Cardio-metabolic disease in India—the up-coming tsunami

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Introduction

The Indian Ocean earthquake occurred on 26 December, 2004 with the epicentre off the west coast of Indonesia and triggered a series of tsunamis along the southeast coast of the Indian mainland, leaving behind destruction and death the like of which was unparalleled in the history of the country. Nearly all of the victims were taken completely by surprise, despite a lag of several hours between the earthquake and the tsunami.

Human history documents the agricultural and industrial revolution that provided for abundance of carbohydrate-rich crops and calories for consumption than mankind needed. It is unlikely that the thrifty gene adaptation was complete and genetic predisposition to insulin resistance continued. Addition of refined carbohydrates, excess of saturated fats and the transition from hunter-gatherers' civilization eventually have led to the complex phenotype of metabolic syndrome. Cardiovascular disease (CVD) was a foregone conclusion.

Tsunami of cardiometabolic syndrome—disaster awaiting

India is a country of 1.3 billion people, with 29 states and 7 union territories. Apparently, the Asian Indian ethnicity are predisposed to CVD at an earlier age. Asian Indians have a unique "atherogenic dyslipidemic profile" and a "South Asian phenotype" (1,2) with high propensity for metabolic syndrome.

Influence of the western world on the dietary pattern replacing high fiber diet with refined carbohydrates and saturated fats has a certain impact on the growing epidemic of obesity. Terminologies like "diabesity" and "lipitension" are referred to more often now in the medical community and the communication media to highlight the combination of two risk factors in India. Migration struggle of the rural population that thrived on agriculture-based economy to urban areas has paid the price of losing focus on preventive health. What should sound the alarm bell for India is the high prevalence of hypertension amongst the younger age group less than 45 years of age. This compounds the already known high prevalence of obesity, diabetes mellitus and mixed dyslipidemia.

Prevalence of cardiovascular risk factors in India

Despite small, observational studies there has been a paucity of national data. It is only in the recent times that integration of national data from all states has become a priority.

Age-standardized CVD death rate estimation of 272 per 100,000 population in India as shown in the Global Burden of Disease study exceeded the global average, Ischemic heart disease and stroke continue to be the major contributors. The 59% increase in premature mortality because of CVD in India over two decades highlights the continuing threat to the population (3).

The prevalence of conventional risk factors in India is lower than the developed nations. Major CV events and fatality rates were much higher in Indian and the developing countries as shown in the PURE study (4). Smoking as a risk factor is decreasing in urban population, but still a major concern in rural India.

Recently, Geldsetzer *et al.* (5,6) reviewed pooled data from 2 large household surveys in India; the District-Level Household Survey-4 (DLHS-4) and the second update of the Annual Health Survey (AHS). These studies were carried out between 2012 and 2014 across 29 states of India. Hypertension prevalence was reported highest in the states

of Punjab, Himachal Pradesh, Kerala, Sikkim and Nagaland. Age-standardized prevalence of diabetes and hypertension was 6.1% and 20% in women. Age-standardized prevalence of diabetes and hypertension was 6.5% and 24.5% in men.

Kerala in southern India is increasingly becoming a role model for population-based studies and research in cardio-metabolic disease. Analysis of 5,063 individuals in a cross-sectional community-based survey conducted in urban and rural areas reported recently a prevalence of metabolic syndrome of 24%, 29% and 33% for the NCEP ATP III, IDF and AHA/NHLBI Harmonization definition criteria (7).

Women and urban population compared worse than men and the rural population (28% *vs.* 20% for women and men; 26% *vs.* 22% for urban and rural subjects, P<0.001). Propensity for definite CAD was 1.7 times higher in individuals with metabolic syndrome. On a note of great concern, close to a quarter of the individuals had abdominal obesity (30.4% urban, 23.9% rural, P<0.001). Diabetes and hypertension prevalence of 16% and 29% in Kerala exceeded the national averages of 6.3% and 22.2% respectively. Apparently, this is not all about genes. The higher prevalence of diabetes and hypertension in Kerala as compared to the national data survey in women and men reflects upon the cultural background and lifestyle patterns, rapid urbanization and growing obesity. The healthcare initiatives and implementation policies, if they succeed, can become an example for other states to reduce the cardio-metabolic burden.

