Quantifying Disease in Challenging Conditions: Incidence and Prevalence of Rheumatoid Arthritis

Prevalence and incidence are both key measures in decision-making processes and in healthcare management in general. While prevalence informs about the probability of being ill, incidence is related to the probability of becoming sick: Both are very relevant estimates of the frequency of a disease.

Available data on the prevalence and incidence of rheumatoid arthritis (RA) display high variability among different geographic areas and over time[1,2,3,4,5,6,7]. This variability cannot be explained only by genetic factors; other environmental and epigenetic conditions may also influence these figures. Besides, some methodological aspects in the determination of these frequencies might have a strong influence on the informed rates.

The annual incidence rates of RA range from 20 to 50 per 100,000 inhabitants in North American and Northern European countries[8,9,10,11], while in Southern Europe there is a lower occurrence of the disease[12,13,14]. Besides, incidence seems to be increasing in recent years in some countries after a drop during the last decade of the 20th century. In South America, 1 study carried out in Argentina and published in 2003 reported an incidence rate of 24.5 per 100,000 inhabitants[15].

Many population-based studies have shown a prevalence rate of RA close to 1% (UK, USA, Lithuania). Again, some important differences among countries have been noted. Scandinavian and Mediterranean countries seem to display lower rates, between 0.18% and 0.92%. Conversely, higher rates were reported from regions near the Arctic. Three previous studies on the prevalence of RA carried out in Argentina, based on the American College of Rheumatology (ACR) 1987 criteria, reported rates of 0.24, 0.19, and 0.94, respectively[15,16,17]; some of the discrepancies among them might be explained by intracountry regional differences. Nevertheless, underreporting may be another important methodological aspect to consider in the analysis of these differences.

With the aim of minimizing underreporting, cap-ture-recapture models have been used to estimate incidence and prevalence of many diseases and health-related problems[17]. This approach derives the size of the source population from the number of individuals "captured" by 2 (or more) independent samplings of this population. As an example, medical registries of RA cases that include only patients with a condition diagnosed and followed up by rheumatologists, but not those assessed by general practitioners or orthopedists, may lead to underestimation. To overcome this limitation, a telephone survey may be carried out as a secondary source of cases to get a capture-recapture based estimate. Capture-recapture methods are based on 2 assumptions: (1) there is no dependency among all the sources of information in the model, and (2) all the individuals have the same probability of being captured. Neither of the 2 assumptions can usually be directly tested, and violations in these assumptions may result in overestimation or underestimation of the studied frequency rates.

Another methodological source of variation is related to diagnostic criteria. The 2010 ACR/European League Against Rheumatism classification criteria for RA delivered a new definition for the disease. These criteria improve sensitivity (mainly in early stages of the disease), with a reduction in specificity. More patients are diagnosed as compared with the ACR 1987 criteria. While the 1987 criteria seem to be based on longterm damage, the 2010 criteria point out the acute inflammatory components of the disease[18]. As expected, the between-study comparisons are affected as the disease definition differs. This aspect emphasizes the fact that the lack of a gold standard continues to be an obstacle in the estimation of both incidence and prevalence rates for RA.

To the best of our knowledge, the study by Di, et al[19] is the first to provide an estimate of the incidence of RA as defined by the 2010 ACR/European League Against Rheumatism (EULAR) criteria in a Latin American city (Buenos Aires, Argentina). The authors obtained global and age- and sex-specific incidence and prevalence rates, using

data from a university hospital-based health management organization. By applying a capture-recapture technique, they determined the 2000–2015 incidence rate to be 18.5 cases per 100,000 person-years; the prevalence was 0.329% by January 2015[19]. In the retrospective calculation of incidence, changes in the diagnostic methods lead to a biased estimator: by 2000, anticitrullinated protein antibodies (ACPA) were not part of the regular diagnostic process for RA. Nevertheless, for the Di study, the ACR/EULAR 2010 criteria were used to define the cases required to estimate the incidence rates. Moreover, once installed into the general practice, measurements of ACPA had the common evolution of laboratory methods in longitudinal studies when relatively long terms are involved (in this case, different generations of ELISA kits). Another limitation in applying the 2010 criteria, which was highlighted by Humphreys, et al in the Norfolk study[18], could also apply to the Di, et al study results: the 2010 criteria include an amendment stating that any patient with radiological evidence of typical RA erosions should be classified as RA (without requirement for any other criteria). Because radiographs were not taken into account in all the sources of this capture-recapture study, the accuracy of the obtained frequencies might have been affected. Besides, it has to be pointed out that there is no clear, unequivocal and universally accepted definition of "typical RA erosion," which seems to be another difficult issue to consider in the evaluation of the accuracy of these disease estimates.

Many of these limitations may affect other epidemiological studies based on the prevalence and incidence of RA; yet these indicators are at the core of our medical decision-making processes. Any good-quality information in the area, even recognizing the above-mentioned methodological concerns, should be more than welcome. This is especially remarkable for emerging/developing countries, where the capabilities for obtaining such information are particularly limited by resources.

It is hoped that greater use of appropriate tools to obtain unbiased, accurate measurement of RA frequency will lead to more effective diagnostic and therapeutic programs in human health worldwide, and particularly in less-developed countries.

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