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EDITORIAL

Risk Prediction Systems: One for all or all for Some

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Editorial referring to the article: The Role of Cardiovascular Risk Factors and Risk Scoring Systems in Predicting Coronary Atherosclerosis.

Cardiovascular diseases (CVD) are the main cause of death in Brazil and worldwide, determining an increase in morbidity and disability-adjusted life years (DALYs). The prevalence of CVD increased from 271 million (95% uncertainty interval [UI]: 257–285) in 1990 to 523 million (95% UI: 497–550) in 2019, and the number of deaths steadily grew from 12.1 million (95% UI: 11.4–12.6) in 1990 to 18.6 million (95% UI: 17.1–19.7) in 2019 in the 21 world regions analyzed by the Global Burden of Disease (GBD) 2019 study. The prevalence of CVD is likely to increase in Northern Africa and Western Asia, Central and Southern Asia, Eastern and Southeastern Asia, and Latin America and the Caribbean due to population growth and aging.[1]

Ischemic heart disease (IHD) is part of this heterogeneous group of disorders, in which an acute coronary event is the first manifestation in approximately half of the cases.[2,3] The total number of DALYs due to IHD has risen steadily since 1990, reaching 182 million (95% UI: 170-194) DALYs and 9.14 million (95% UI: 8.40-9.74) deaths in 2019. The GBD 2019 study has estimated 197 million (95% UI: 178-220) prevalent cases of IHD in 2019.[1]

Age-standardized rates for DALYs, deaths, and prevalent cases has declined over this period, indicating that, on average, global increases in IHD have been due to population growth and aging. Age-standardized DALYs due to IHD were highest in Eastern Europe, Central Asia, and the Middle East / Northern Africa. However, for some countries, such as China, age-standardized rates have not declined. Most national health systems will need to address the increasing demand for IHD-related preventive and therapeutic services as these trends continue. Therefore, the ability to recognize asymptomatic individuals with coronary artery disease (CAD) is essential for planning interventions that seek to reduce the individual risk of progressing to a major cardiovascular event, such as myocardial infarction (MI), stroke, or death.

The likelihood of an individual having CAD and, therefore, requiring cardiovascular risk assessment depends on the identification of risk factors and pre-existing comorbidities. The intuitive attribution of risk is often mistaken and can be justified by the complex interaction of different risk factors with the possibility of synergistic pathophysiological action between them.[2,3] Thus, clinical guidelines recommend the use of algorithms based on regression analysis in population studies to improve risk judgment and optimize preventive strategies.

The Brazilian Society of Cardiology recommends through its latest guideline for the prevention of cardiovascular risk (2019) the use of the Global Risk Score (ERG) to help identify asymptomatic individuals with a greater predisposition to CAD.[3] This tool is derived from the "Framingham Heart Study" (FHS), developed in a North American population, which estimates the risk of MI, stroke, heart failure, peripheral vascular failure, or death in 10 years.[4] However, new risk scores are developed in different regions of the world and bring with them innovations and the bases learned from the FHS.

Different geographic regions and their own population characteristics, as well as the transformations they undergo within a timeline, play a fundamental role in the distribution of risk factors and interfere with the positive and negative predictive values of risk scores. Such considerations indicate the need to test and compare the validity of risk scores in different countries and, possibly, within the same country at different times.[5,6] Görmel et al. have exemplified the difference in the predictive value that can be found between the scores when applied to different regions and populations.[7]

Keywords

Coronary atherosclerosis, Coronary artery disease, Risk factors, Cardiovascular diseases, morbidity.