The other notable observation from the survey was getting rid of the myth that these are disorders of the urban and the affluent. The prevalence of diabetes, hypertension and dyslipidemia was 14%, 24% and 23% respectively in the rural population. Although the figures were statistically less for diabetes, hypertension and similar for hypercholesterolemia, further geographical translocation and lifestyle transitions will narrow this reducing gap. This can be a thought provoking question to answer the genetic ethnicity predisposition theory.

Vegetarianism and cardio-metabolic syndrome

Indian culture imbibes vegetarianism influenced by cultural beliefs and scriptures. There is hardly any fundamental discussion on scientific evidence from an early age. Consumption of meat products may be considered a taboo in various religious sects. Proteins are replaced by carbohydrates in the vegetarian diet. Unlike reported, fruits and vegetables are consumed quite liberally in Indian diet. Unfortunately, this leads to further reduction in quality protein containing portions and addition of saturated fats for satiety. Contributing to the obesity and metabolic syndrome epidemic is the "contaminated vegetarianism", where invisible fats in the form of partially hydrogenated vegetable oils, butter, and ghee (clarified butter) are added during cooking (8).

Recent study of the Vegetarian Diet and cardiometabolic risk among Asian Indians in the United States has interesting inferences on the predisposition of the community for CVDs. The prevalence of diabetes was 17.4%, pre-diabetes 33%, metabolic syndrome 38.2% and obesity 48%. Vegetarianism was not a protective factor for metabolic syndrome and obesity although the risk for diabetes was lowered (9). Paleolithic nutrition, a low-salt, high-protein diet with virtual elimination of grains and dairy products is thought to reduce the prevalence of metabolic syndrome, but may not be the most suitable diet alteration in India (10).

What is unknown

(I) Causative major link—ethnic predisposition or lifestyle related;
(II) Vegetarianism as a dietary factor;
(III) Vitamin B12 deficiency and elevated levels of homocysteine consequent to a vegetarian diet (11,12);
(IV) Vitamin D deficiency;
(V) Lipoprotein(a) elevation and polymorphism.

What can be done

(I) Change in the self-perception that Indian pattern of lifestyle unlike the western world provides immunity against cardio-metabolic syndrome;
(II) Radical change in the misconception that dyslipidemia is amenable to reducing diet cholesterol;
(III) Comparative study between the Indian population on vegetarian diet and different ethnic population on vegetarian diet. If vegetarian diet with the perceived benefits is protective for cardio-metabolic diseases, may be adapted by the community. If not to the desired level, early implementation of the poly-pill strategy in the vulnerable population;
(IV) Identify the population at risk and frequently use the secondary prevention drugs like aspirin and statin. Judicious use of class of drugs like Ace inhibitors and

beta blockers for cardiovascular and renal protection;

(V) Genetic polymorphism studies. Example is the A1298C polymorphism that needs further evaluation (13);

(VI) The Science of Yoga, transcendental meditation and holistic methods to control the mind and body has widespread practice. Prospective studies are urgently required to substantiate the benefits of these methods as often, they are perceived as substitutes rather than complementary for aerobic activities;

(VII) Metabolic syndrome prevalence was less common in the educated and may serve as a great opportunity to invest in primordial prevention measures in school and colleges. Physicians may step forward and lead by example to motivate for physical exercise (14);

(VIII) Urban development projects will require government regulatory authorities to create space for walking trails, sports facilities and recreation parks;

(IX) Intensive awareness program in the rural population as they will be the new vulnerable class;

(X) Better co-ordination and confidence in the regulatory authorities, government and private health care providers to be prepared for the tsunami of cardio-metabolic syndrome.

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Footnote

Conflicts of Interest: The author has no conflicts of interest to declare.

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