

## Cardiometabolic Diseases, Risk Stratification, and Management

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Cardiometabolic diseases such as hypertension, excess weight, obesity, type-2 diabetes, and vascular diseases have reached epidemic proportions worldwide [1-8]. Globally, an estimated 26% of the population of the World's population (972 million) has hypertension. To achieve the global target to reduce the prevalence of hypertension by 25% by 2025, World Health Organization (WHO) and the United States Centers for Disease Control (CDC) and Prevention have launched the Global Hearts Initiative. With its technical package-HEARTS (manage cardiovascular diseases), MPOWER (control tobacco), Active (increased physical activity), SHAKE (reduce salt consumption) and REPLACE (eliminate trans-fat), the initiatives aim to improve heart health worldwide. Despite growing recognition of the problem, the obesity epidemic continues in the US at alarming rate. The prevalence of obesity currently is 40% among young adults aged 20 - 40 years, 45% among middle-aged adults aged 40 to 60 years, and 43% among adults aged 60 and older. Type-2 diabetes has become the biggest epidemic of this century worldwide. China and India lead the world, in terms of number of diabetic individuals. What really is baffling is the fact, that there are more prediabetics than diabetics. For instance, in the USA diabetic population is about 30 million. Whereas, according to the CDC, there are more than 100 million pre-diabetics. Diabetic population in China and India are close to 116 million and 80 million respectively. Worldwide prevalence of diabetes is estimated at 463 million and if we add pre-diabetics to this number, it would exceed a billion individuals. Cardiovascular diseases are the most common noncommunicable diseases globally, responsible for an estimated 18 million deaths in 2017, of which more than three quarters, were in low-income and middle-income countries.

Seminal work from the researchers of the Framingham Heart Group (FHG), provided a road map for the early identification and robust management, of risks that promote the development of vascular diseases. Based on the results of these studies and the scientific statements and guidelines issued by the various professional societies, effective preventive strategies were developed to prevent deaths related to cardiovascular diseases. Several clinical studies and multinational studies, have demonstrated that effective management of modifiable risk factors, healthy lifestyle, exercise and healthy diet, significantly reduces premature death due to cardiovascular diseases (CVDs) [9-11]. Despite these efforts, a substantial global burden of carotid atherosclerosis exists. Effective strategies are needed for primary prevention and management of arterial atherosclerosis. High quality epidemiological investigation on atherosclerosis are needed to better address the global burden of arterial atherosclerosis at finer levels. The risk factors for cerebrovascular disease are pretty much the same as for the CVDs. In a large case-control study in 32 countries, researchers sought to quantify modifiable risk factors for stroke in different regions of the world. Like INTERHEART study, ten potentially modifiable factors are collectively responsible for stroke [12]. Experts are of the opinion, that the authors failed to show compelling evidence, that control of the ten potentially modifiable risk factors would result in stroke prevention.

Metabolic diseases such as hypertension, excess weight, obesity, diabetes and vascular diseases contribute significantly, to the overall morbidity and mortality related to heart attack and stroke. Despite this knowledge about the acute vascular events, there is a considerable disconnect in our understanding of the role of metabolic diseases, nutrition, health education, social status, hormone levels and a variety of other metabolic risks. Known metabolic risks that promote the development of metabolic diseases include, oxidative stress, chronic inflammation, altered blood flow, increased blood pressure and blood glucose, elevated blood lipids, insulin resistance, endothelial dys-

function, hardening of the artery, and subclinical atherosclerosis. The two largest international studies on cardiovascular risk factors for myocardial infarction (INTEHEART) and stroke (INTERSTROKE) demonstrated, that there was a difference in the contribution of certain risk factors that promoted these acute events. For instance, both in South Asians and Latin American populations, highest contributing risk factor was abdominal obesity [13]. Introduction of the term ‘Metabolic Syndrome’, which refers to the clustering of three or more metabolic risks, has indeed created quite confusion in the cardiometabolic literature. When we refer to metabolic diseases, it is not just cluster of three risks, but all the known risks related to altered physiology, that contribute to the development of metabolic risk factors. The incidence of metabolic diseases is increasing at an alarming rate worldwide to epidemic proportions. This has led to an expansion in populations, who are at risk of developing vascular diseases at an earlier age.

