Letter to the Editor

Atherosclerostic cardiovascular disease risk score: Are Indians underestimating the risk of cardiovascular disease?

According to the reports of the World Health Organization (WHO), there has been an increased trend in the years of life lost and disability-adjusted life years because of coronary artery disease in India, in recent years. With advancement in the treatment modalities for patients diagnosed with cardiovascular disease (CVD), there has also been an increased emphasis on preventive cardiology. The risk of developing CVD over the next 10 years and the lifetime risk of CVD are assessed with the help of risk calculators such as atherosclerostic cardiovascular disease (ASCVD) risk calculators.[1] This pooled cohort risk equation was developed from several large cohort studies including the atherosclerostic risk in communities study, the cardiovascular health study, and Coronary Artery Risk Development in Young Adults study and data from the Framingham Original and Offspring Study cohorts. These cohorts mainly included white and African-American participants. Although the pooled cohort risk predicts the CVD risk in whites and African Americans with accuracy as implied by various validation trails, its use in other races has not been well validated.

The meaning of race has varied over time but is mainly used to include certain physical traits or phenotypic features.[2] Race as a nonmodifiable risk factor in CVD is well established.[3] Apart from the genetic differences between races, race differs in several other risk factors not included in the ASCVD calculation but has been long established as risk factors of CVDs. For instance, African Americans were reported to have a higher prevalence of obesity than their Caucasian counterparts,[3] and obesity is an independent risk factor of CVD irrespective of metabolic health. African Americans were also reported to have a higher mean systolic blood pressure and lower C reactive protein (CRP) levels as compared to their Caucasian counterparts.[4]

A recent study comparing two heart failure cohorts from two heart failure registry (the SHOP study[5] and the SwedeHF registry[6]) found Asians to have lower body mass index than whites.[7] The prevalence of obesity as per data from a large US integrated health system was 41.5%,[8] whereas as per the reports of ICMR-INDIAB study,[9] the prevalence of obesity in the Indian population was 21.075%. This difference in prevalence of obesity, for example, among the two races (factor not included in the ASCVD risk equation), may result in an altered behavior of the cohort equation in the Indian population. Obesity is one of the proved independent risk factors for CVD that alter with differences in the race and is not included in the ASCVD risk equation. Other factors studied as independent risk factor for ischemic heart disease and that alter among races include serum homocysteine, central obesity, and so on. Studies have found higher levels of serum homocysteine among Asian Indians than among European men.[10] The variables and weightage of each variables in a risk stratification equation are decided by logistic regression after a model that almost perfectly fits is developed. However, when two races under consideration are significantly heterogeneous, the logistic model developed for one race may not be a fit for another.[11] Table 1 describes some of the differences in risk factors for atherosclerosis in Indians in contrast with the Americans.

According to the report of the American College of Cardiology/ American Heart Association, there is a National Heart, Lung, and Blood Institute (NHLBI) grade E (expert opinion)- evidence for the use of the sex-specific pooled cohort equations for non-Hispanic whites-, for estimation of risk in patients from populations other than African Americans and non-Hispanic whites. A study by Kandula et al.[19] to find the association of 10-year and lifetime predicted cardiovascular disease risk with subclinical atherosclerosis in South Asians found a positive association between the two variables. The study found that the odds that an individual will have significant coronary artery calcium scoring is 1.81 and 1.56 in males and females, respectively, with a high ASCVD score (score >7.5% and diabetes mellitus). Although the study was able to prove a positive

Table 1
Risk factors for atherosclerotic cardiovascular disease.

Risk factors	Indians	Americans
Factors mentioned in the ASCVD risk cohort equation		
Hypertension prevalence	25.3%[12]	45.4%[13]
Diabetes prevalence	7.7%[14]	11.8%[13]
Current smoking prevalence	24% (men)	
2.7% (women)[15]	18.6%[13]	
Factors not mentioned in the ASCVD risk cohort equation		
Obesity prevalence	21.075%[9]	41.5%[8]
Physical inactivity levels	54.4%[16]	55.5% (males)
		42.5% (females)[17]
Homocysteine levels	Studies have found higher levels of serum homocysteine among Asian Indians compared with European men.[10]	
C-reactive protein	Studies have found elevated plasma high-sensitivity C-reactive protein concentrations in Asian Indians living in the United States.[18]	

ASCVD, atherosclerostic cardiovascular disease.

association between ASCVD 10-year risk scoring and coronary artery risk (indirectly by assessing coronary artery calcium scoring), the study however failed to provide any information on whether the pooled cohort risk score will accurately estimate the risk in the American South Asian population. A study "Prevalence by Computed Tomographic Angiography of Coronary Plaques in South Asian and White Patients With Type 2 Diabetes Mellitus at Low and High Risk Using Four Cardiovascular Risk Scores (UKPDS, FRS, ASCVD, and JBS3)" by Gobardhan et al[20] concluded that South Asians categorized as high risk using the ASCVD score showed more coronary artery calcium than whites. A similar study by Garg et al[21] concluded that the ASCVD risk score does not behave the same as in the Western population. A recent study by Al Rifai et al[22] concluded that the ASCVD score overestimated CVD in South Asians belonging to the low- and intermediate-risk group.

It would be of importance to mention here regarding the JBS3 risk score (Joint British Society for prevention of CVDs) recommend by the NICE guidelines for use in the United Kingdom as it is based on the UK population[23] and the QRISK 3 risk prediction algorithm. The JBS3 risk score is based on the QRISK risk score. The JBS3 and QRISK 3 score does account for Indian ethnicity for cardiovascular risk prediction, but Indians and South Asians account for only a small proportion of the included cohort (1.9% and 5%, respectively) used in risk equation calculation.[24] Similar is the problem with the WHO cardiovascular risk prediction chart that has been developed for use in low-income countries without adequate infrastructure. The WHO risk prediction chart uses basic and limited number of variables, and hence risk stratification and primary prevention with drug using these charts might not be ethical and precise.

Hence, although the ASCVD scoring system may help the Indian population in primary prevention by identifying individuals with high risk of CVD, it might be an underestimate. The pooled cohort equation of ASCVD hence needs to be validated with similar cohorts in the Indian context, and thereby, appropriate alteration is to be made to the same if need arises.

Conflict of interest

No conflict of interest for both authors.

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