DOI: http://doi.org/10.4038/jccp.v53i2.7952 **Editorial**

Cardiovascular risk stratification in primary prevention of non-communicable diseases

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Cardiovascular diseases (CVDs) are the leading causes of death globally and in Sri Lanka.[1] Low and low-middle income countries contribute a greater share to the global burden of CVD than the developed countries at present with more than 75% coming from low and low-middle income countries.[2,3] Global epidemiological transition with the growth of the ageing population and widespread improvements in the socio-demographic index is thought to be the main reasons for this. Even though the CVD burden globally is decreasing, it is on the rise in low and low-middle income countries.[4] CVDs are caused by atherosclerosis which is a slowly progressing condition developing insidiously over many years since childhood and remains asymptomatic for many years before causing symptoms, complications, or death.[5,6]

The most effective way to reduce the CVD burden locally and globally is the prevention of CVD than the treatment of established CVDs. It is shown that controlling modifiable risk factors of atherosclerosis can achieve an 80-90% reduction of CVDs.[7,8] Established CVD treatment is often expensive and may not be curative even with the best available therapeutic interventions. Further, some CVDs occur suddenly and there is limited time to seek medical attention.[9,11]

Prevention of CVD depends on optimal control of risk factors as they are rarely a result of a single risk factor but are commonly a result of a combination of several risk factors leading to atherosclerosis. Risk factors usually cluster together and interact multiplicatively to increase CVD risk in an individual.[12] Therefore, treating individuals with a high total-CVD risk as opposed to treating individuals with a high-single risk factor is the best. It has been shown that this total risk approach significantly reduces under-treatment, and unnecessary drug-related adverse effects in addition to reducing unnecessary medication-related costs.[13,14]

Primary prevention to be cost-effective, especially in low and low-middle income countries, needs to be implemented by targeting the at-risk population (high-risk strategy) than targeting the total population (population-based strategy).[15] However, this approach requires reliable risk prediction models to identify the individuals at increased risk without failing.

The predictive ability of cardiovascular risk prediction models in different populations does differ as the cardiovascular risk of an individual depends on multiple factors like genetics, ethnicity and socio-demographics. Therefore, the risk models derived from western Caucasians may not be predictive enough of South Asians and selecting the best prediction model for a specific population is essential.[16]

Even though there are several famous cardiovascular risk prediction models available for use, none is derived from South Asians/Sri Lankans and has shown to be less predictive in South Asians.[17,18] The World Health Organization (WHO) has developed risk prediction charts by modelling approach for 14 epidemiological sub-regions where there are no specific risk prediction models to address this issue.[19] It was shown that the predictions of the World Health Organization/International Society of Hypertension-South-east Asia B risk charts-2007 (WHO/ISH-SEAR-B) were satisfactory in risk prediction of Sri Lankans especially low-risk males by validation.[20] WHO lately revised the risk prediction charts in 2019 using

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individual-participant data from 85 prospective cohort studies and re-calibrated previous charts using age-specific and gender-specific incidence rates and risk-factor values obtained from the Global Burden of Disease (GBD) Study to suit 21 global epidemiological regions and these seem the best to be used in risk stratification of Sri Lankans until a specific risk prediction model developed from a Sri Lankan cohort is available.[21] However, Sri Lanka is considered under the WHO SEAR sub-region with Indonesia, Cambodia, Lao PDR, Maldives, Myanmar, Malaysia, Philippines, Thailand, Timor-Leste, Vietnam, Mauritius, and Seychelles and therefore may not be 100% predictive of Sri Lankans' risk.