Metabolic risk factors seem to occur in clusters. Researchers of the Cardiovascular Institute, Chinese Academy of Medical Sciences, Beijing, China, compared their data with the NHANES survey of the US between 1999 - 2000 and concluded, “Overall, 80.5%, 45.9%, and 17.2% of Chinese adults had > or = 1, > or = 2, and > or = 3 modifiable CVD risk factors (dyslipidemia, hypertension, diabetes, cigarette smoking, and overweight), respectively. By comparison, 93.1%, 73.0%, and 35.9% of US adults had > or =1, > or =2 and > or =3 of these risk factors, respectively [14]”. Clustering of the metabolic risks are common worldwide. Early detection of these risks, and better management of the modifiable metabolic risk clustering, should be an important component of any national strategy, aimed at reducing burden of vascular diseases. Furthermore, an unprecedented SARS-CoV-2 pandemic has demonstrated the vulnerability of those individuals with metabolic risks to this virus and its severity [15-18]. We have discussed in our earlier reports, as to how this killer respiratory virus, takes over the vascular endothelium and initiates thrombotic events in the Covid-19 patients. A multicenter US study has demonstrated correlation of aspirin use, with reduced mortality risk among older adults with COVID-19. Researchers at the University of Maryland School of Medicine conducted this study, to evaluate the beneficial effects of aspirin [19]. They concluded from their studies, “Aspirin use had a crude association with less mechanical ventilation 35.7% aspirin vs. 48.4% non-aspirin) and less ICU admission 38.8% aspirin vs. 51.0% non-aspirin, and in hospital-mortality (26.5% vs. 23.2%).

Professor J Cohn and associates at the Rasmussen Center for Cardiovascular Disease Prevention, University of Minnesota, have established a screening program of an asymptomatic population with 10 tests, designed to detect early vascular and cardiac abnormalities, to identify potential targets for risk contributor intervention [20]. They found that the screening tests utilized were effective in uncovering unsuspected early cardiovascular disease (CVD), in which targeted treatment could be effective in reducing the incidence of CVD events. These efforts were just one step ahead and beyond Framingham Heart Study Group recommendations. Encouraged by these studies, we at the Institute of Preventive Cardiology ([www.ipcheartcentre.com](http://www.ipcheartcentre.com)), Mumbai, India, under the leadership of Dr Pratiksha Gandhi, have screened well over 1000 patients for early detection of metabolic risks and risk-clusters [21]. For these studies, we used a unique non-invasive diagnostic platform developed by Dr. Albert Maarek of LD Technologies of Miami, Florida ([www.ldtek.com](http://www.ldtek.com)). This platform uses proprietary software and analytics, to score individual risks, risk clusters, and computes overall risk as well as a wellness index [22,23]. Our professional society (South Asian Society on Atherosclerosis and Thrombosis; [www.sasat.org](http://www.sasat.org)) has joined hands with the IPcheart-centre, to develop novel approaches for risk stratification and management of cardiometabolic risks.

According to the CDC, chronic diseases that are avoidable through preventive care services account for 75 percent of the nation’s healthcare spending and, lower economic burden in the US by \$260 billion a year. Furthermore, if everyone in the country received recommended clinical care, then healthcare system could save over 100,000 lives a year. Preventable causes of death, such as tobacco smoking, poor diet and physical inactivity, and misuse of alcohol, have been estimated to be responsible for 900,000 deaths annually, nearly 40% of total yearly mortality in the United States [24]. It is mind boggling even to think, that the estimated cumulative financial costs of the COVID-19 could be more than \$16 trillion, approximately 90% of the annual gross domestic product of the US [25]. There are over 1.13 billion individuals worldwide, who have hypertension. There are over 1.9 billion adults 18 years and over, who are overweight. There is a total of over a billion individuals, with altered glucose metabolism (prediabetics and diabetics) and half a billion with vascular diseases.

In 2017 cardiovascular diseases, the number 1 cause of death globally, caused estimated 17.9 million deaths. Collectively, these chronic metabolic diseases cause catastrophic economic damage. We the members of a professional society, SASAT as well as 'IPC Heartcare' urge readers, to come up with novel ideas to reverse, reduce or prevent chronic metabolic diseases.

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