help identify best practices, optimize protocols and pathways, and continuously improve the quality of care delivered to patients with CVD in emergency settings.

NBEMS CPR workshop

The National Board of Examinations in Medical Sciences (NBEMS) has planned a nation-wide programme to raise awareness and train the public in cardiopulmonary resuscitation (CPR). The first workshop was conducted on December 06, 2023 & Union Health Minister Dr. Mansukh Mandaviya launched this public awareness campaign on Cardiopulmonary Resuscitation (CPR) Awareness by NBEMS. “It is imperative that patient receive treatment immediately after suffering a cardiac arrest; hence, awareness and adequate training in CPR are paramount, stated the Hon’ble Minister, Dr. Mansukh Mandaviya. More than 20 lakh people participated in the CPR training across the nation. CPR plays a crucial role in spreading awareness about cardiopulmonary resuscitation (CPR) during emergency situations. CPR is a life-saving skill that can significantly improve the chances of survival for individuals experiencing cardiac arrest or other medical emergencies. The NBEMS CPR workshop educates participants on the proper techniques and procedures for performing CPR effectively, empowering them to act swiftly and confidently in emergency situations. During a cardiac arrest or similar emergency, every second counts. The NBEMS CPR workshop teaches participants how to recognize the signs of cardiac arrest, initiate CPR promptly, and continue life-saving measures until professional medical help arrives. This immediate response can make a crucial difference in saving lives.

Impact of vaccination after COVID-19 infection

The study by Zubair Akhtar et al. acknowledged the potential for reporting bias, particularly concerning the availability of mRNA vaccines in developed countries. This bias may influence the observed differences in cardiac events between vaccine types [12].

Despite the observed cardiac risks associated with COVID-19 vaccination, the study emphasizes that the personal and public health benefits of COVID-19 immunization far outweigh the modest cardiac risks. Furthermore, any cardiac events following vaccination were generally transient and resolved within a few days or weeks.

Population-based studies have indicated that the risk of cardiac complications, including myocarditis and pericarditis, is significantly higher after SARS-CoV-2 infection compared to mRNA COVID-19 vaccination, particularly among adolescents aged 12–17 years [13].

The outcome of CVD in COVID-19 vaccinated individuals compared to non-vaccinated or uninfected populations can vary based on several factors, including the severity of the COVID-19 infection, pre-existing cardiovascular health status, and individual risk factors.

While myocarditis and pericarditis are known complications of mRNA COVID-19 vaccines, especially in certain demographic groups, the incidence is rare, and the benefits of vaccination in preventing COVID-19 outweigh the risks associated with these cardiac complications. It's essential for healthcare providers and individuals to weigh the risks and benefits of vaccination based on individual health status and vaccination eligibility.

Conclusion

The COVID-19 infection is identified as an independent risk factor for cardiovascular disease. Patients with COVID-19 may experience various cardiovascular complications, including myocardial injury, pericarditis, coagulopathy, myocardial infarction, heart failure, arrhythmias, and persistent post-acute adverse cardiovascular outcomes. While the COVID-19 vaccination is generally cardioprotective, it can lead to myocarditis or pericarditis in some cases, particularly among young males. However, the incidence of myopericarditis following vaccination is lower compared to the risk associated with SARS-CoV-2 infection.

Increased awareness among primary care physicians regarding potential cardiovascular causes of non-specific post-COVID-19 symptoms is crucial. This includes recognizing the signs of myocarditis, pericarditis, and other cardiac complications in younger adults and promptly referring them for further evaluation and management. Additionally, optimal management of cardiovascular risk factors and clear diagnostic, referral, and management pathways for patients with non-specific symptoms are essential to rule out cardiac complications.

The current scenario emphasizes the importance of comprehensive strategies to address the cardiovascular implications of COVID-19 infection and vaccination, including early detection, prompt management, and preventive measures to mitigate the risk of cardiovascular complications in affected individuals.

Statements and Declarations

Conflicts of interest

The authors declares that they do not have conflict of interest.

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