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Clinical research by Görmel et al. has assessed the role of cardiovascular risk factors and risk scoring systems in predicting severe coronary atherosclerosis. Severe CAD was considered when ≥ 1 epicardial artery had a stenotic lesion ≥ 50% or the need for percutaneous or surgical coronary intervention. The study has been carried out in Turkey and included 414 patients (297 men; 61.3 ± 12.3 years) undergoing coronary angiography. The Pooled Cohort Risk Assessment Equation (PCRAE), originating in North America, showed higher positive and negative predictive values to detect severe CAD in high-risk patients than the FHS tool and the Systemic Coronary Risk Evaluation (SCORE), originating in North America and Europe, respectively.[7]

In addition, according to Görmel et al., when patients were classified as having low, intermediate, or high cardiovascular risk, the rate of patients in the high-risk group was significantly different between the PCRAE, the FHS and the SCORE tools (73.4%, 27.5%, and 37.9%, respectively; p <0.001). However, the analysis of subgroups based on individual risk factors could not be considered because of the insufficient sample size. Another important limitation of the study is its single-center nature that hinders generalization of the results.[7]

It is important to note that IHD was responsible for a variable percentage of DALYs in different world regions (Figure 1A-1E). In 2019, in Turkey (Figure 1A), 9.43% (95% II: 7.76% -11.24%) of DALYs were due to IHD, with an annual change of -0.88% between 1990 and 2019. For the United States (Figure 1B), in those same years, the values were 8.09% (95% II: 7.09% -9.17%) and -1.4%; for Western Europe (Figure 1C), 7.22% (95% II: 6.21% -8.19%) and -2.26%; for Brazil (Figure 1E), 5.71% (95% II: 5.07% -6, 34%) and -0.31%; and globally (Figure 1D), 7.19% (95% II: 6.46% -7.95%) and 0.13%, respectively. With such relevant regional variations in mortality and DALYs, it seems difficult to assume that a single risk prediction score would be adequate for different realities, which could justify such different findings by different authors in assessing high-risk patients.[7] In addition, Figure 1 demonstrates the relative importance of noncommunicable diseases (marked in blue) in the regions mentioned above, where those scores were developed and applied.

In conclusion, the prediction of CAD in asymptomatic patients based on risk scores requires validation studies in different populations and, possibly, within the same population at different times. In view of the interest in developing better cardiovascular risk scoring systems, encouraging multicenter research in large sample aggregates can provide better investigation of individual risk factors and their importance for the whole.[8]

