Editorial

Algorithm, epidemiological survey and cardiovascular risk factors

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Epidemiological survey uses statistical estimates to assess and clarify the role and significance of the health problems, including cardiovascular risk factors, in an attempt identifying their effects on cardiovascular disease, primarily ischemic and hypertensive heart disease. Indeed, there is evidence that these two pathological patterns are to be considered as the major outcomes able to determine the adverse prognosis in those individuals who are suffering[1–3] in view of the large number of deaths and/or disability caused.

Until a few years ago, mathematical models were applied to the statistical procedures. These methods consisted of empirical equations that determined how a system changed from a result to other similar and/or of what one variable could influence the estimate of observations instead of other variables. Therefore, these equations used either numerical or analytical procedures allowing the transfer of the results obtained to statistical models.

Statistical models provided the characterization of numerical results estimating the probabilistic behavior of the study, which was conducted, by the extrapolation of a limited number of data analyzed. So, it could be determined positive results, but also error estimates of observations, or, sometimes, incorrect approach to some data related to the topic to be solved. This was a consequence of the fact that the number of observations conducted involved only a limited aspect of the findings linked with what the risk factor influenced the cardiovascular disease. These data were processed and provided by mechanical calculators, which were and are devices able to make mathematical estimates.

So, a risk factor like smoking could be approached in different types of study -clinical, biological, metabolic and many others, which were independent one to another- that, however, gave partial results of the pathological observations identified. Notwithstanding these observations, partially limited when compared to those documented today, the American Heart Association included both active and passive smoking among the major risk factors for heart disease in both adults and children.[4]

There was evidence that the wide number of studies conducted, even if examined separately, permitted to identify the mechanisms of cardiovascular damage caused by cigarette smoking using mathematical calculation providing often similar results derived by different approaches to the study protocol. Currently, the progress in statistics together with the instrumental devices associated permit to evaluate the role and significance of the risk factors related to the cardiovascular disease in a very more effective manner. Often, the term "algorithm" is commonly used.

An algorithm is a procedure or formula for solving a problem, based on conduction of a sequence of specified actions commonly associated with the factor investigated. Usually, a computer program can be viewed as an elaborate algorithm. In mathematics and, consequently, statistics an algorithm usually means a small procedure that solves a recurrent problem since it permits to analyze large numbers of data if compared to the mathematical models using analytic and/or probability equations. Therefore, an almost complete set of data characterized by complex calculations may be analyzed and stored in a computer.

Statistical analysis performed by algorithm undoubtedly demonstrated that a multifactorial intervention characterizes the role of cardiovascular risk factors in determining a heart disease. Moreover, when cigarette smoking is examined, there is evidence that it can be considered an etiologic factor for cardiovascular disease, including ischemic and hypertensive heart disease.[5,6] Generally, cardiovascular risk factors, all together, show contributing the formation and evolution of some typically functional and morphological alterations of the cardiovascular system, primarily atherosclerotic plaque, which is the most important pathology of the arterial vessels.[7,8]

From these observations, there is no doubt that epidemiological survey can achieve a new positive impulse from the analysis provided by these electronic devices. It is worth noting that WHO [9] defines the epidemiology as the study of the distribution and determinants of health-related states or events (including heart disease), and the application of this study to the control of diseases and other health problems. Various methods can be used to carry out epidemiological investigations: surveillance and descriptive studies can be used to assess the distribution of the data, while analytical studies are used to study the determinants. Therefore, there is evidence that having analyzed and stored observations related to a specific topic, including the results derived from the relationship between cardiovascular risk factors and heart disease, is a basic parameter to assess correctly the existing links, and, for now, the algorithm would influence positively this behavior. In addition, the algorithm should be considered as a device, which allow meta-analysis studies.[10]

Conclusion

In conclusion, notwithstanding the term algorithm is yet not widely used, there is evidence that the results provided are those calculated and stored in an electronic computer that, as each device does, depend on the characteristics and type of manufactured material (memory and other!). Therefore, the word "algorithm" should be identified as a common meaning, and analyzed in the references related to the field of research on the topic investigated. Merely, an algorithm provides calculation data linked to a specific study in progress.

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Conflicts of interest

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