Editorial

Emergence of cardiometabolic risk in Bangladesh

South Asian nations are facing an epidemic of cardiovascular disease (CVD). According to the World Health Organization (WHO) this region has one of the highest cardiovascular mortality rates in the world.[1] Age-adjusted cardiovascular mortality rates in countries of this region vary from a low of 179/100,000 in men and 153/100,000 among women in Bangladesh to a high of 349/100,000 among men in India and 294/100,000 in women in Pakistan (Fig. 1). These rates are more than 2–3 times greater than in USA where rates are 170/100,000 in men and 108/100,000 in women. Global Burden of Diseases Study has reported that deaths as well as disability from ischemic heart disease (IHD) has more than quadrupled in most of the countries of this region in the last 30 years.[2] Four factors contribute to high cardiovascular disease burden and high mortality in this region[3]: (a) lack of policies related to social determinants of cardiovascular diseases and control of primordial risk factors (smoking, non-smoked tobacco, alcohol, physical inactivity and unhealthy diet) for IHD prevention; (b) poor quality preventive management, i.e., poor control of risk factors (smoking, obesity, high blood pressure, high cholesterol, and diabetes); (c) low availability and quality of acute IHD management; and (d) lack of appropriate long term care of these patients and absent cardiovascular rehabilitative and secondary prevention programs. Unfortunately, all these factors are widely prevalent in South Asian countries. The Prospective Urban Rural Epidemiology (PURE) Study reported that despite lower overall cardiovascular risk in 4 low income countries (represented by India, Pakistan and Bangladesh) and a low INTERHEART risk score, CVD mortality was the highest in these countries compared to 13 high-, middle- and lower-middle income countries.[4] This suggests that the levels of risk factor control is low, acute disease management is poor and so are secondary prevention practices.[5]

1. Coronary risk factors in Bangladesh

There are no prospective studies in this region that have determined factors of risk for IHD. Risk factors for premature IHD in this region have been quantified in the INTERHEART study.[6] In this case–control study, nine common risk factors explained more than 90% of incident acute myocardial infarctions in South Asian patients. The risk factors include dyslipidemia (ApoB/ApoA1 ratio), smoking, hypertension, diabetes, abdominal obesity, physical inactivity, low fruits and vegetables in diet, alcohol abuse and psychosocial stress.[6] All these risk factors are widely prevalent in South Asian countries. Reviews from India, Bangladesh and Pakistan have reported that all the major risk factors – especially cardiometabolic risk factors– obesity, abdominal obesity, hypertension, dyslipidemia, and diabetes are increasing.[7–9] These reviews are, however, based on small regional studies in urban, rural or both populations and there is a need for nationally representative studies.

IHD is an important medical and public health problem in Bangladesh and is a leading cause of mortality. Similar to other
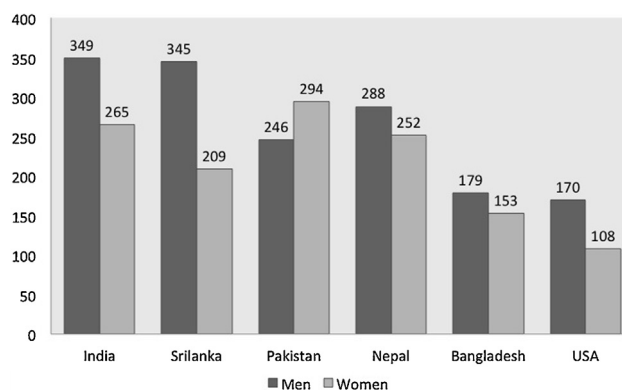

Fig. 1 – Age-adjusted cardiovascular mortality/100,000 in various South Asian countries and USA: WHO Global Status Report on Non-Communicable Diseases 2014.[1]

South Asians, Bangladeshis are unduly prone to develop coronary disease which is often premature in onset, follows a rapidly progressive course and is angiographically more severe.[10] The underlying pathophysiology is poorly understood. Genetic predisposition, high prevalence of metabolic syndrome and conventional risk factors play important role. Lifestyle related factors, including poor dietary habits, excess saturated and trans fat, high salt intake, and low-level physical activity may be important. Some novel risk factors, including hypovitaminosis D, arsenic contamination in water and food, and particulate matter air pollution may play unique role.[10] Bangladesh is a pioneer in estimation of national burden of risk factors. Several efforts to estimate the burden of risk factors have been undertaken. In 2002, a survey used World Health Organization (WHO) stepwise approach to surveillance (STEPS) methodology and reported that preventable risk factors including tobacco use, unhealthy diets, physical inactivity and alcohol abuse were becoming an increasing problem in the country.[11] Countrywide, evidence suggests that there are high rates of any tobacco use – particularly among men, moderate rates of low fruit and vegetable consumption and high rates of physical inactivity among adults.[8]

