

Basic statistical tools in research and data analysis

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ABSTRACT

Statistical methods involved in carrying out a study include planning, designing, collecting data, analysing, drawing meaningful interpretation and reporting of the research findings. The statistical analysis gives meaning to the meaningless numbers, thereby breathing life into a lifeless data. The results and inferences are precise only if proper statistical tests are used. This article will try to acquaint the reader with the basic research tools that are utilised while conducting various studies. The article covers a brief outline of the variables, an understanding of quantitative and qualitative variables and the measures of central tendency. An idea of the sample size estimation, power analysis and the statistical errors is given. Finally, there is a summary of parametric and non-parametric tests used for data analysis.

Key words: Basic statistical tools, degree of dispersion, measures of central tendency, parametric tests and non-parametric tests, variables, variance

INTRODUCTION

Statistics is a branch of science that deals with the collection, organisation, analysis of data and drawing of inferences from the samples to the whole population.^[1] This requires a proper design of the study, an appropriate selection of the study sample and choice of a suitable statistical test. An adequate knowledge of statistics is necessary for proper designing of an epidemiological study or a clinical trial. Improper statistical methods may result in erroneous conclusions which may lead to unethical practice.^[2]

VARIABLES

Variable is a characteristic that varies from one individual member of population to another individual.^[3] Variables such as height and weight are measured by some type of scale, convey quantitative information and are called as quantitative variables. Sex and eye colour give qualitative information and are called as qualitative variables^[4] [Figure 1].

Quantitative variables

Quantitative or numerical data are subdivided into discrete and continuous measurements. Discrete

numerical data are recorded as a whole number such as 0, 1, 2, 3... (integer), whereas continuous data can assume any value. Observations that can be counted constitute the discrete data and observations that can be measured constitute the continuous data. Examples of discrete data are number of episodes of respiratory arrests or the number of re-intubations in an intensive care unit. Similarly, examples of continuous data are the serial serum glucose levels, partial pressure of oxygen in arterial blood and the oesophageal temperature.

A hierarchical scale of increasing precision can be used for observing and recording the data which is based on categorical, ordinal, interval and ratio scales [Figure 1].

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Basic Tools Of Research

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