Cardiovascular risk prediction is indicated in all above 35-40 years of age who have not had any CVD in the past with few exceptions. It is not necessary for people who have had previous CVDs, or have very high levels of individual risk factors, (e.g. total cholesterol ≥8 mmol/l (320 mg/dl) or low-density lipoprotein (LDL) cholesterol ≥6 mmol/l (240 mg/dl) or TC/HDL-C (total cholesterol/high-density lipoprotein cholesterol) ratio >8, persistently raised blood pressure >160-170/100-105 mmHg, with type 1 or 2 diabetes, with overt nephropathy or other significant renal disease or with renal failure or renal impairment as they are already at high risk of developing recurrent CVDs.[22]

Risk charts should be used in the correct contexts. 10-year cardiovascular risk charts are for subjects between the ages of 40-75 years. Patients less than 40 years of age should be risk-stratified differently either by assessing their lifetime risk, calculating cardiovascular risk age, or calculating a person's risk at the age of 60 years if current risk factor levels were maintained. Elderly, above 80-85 years are considered at increased risk of CVDs even with the age alone, particularly people who smoke or have raised blood pressure.[23,24] Patients with type 2 diabetes also need to be risk-stratified using cardiovascular risk charts but patients with type 1 diabetes older than 40 years, who have had diabetes for more than 10 years, with established nephropathy or with other cardiovascular risk factors are considered as high risk without risk stratification.[24] There are two WHO risk charts for each epidemiological sub-region to be used depending on the available data. The laboratory-based chart is to be used when total cholesterol data is available, and the non-laboratory based one is to be used when total cholesterol level is not available where body mass index (BMI) is used instead. The laboratory-based chart does consider the presence of diabetes in addition to total cholesterol level and is more predictive compared to the non-laboratory-based charts and is recommended to base non-communicable disease treatment decisions. Non-laboratory based chart does not consider the presence of diabetes in risk stratification and is less predictive and is recommended for non-communicable disease screening in resource-poor settings and the ones who are screened positive will need to be referred to have laboratory-based risk assessment before initiation of treatment.[22]

Primary prevention recommendations do vary with the risk category. The thresholds beyond which intensive pharmacological treatment is initiated depending on the total risk and the availability of resources. All are advised to adhere to lifestyle modifications including quitting tobacco, engaging in physical activity, and consuming healthy diets. According to the WHO guidelines, a 10-year cardiovascular risk <10% is defined as low risk but not "no risk". A risk between 10% to <20% is defined as moderate risk and is recommended to monitor cardiovascular risk profiles every 6-12 months. A risk above 20% is defined high risk needing initiation of medications in addition to lifestyle modification to control risk factors and recommends re-evaluation of cardiovascular risk every 3-6 months.[22,23]

However, there are some limitations in using cardiovascular risk prediction models. Most risk charts cannot be used in extremes of ages; <35-40 years or >75-80 years. Further, the predictions may not be accurate when one risk factor is significantly high and in those situations, decisions need to be taken depending on the value of that individual risk factor. The actual risk could be more than the predicted risk in some situations; e.g.; in patients already on antihypertensive therapy, with premature menopause, central obesity, sedentary lifestyle, family history of premature CHD or stroke in a first-degree relative (male <55 years, female <65 years), raised triglyceride level (>2.0 mmol/l or 180 mg/dl), low HDL cholesterol level (<1 mmol/l or 40mg/dl in males, <1.3 mmol/l or 50 mg/dl in females), raised C-reactive protein, fibrinogen, homocysteine, apolipoprotein B or Lp(a), or fasting glycaemia, or impaired glucose tolerance, micro-albuminuria, raised pulse rate and socioeconomic deprivation.[22]

In conclusion, primary prevention of non-communicable diseases needs screening of people over 40 years and identifying high-risk individuals using the best risk prediction model developed for a given population. Selected high-risk patients should be treated according to their total cardiovascular risk to achieve treatment goals in all individual risk factors leading to the ultimate reduction of total cardiovascular risk in the individual. In Sri Lankan context, WHO cardiovascular risk charts developed for the south-east Asia region (laboratory-

based revised in 2019) are the best available to identify individuals with a risk of more than 20%. Therefore, the best option for reducing the cardiovascular burden of Sri Lanka would be to implement primary preventive measures (lifestyle modification and medications) according to individuals' predicted total cardiovascular risk.

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