In this issue of the journal, Zaman and co-authors present data on cardiometabolic risk factors – diabetes and hypercholesterolemia – from the second phase of WHO-STEPS in a nationally representative population based study in Bangladesh.[12] Results indicate that there is a significant prevalence of diabetes at 5.5% (men 7.6%, women 2.8%) and its prevalence is significantly greater in urban (7.6%) compared with rural (2.8%) populations. In this study diabetes has been diagnosed by criteria of either previously diagnosed diabetes or fasting glucose ≥126 mg/dl and this may be an under-reporting of the condition as combining these criteria with use of 2-h post-glucose load blood glucose shall increase this prevalence rate. The study also evaluated the prevalence of hypercholesterolemia and reported a very low prevalence (1.3%) of severe hypercholesterolemia (total cholesterol ≥240 mg/dl) as well as borderline high total cholesterol (≥200 mg/dl) at 5.8%. Total cholesterol ≥170 mg/dl corresponds to low density lipoprotein (LDL) cholesterol >100 mg/dl, the currently accepted criteria of cardiovascular risk, and it would have been helpful if the authors had provided data at this level of risk. The mean cholesterol level in the present study is 167 ± 26 mg/dl and this is greater than the population means of 156 mg/dl in a 1996 study in a Bangladeshi rural population and similar to recent studies in Bangladesh.[8] As there is a continuous and graded relationship of total and LDL cholesterol with coronary risk,[13] a rightward shift of the total cholesterol bell-curve suggests a significant increase in coronary risk in Bangladesh.

2.   Comparison with other South Asian countries

How do these data compare with studies in India and Pakistan, the other large countries of South Asian region? Although there are no nationally representative studies about prevalence of diabetes and hypercholesterolemia in these countries, reviews have reported greater prevalence than in Bangladesh. Reviews of studies from India have reported diabetes prevalence of 3–4%

in rural adults and 8–12% in the urban.[14] Similarly prevalence of hypercholesterolemia (≥200 mg/dl) is about 20–25% in urban adults and 10–12% in the rural.[15] PODIS (Prevalence of diabetes In India study), a nationwide study, evaluated diabetes prevalence at multiple urban and rural sites in India using clinical diagnosis and fasting blood glucose levels and reported diabetes in 4.3%.[16] The standardized prevalence of diabetes in urban areas (5.9%) was significantly higher than in rural populations (2.7%). These rates are lower than the prevalence in Bangladesh. However, the ICMR-INDIAB study has reported a higher prevalence of diabetes in 4 Indian states ranging from 10.4% in Tamil Nadu, 8.4% in Maharashtra, 5.3% in Jharkhand and 13.6% in Chandigarh.[17] Pakistan Diabetes Survey reported diabetes and impaired fasting glucose prevalence of 22.0% in urban and 17.2% in rural areas and another study reported diabetes in 12.1% men and 9.8% women in the Punjab province.[9] There are no representative data on prevalence of hypercholesterolemia in Pakistan although Global Burden of Chronic Diseases Risk Factors study reported that high total cholesterol was responsible for about 100,000 deaths.[9] Greater prevalence of diabetes and hypercholesterolemia has been reported form other South Asian nations – Sri Lanka and Nepal.[1] Another limitation of the study by Zaman et al.[12] is the measurement of other lipid parameters that are important cardiovascular risk factors in South Asians. These parameters include apolipoproteins, triglycerides, high-density lipoprotein (HDL) cholesterol and non-HDL cholesterol.[6] Large national studies such as India Heart Watch in urban populations[18] and Indian Industrial Population Study[19] have reported that these dyslipidemias are present in significant number of adults in India.

3.   Conclusions

The study by Zaman et al. is an important addition to epidemiology of cardiometabolic risk factors in the South Asian region. The study uses standard WHO-STEPS methodology to assess national prevalence of diabetes and hypercholesterolemia. This is a lesson in epidemiological methodology for larger countries such as India and Pakistan where such studies are non-existent. There is significant presence of diabetes and hypercholesterolemia in Bangladesh and although these risk factors as well as cardiovascular mortality are lower than in other South Asian countries (Fig. 1), it points to an impending epidemic. Whether the fractured and choked health systems of Bangladesh, India and Pakistan can cope with this epidemic awaits future reports. Meanwhile, Bangladesh with its inclusive health system,[20] which has successfully tackled problems of infections and maternal and childhood diseases better than its neighbors, is poised to lead the way forward. Thus, the present study[12] suggests that cardiovascular risk is widespread in the country, and although at a lower level than in the neighboring countries, it is likely that with social and epidemiological transition cardiovascular diseases would emerge as important.

