Correct Use of Incidence and Prevalence

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The use of incidence and prevalence is quite common in medical literature as measures of frequency, Unfortunately the terms are often misused[1] to express the frequency of different diseases/attributes,, mainly because of lack of knowledge about correct use of them. It is the incorrect use of these tenns, which either makes the objectives, study design or the conclusion of the study incoherent and suspicious. “Health effects of ethy lenediamine[2]” and "Tuberculosis of the skin in Hazara[3]” are two examples of incorrect use of these terms. The objective of this article is to describe the correct use of the two terms.

Prevalence

It is defined as the number of instances of a given disease or a condition in a given population at a designated time; sometimes used to mean aprevalence rate. When used without qualification, the term usually refers to the situation at a specific point in time (point prevalence) [4]. This can be calculated from the following formula:

Point Prevalence (or) Prevalence = Total No. of persons with attribute at a given time
Total population at risk at the same time

Example

On 15th April, 1994 all the 530 children enrolled in a school were examined for tuberculosis, 20 of them were found to have disease at the time of examination. Prevalence (of tuberculosis in school children on 15th April, 1994)= 20/530 = .038 or3.8 percent or 38 per thousand.

Incidence

Incidence of an event (disease or attribute) is the number of new cases in a population over a period of time[5].This can be calculated from the following formula:

Incidence = No. of individuals experiencing a new event during a time period
No, of susceptible individuals at the beginning of time period Example

The 510 children who did not have tuberculosis on 15th April, 1994 were re-examined for the presence or absence of disease after three months, 12 of them had developed the disease. The incidence of tuberculosis during the three months can be calculated as follows:

Incidence of tuberculosis = 12=0.0235 or 2.35% Over three months period 510 or 23.5 per thousand.

If we re-calculate the prevalence of tuberculosis on 15th July, 1994 (assuming that all the cases having tuberculosis on 15th April, 1994, still had the disease), the prevalence would be as follows:

Prevalence of tuberculosis = (20+12)32 = .0604 on 15th July, 1994 530 or 6.04 percent

From the above examples it is evident that the basic distinetion between incidence and prevalence is that incidence refers to “new” cases whereas prevalence refers to “all” cases (new+old). A new case is not the one which has been diagnosed recently, rather it is the case for which the date of origin or approximately time is known. For example, a physician will not include a recently diagnosed case of high blood pressure for the calculation of incidence, because it is not known whether the case developed high blood pressure just a few days earlier or has the disease for past many years. However, if the physician is sure that during the last follow-up, the person did not have the disease and has developed it in the past one month (or any other defined time), the case would be included for the calculation of incidence. If the time of origin of disease is not known, the case would be included for the calculation of prevalence only, however, if the time of origin of disease is known, the case may be used for the calculation of incidence as well as prevalence. it is important to differentiate between incidence and prevalence because the two rates give different measurements and their choice depends

primarily on objectives to be achieved and the study design. The following examples clarify the use of incidence and prevalence for different objectives:

Example 1

The hospital infection control commuittee finds that frequency/rate of hepatitis is higher in paediatrics ward A as compared to paediatrics ward B (presumably because of lack of proper hygienic conditions and re-use of disposable syringes). The management of the ward A cannot be blamed if the findings are based upon a prevalence based study rather than incidence. One has to calculate the number of new cases of hepatitis occurring in both the wards and it can only be calculated by measuring the hepatitis status of all the children at a specific time (or at the time of admission) and later the same children must be tested again for their hepatitis status at the end of specified time (or when discharged). Only the comparison of incidence of hepatitis in the two wards can indicate whether the infection is nosocomial or not.

Example 2

If a district health officer wants to plan support services for chronic disabling arthritis, it may be enough to calculate the prevalence of disease by taking appropriate sample size. This can give an estimate of total number of existing cases of arthritis in a specified population. An incidence study will not be required as it covers only new cases and not all the cases.

Example 3

If a researcher wants to study smoking as a cause of reduced FEV1, it will not be justifiable if the conclusions are drawn in favour of oragainst the hypothesis, on the basis of a cross- sectional study. A cross-sectional study can only indicate the magnitude or prevalence of the study factor (smoking) and out come factor (FE V1) in the population under study. An incidence study such as an RCT or a cohort would be required to establish a relationship between the above mentioned two factors and the frequency to be calculated would be an incidence and not a prevalence. Generally, the incidence is calculated where observation of change is of interest, as in any study with causality objectives (examples 1 ad 3) and for studying acute conditions or events of short duration such as influenza. Prevalence is often the measure of choice when looking at the magnitude of existing situation, particularly those involving chronic or on-going conditions where change does not occur rapidly (example 2). While calculating the two rates, some of the factors to be kept in mind are the definition of cases, inclusion, exclusion criteria, time period, sampling issues and the choice of denominator. All the above mentioned factors may play important role in inflating or deflating the true rates. As regards the choice of denominator is concerned, it is usually preferable to restrict the denominator to the individuals who are potential cases, that is, can be a part of numerator as well. The denominator restricted in this way is termed “the population or study base at risk”. Incidence, prevalence and case fatality rates share the common feature that their denominators are all estimates of the number of individuals at risk of experiencing the event included in the numerator.

References

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