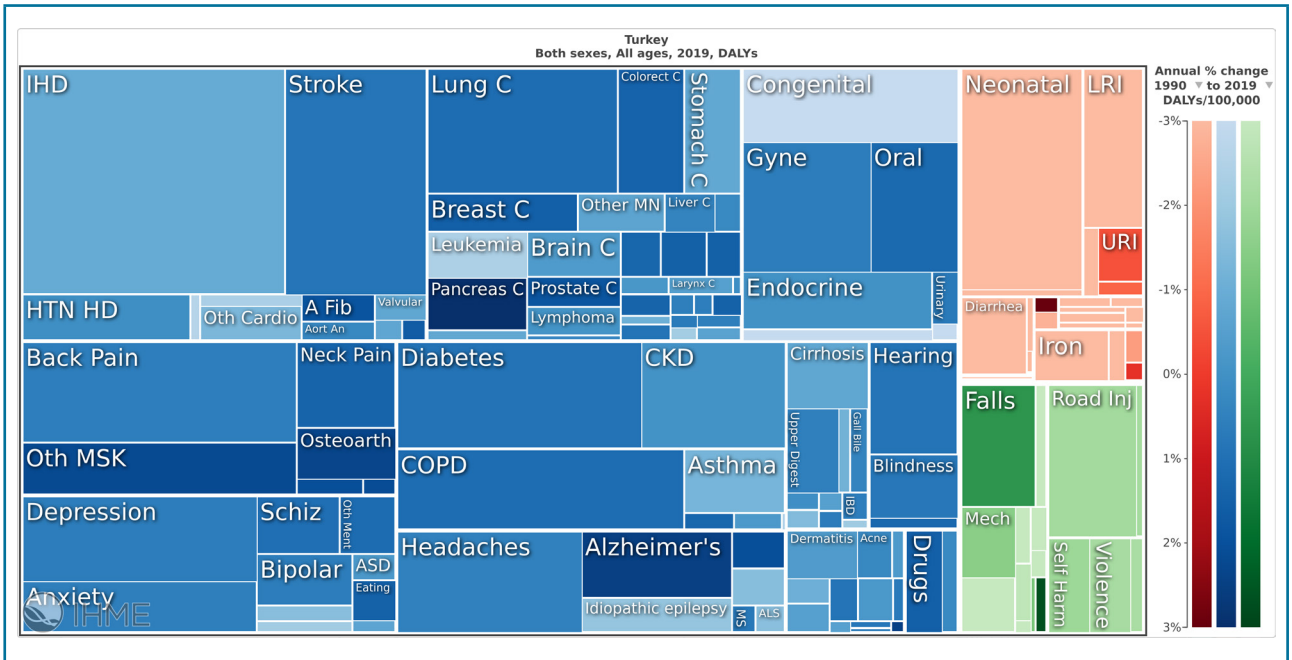

Figure 1A Turkey - 2019 DALYs according to causes and annual percent change from 1990 to 2019, for both sexes, all ages.[9]

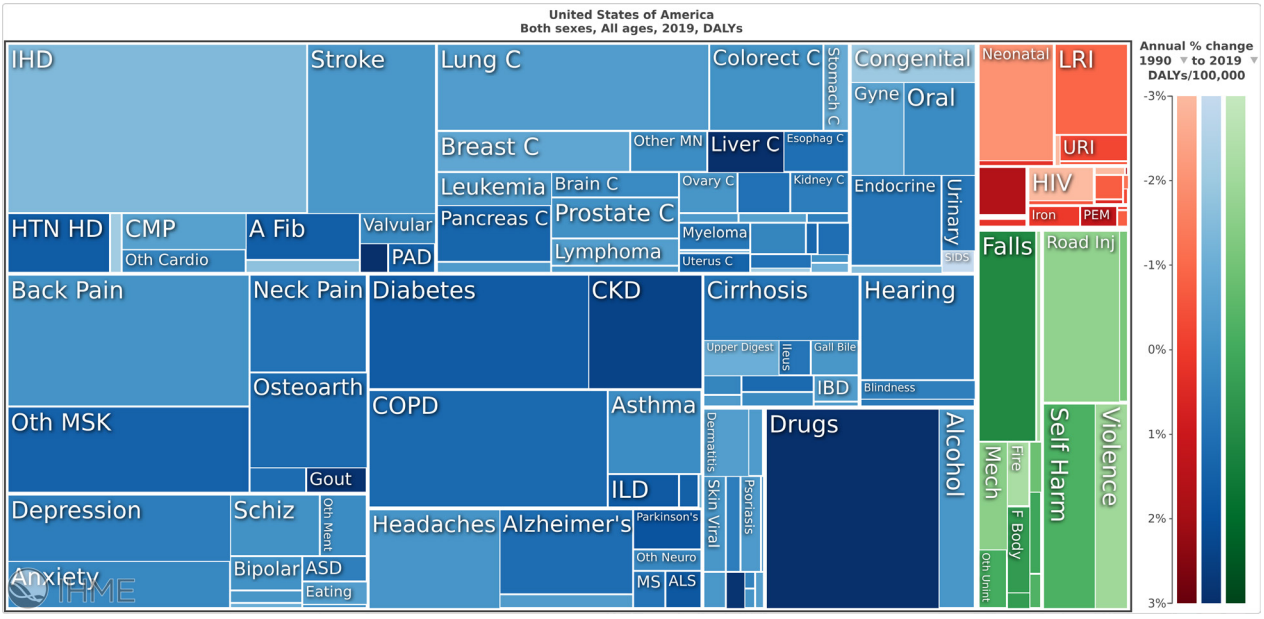

Figure 1B - United States of America / Figure 1C - Western Europe - 2019 DALYs according to causes and annual percent change from 1990 to 2019, for both sexes, all ages.[9]

