Inconsistency between Danish incidence and prevalence data about psoriatic arthritis (PsA)

We are grateful to Egeberg and Kristensen for presenting the detailed data about the prevalence and incidence of psoriatic arthritis (PsA).[1] Based on these detailed information, we tried to estimate the excess mortality of people with diagnosed PsA by uising a mathematical relation between incidence, prevalence and mortality.[2 3] During analysis of the incidence and prevalence data, we have made the following observation: if we assume that—on population average—people with PsA do not have a better survival than those without PsA, we can compute a lower bound for the incidence rate from the prevalence data (the details for the derivation of the lower bound can be found in the Appendix). We calculated this mathematical lower bound based on the prevalence data and compared the lower bound with the incidence data given in Ref 1. We found that in less than 50% of the strata where incidence data were given, the corresponding mathematical lower bounds have been reached (or exceeded). For instance, the lower bound for the incidence rate in the age group 40–49 in 2009 is 43.3 per 100 000 person-years (both sexes). The observed incidence rate in this stratum is only 29.8 per 100 000 person-years—a deviation of more than 30%. More than half of the reported incidence rates stratified by age and year are implausibly small given the observed prevalence values. Unfortunately, we do not have an explanation for the inconsistencies between the incidence and prevalence data. Possibly, in estimating the age-specific prevalence, some double counting of cases has occurred.

Appendix: Deriving a lower bound for the age-specific incidence rate

Mathematically, it can be shown that

$$\partial p = (1 - p) \times \left\{ i - p \times (m1 - m0) \right\}$$

where ∂p is the temporal change of the age-specific prevalence p with respect to time and age.[1 2] The rates i, m0 and m1 are the age-specific incidence and mortality rates of the people with (m1) and without diagnosed PsA (m0).

A straightforward calculation yields that

$$\partial p / (1 - p) + p \times (m1 - m0) = i.$$

With the assumption that the mortality rate of the people without PsA is not higher than the mortality of the people with PsA, that is, m0 ≤ m1, this equation implies

$$\partial p / (1 - p) \leq i. \tag{1}$$

This means the incidence rate (i) is always greater than the temporal change (∂p) of the prevalence over 1 minus the age-specific prevalence. Thus, we have a lower bound for the incidence rate.

The question arises, if the assumption m0≤m1 is reasonable on the population level (here: Denmark). The main reason for this assumption being true (on the population level) is that PsA often is a severe disease coming along with severe side effects and disease-specific complications. Hence, it appears reasonable to us that equation (1) yields a lower bound for the incidence rate.

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