LETTER TO EDITOR

Epidemiological study designs- Examples of medical sciences

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Dear editor

Epidemiology is the study and analysis of distribution and determinants of health-related conditions or events including diseases, and the practice of this study to the control of diseases and other health problems (1). One of the basic issues in epidemiology and the beginning of a research project is conducting a suitable design for our study (2). The aim of this study is to brief explanation the classification of different types of epidemiological studies according to diabetes disease.

The researcher should design his/her own study design based on his/her research question, available resources, time and budget. Figure 1 shows the classification of epidemiological studies (Figure 1) (3,4)

Descriptive studies

In descriptive studies, the researcher describes the variable (or variables) without any intervention (5):

Case report

Detailed description of a patient or individual with different conditions. In this type of study, the researcher should describe the symptoms, signs, history of exposure, interventions and treatments used, and outcomes (6). For example: Kevat et al. study, entitled "A 5-year-old girl with type 2 diabetes" (7) and Rahmanian et al. study, entitled "Giant prolactinoma: case report and review of literature" (8).

Case series

A case series study is similar to the case report study, but the number of studied patient is more than one (5) For example: Pappa et al. study, entitled "Diabetes Mellitus in Friedreich Ataxia: A Case Series of 19 Patients From the German-Austrian Diabetes Mellitus Registry" (9).
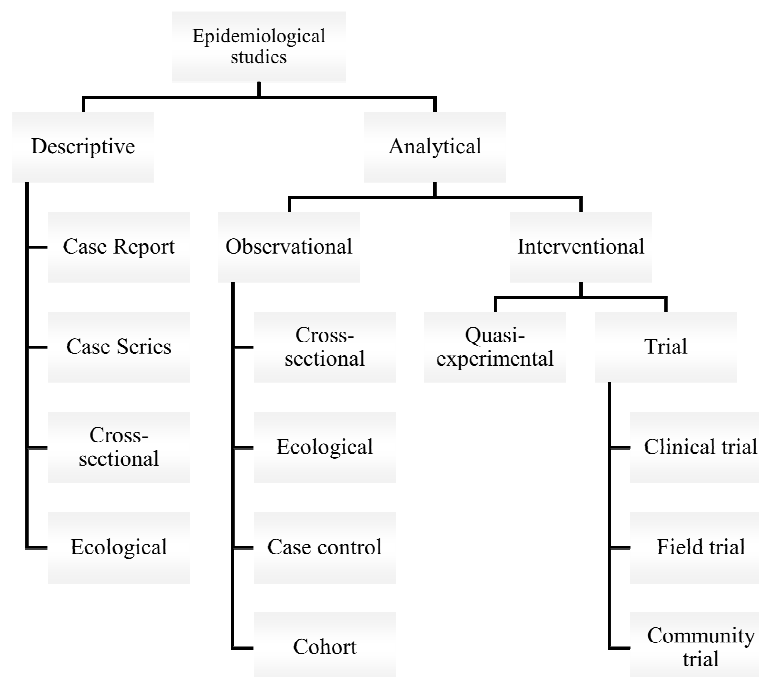
Figure 1. Classification of epidemiological studies

Cross-sectional studies

Cross-sectional studies provide for researchers a snapshot of a population. This type of study can also be analytical (1). For example: Nguen et al. study, entitled "A cross-sectional study to evaluate diabetes management, control and complications in 1631 patients with type 2 diabetes mellitus in Vietnam (DiabCare Asia)" (10) and Afkhami-Ardekani et al. study, entitled "Prevalence and predictors of vitamin D insufficiency in adult population of yazd– The sun province in center of Iran" (11).

Ecological studies (correlation studies)

The aggregated data for groups- The researcher is seeking to find an association between exposure and outcome in the population rather than in individuals (12). For example: Khazaei et al. study, entitled "Relation Between the Prevalence of Diabetes Mellitus and Human Development Index: A Global Ecological Study" (13).

Analytical studies

These studies test the hypothesis and evaluate the causal relationships between variables (14).

Observational studies

In these studies, the researcher does not perform any active intervention in the subjects (14), such as :

Cross-sectional studies
This was explained in the previous paragraphs.

Ecological studies
This was explained in the previous paragraphs.

Case control studies: In this study, participants are classified into two categories, case and control, based on outcomes. Next they are compare the exposure levels in the two groups (figure 2) (15). For example: Wang et al. study, entitled "A Case-Control Study of Risk Factors for Development of Type 2 Diabetes: Emphasis on Physical Activity" (16) and Lotfi et al. study, entitled "Socioeconomic Status and Osteoporosis Risk: A Case-control Study in Outpatient Women in Yazd" (17).