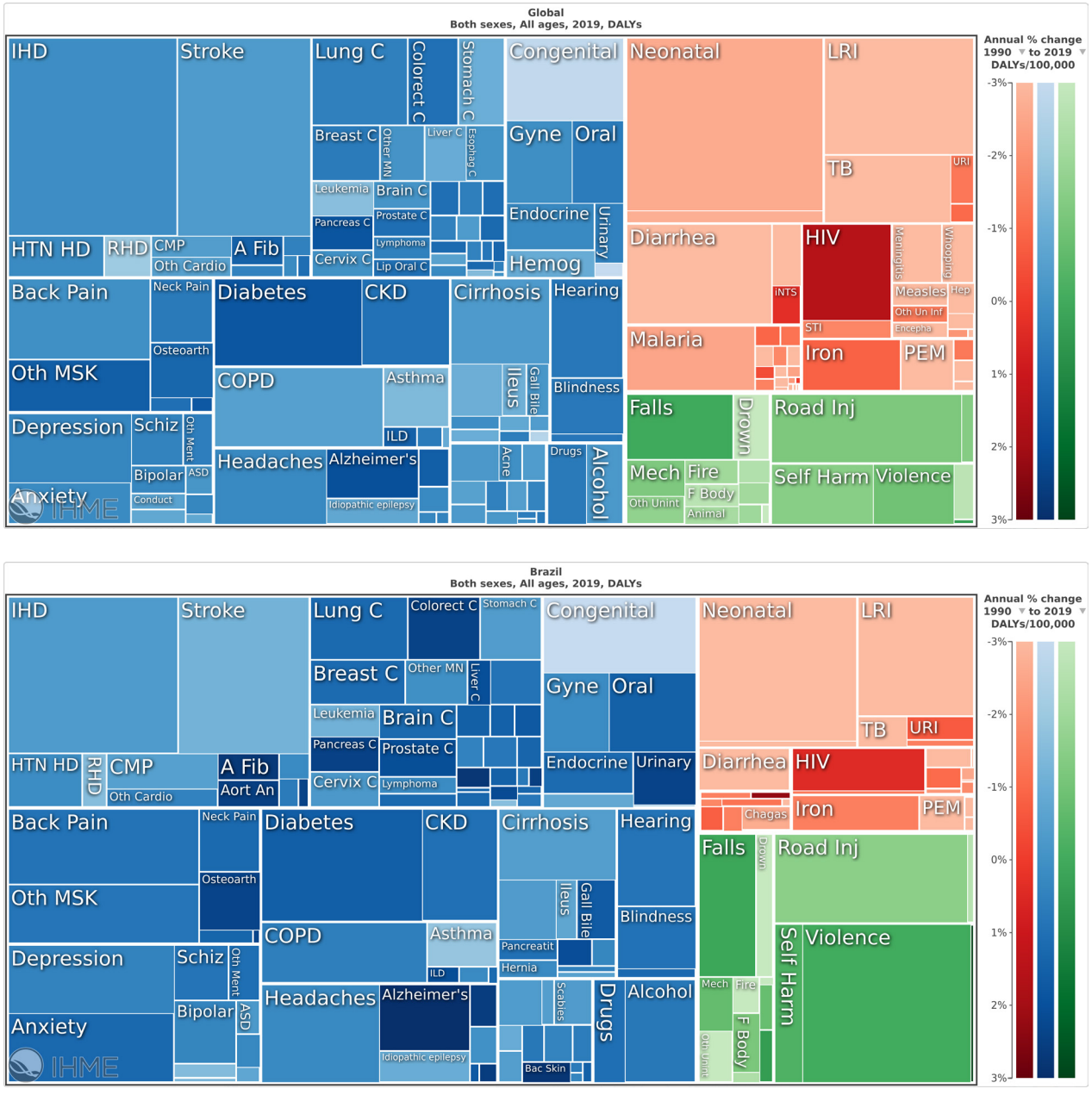

Figure 1D - Global / Figure 1E - Brazil - 2019 DALYs according to causes and annual percent change from 1990 to 2019, for both sexes, all ages.[9]

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