Conflicts of interest

The author has none to declare.

REFERENCES

1. World Health Organization. *Global Status Report on Non-Communicable Diseases 2014.* Geneva: World Health Organization; 2014.
2. Institute for Health Metrics and Evaluation (IHME). *Global Burden of Disease (GBD) Database.* Seattle: IHME, University of Washington; 2014. Available at: http://www.healthdata.org/gbd/data. Accessed: 17.07.15.
3. Gupta R, Guptha S, Joshi S, Xavier D. Translating evidence into policy for cardiovascular disease control in India. *Health Res Policy Syst.* 2011;9:8.
4. Yusuf S, Rangarajan S, Teo K, et al. Cardiovascular risk and events in 17 low-, middle- and high-income countries. *N Engl J Med.* 2014;371:818–827.
5. Spencer S. Lessons from the PURE study. *Global Cardiol Sci Pract.* 2014;2014:379–381.
6. Joshi P, Islam S, Pais P, et al. Risk factors for early myocardial infarction in South Asians compared with individuals in other countries. *JAMA.* 2007;297:286–294.
7. Gupta R, Guptha S, Sharma KK, Gupta A, Deedwania PC. Regional variations in cardiovascular risk factors in India: India Heart Watch. *World J Cardiol.* 2012;4:112–120.
8. Mirelman A, Koehlmoos TP, Niessen LW. Risk attributable burden of chronic diseases and cost of prevention in Bangladesh. *Global Heart.* 2012;7:61–66.
9. Jafar TH, Haaland BA, Rahman A, et al. Non-communicable diseases and injuries in Pakistan: strategic priorities. *Lancet.* 2013;381:2281–2290.
10. Islam AK, Majumder AA. Coronary artery disease in Bangladesh: a review. *Indian Heart J.* 2013;65:424–435.
11. World Health Organization. *Behavioral Risk Factors of Non-communicable Disease in Bangladesh.* Geneva: World Health Organization; 2002:1–117.
12. Zaman MM, Choudhury SR, Ahmed J, Talukder MH, Rahman AHM. Blood glucose and cholesterol levels in adult population of Bangladesh: results from STEPS 2006 survey. *Indian Heart J.* 2015 (in press).
13. Prospective Studies Collaboration. Blood cholesterol and vascular mortality by age, sex, and blood pressure: a meta-analysis of individual data from 61 prospective studies with 55,000 vascular deaths. *Lancet.* 2007;371:1829–1839.
14. Mohan V, Sandeep S, Deepa R, Shah B, Varghese C. Epidemiology of type 2 diabetes: Indian scenario. *Indian J Med Res.* 2007;125:217–230.
15. Misra A, Luthra K, Vikram NK. Dyslipidemia in Asian Indians: determinants and significance. *J Assoc Physicians India.* 2004;52:137–142.
16. Sadikot S, Nigam A, Nigam A, et al. The burden of diabetes and impaired glucose tolerance in India using the WHO 1999 criteria: prevalence of diabetes in India study (PODIS). *Diabetes Res Clin Pract.* 2004;66:301–307.
17. Anjana RM, Pradeepa R, Deepa M, et al. Prevalence of diabetes and prediabetes (impaired fasting glucose and/or impaired glucose tolerance) in urban and rural India: phase I results of the Indian Council of Medical Research-INdia DIABetes (ICMR-INDIAB) study. *Diabetologia.* 2011;54:3022–3027.
18. Guptha S, Gupta R, Deedwania P, et al. Cholesterol lipoproteins, triglycerides and prevalence of dyslipidemias among urban Asian Indian subjects: a cross sectional study. *Indian Heart J.* 2014;66:280–288.
19. Reddy KS, Prabhakaran D, Chaturvedi V, et al. Methods for establishing a surveillance system for cardiovascular diseases in Indian industrial populations. *Bull WHO.* 2006;84:461–469.
20. Chowdhury AMR, Bhuiya A, Chowdhury ME, Rasheed S, Hussain Z, Chen LS. The Bangladesh paradox: exceptional health achievement despite economic poverty. *Lancet.* 2013;382:1734–1745.

Rajeev Gupta[a,b]
[a]Department of Medicine, Fortis Escorts Hospital, Jaipur 302017, India
[b]Academic & Research Development Unit, Rajasthan University of Health Sciences, Jaipur 302033, India
E-mail address: rajeevgg@gmail.com (R. Gupta)