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Importance of Biostatistics to Improve the Quality of Medical Journals

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Abstract

Most of the Medical journals are facing the methodological rigor problem. A p value of <0.05 means that this result would have arisen by chance on less than five occasion in 100. The confidence interval around a result in a clinical trial indicates the limits within which the "real" difference between the treatments is likely to lie, and hence the strength of the inference that can be drawn from the result. A statistically significant result may not be clinically significant. Many researchers are not giving due importance to optimum size calculation, confidence intervals and testing of hypothesis while undertaking their research. This negligence results in wrong conclusions and thus reducing the quality of their research. Absence of evidence is not evidence of absence. Medical researcher should follow the tenets of biostatistics and the suggestions of a qualified biostatistician even from the stage of conceptualization to the finality of publication of the work.

Introduction

The major applications of biostatistics started in the middle of the 17th century in the analysis of vital statistics. After the early developments in vital statistics, the field of genetics was the next area that benefited most from the new statistical ideas emerging in the works of Charles Darwin (1809-1882), Francis Galton (1822-1910), Karl Pearson (1857-1936), and Ronald A. Fisher (1890-1962). Now, the fields of application and areas of concern of biostatistics include, among others, bioassay, demography, epidemiology, clinical trials, surveys of human populations, community diagnosis, bio-mathematical modelling, etc. Findings of good research deserve to be presented well, and a good presentation is as much a part of the research as the painstaking collection and analysis of the data. Critical reviewers of the biomedical literature have consistently found that more than half of the published articles (including scientific articles, published even in the best journals) that used statistical methods contained unacceptable errors[1-8]. The term "statistics" here in this context, has a wider meaning and includes the methodology of research, study design, or epidemiological methodology etc[9-14]. A recent study on the published literature of biomedical journals has shown that these errors mainly concern the sample size, statistical power, agreement between aim and conclusion, distribution of data, as well as description of location and variability of data[1]. A brief glance through almost any recently published medical journal will show that statistical methods are playing an increasingly visible role in modern medical research. At the very least, most research papers quote at least one 'p-value' to communicate. At the same time, a growing number of papers are now presenting the results of relatively sophisticated, statistical analyses of complex sets of medical data[8]. There are several good quality researches reported in medical journals from developing counties without utilizing the full findings of the study. Result part became poor because of the lack of knowledge in appropriate test for the analysis of data and the coding of data. If the researcher is not aware about the proper research design in descriptive studies, case control studies, cohort studies and clinical trials better to terminate the study rather than reporting clinical trials in the methodology part and the study will be a hospital based observational study. Medical Statistics helps the researcher to arrive at a scientific judgement about a hypothesis. It has been argued that decision making is an integral part of a physician's work. Frequently, decision making is probability based.

Varying quantity is known as variable. Variables are of two types. They are categorical and numerical.

Categorical Variables: Individuals are classified into one of several categories. For example: Blood group which is A,B,AB or O.

Binary variables: If there are only two categories, then the variable is known as binary (or dichotomous). Binary variables are very common. For example: Yes/no responses, female/male, low/normal birth weight. Individuals are classified into the two groups for comparison according to a binary variable. For example: diseased/disease-free, treated/placebo.

Ordinal variables: If there are more than two categories and the categories have an obvious order, then the variable is ordinal. For example: social class (1,2,3a,3b,4,5), pain (non/mild/moderate/ severe).

Nominal variables: Categoric variables which are

neither binary nor ordinal are known as nominal. For example: ethnic group (caucasian/asian/afro-carribean), marital status (married/ single/ divorced/separated/widowed).

Numeric Variables: A number describes each individuals' value. For example: number of transfusions, haemaglobin level.

Discrete variables: If the numeric variable can take only a distinct number of values, usually complete integers (0,1,2,3,...) then it is known as discrete. For example: age in years, parity, number of visits to clinic, number of transfusions.

Continuous variables: In theory, continuous variables can take any value within a certain range. In practice, the possible values the variable takes may be restricted by the accuracy of the recording device. For example: 'exact' age (usually meaning age to the nearest day or month), blood pressure, head circumference, haemaglobin level.

According to the variable researcher should select the appropriate statistical test[15]. If data is following normal distribution then select parametric tests. Whenever data is not following normal distribution should use non parametric tests. Ex: In a drug utilization study of anti depressants with independent variables age, gender, monthly income, employment of the patient and dependent variable Essential drug list of Nepal, generic and trade logistic regression is the appropriate. Another case in significance of hepatobiliary enzymes for differentiating liver and bone diseases with independent variable age, gender and dependent variable is the levels of AST, ALT, ALP, γ-gt were assessed in cases of viral hepatits, extra hepatic cholestasis, pagets disease osteomalacia and controls ANOVA is the appropriate test[16-32].

Conclusion(s)

Presenting the preliminary report of the study in reputed conferences will allow the researchers to improve the quality by the comments from the experts and seniors. It is sincerely recommended and encouraged by the editors and author that the contributing researchers follow a diligent and systematic pattern in conducting and presenting their studies. This will not only lead to improved quality of research but will also enhance and augment the quality of journals and thus, contribute meaningfully to the progress of research and improvement of medical care.

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