Cohort studies: In this study, participants are classified into two categories, exposed and non-exposed, based on exposure to suspected risk factor. Next participants in both groups will be followed to development the desired outcome (outcomes), then they are compared according the outcome (outcomes) in the two

groups (figur3) (18). For example : Eder et al. study, entitled "A Prospective Cohort Study in Patients with Type 2 Diabetes Mellitus for Validation of Biomarkers (PROVALID) – Study, Design and Baseline Characteristics" (19) and karimi et al. study entitled "Population Attributable Risk (PAR) of Hyperuricemia for Diabetes Mellitus in 20-74-Year-Old Population of Yazd during a 10-Year Longitudinal Cohort: Yazd Healthy Heart Cohort (YHHC) in Iran" (20).

Figure 2 shows direction of investigation in time in epidemiological studies (Figure 2).

Interventional (experimental) studies

In these studies, the researcher does active intervention in the some or all subjects (14), such as

Quasi-experimental : This study is designed to estimate the effect of causal intervention on the target population without randomization or control group or random assignment and/or no active manipulation (21). For example : Eknithiset et al. study, entitled "Effectiveness of a diabetes mellitus pictorial diary handbook program for middle-aged and elderly type 2 diabetes mellitus patients: a quasi-experimental study at Taladnoi Primary Care Unit, Saraburi, Thailand" (22).

Trial:

• Clinical trial: Clinical trial is a prospective study that investigates the effect and value of intervention(s) against a control in human beings (23). For example : Sudfeld et al. study, entitled "Efficacy of vitamin D3 supplementation for the prevention of pulmonary tuberculosis and mortality in HIV: a randomised, double-blind, placebo-controlled trial" (24) and Afkhami-Ardekani et al. study, entitled "Effect of vitamin C on blood glucose, serum lipids & serum insulin in type 2 diabetes patients" (25).

• Field trial: In this type of study, in contrast to clinical trials, healthy people who are likely to be at risk are used instead of sick people. Participants in this study are selected from the general population(26). Through this study, the researcher evaluates whether the intervention reduces the risk of disease (27). For example: Sfarjani et al. study, entitled "Family-based Intervention for Controlling Childhood Obesity: An Experience Among Iranian Children" (28).

• Community trial: Community trials are field trials in which totality of the community are intervened instead of individuals (26). For example: et al. study, entitled "The community-based prevention of diabetes
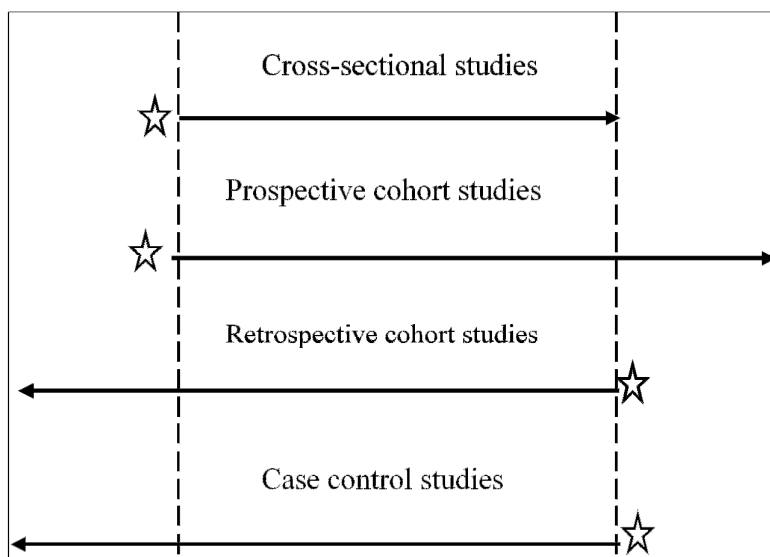

Figure 2. Direction of investigation in time

(ComPoD) study: a randomised, waiting list controlled trial of a voluntary sector-led diabetes prevention program" (29).

Field and Community trial are conducted in real conditions and not in ideal conditions (30).

Therefore, a researcher should follow these steps in conducting a research:

Choose of disease or condition under study

1. Consult with an epidemiologist or statistician
2. Choose the design with the available facilities
3. Study design
4. Perform the study
5. Analyze of study
6. Report of study

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