The Association Between Statistical Sciences And Medical Science Based On Previous Studies

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Abstract

Majority of the population of today poorly understand the implication of statistics in the field of medicine. People often refer to statistics as merely as science of numbers and that its relationship to other field of sciences is far beyond their knowledge and comprehension. Why statistical views must be incorporated in medical or clinical trials, how statistics applied and evolved with medicine, and how do medical researchers test their hypothetical views in order to come up with a factual, safe, null and void results are the question of some. Albeit the fact that absolute certainty in medicine is rare, statistics is still utilize to interpret data. In fact, physicians, researchers, scientists use different statistical methods to improve medicine. For many years, medicine had evolved and reached its present advancement through research that uses statistical technique for data analysis. This paper aims to discuss the importance of statistics in medicine.

Keywords: Statistics, implication of statistics, important statistic in medicine.

1. Introduction

At present, people are living and being benefited with the product of technology which brought advances in the field of medicine. However, behind these advancement is lies statistics. It plays an integral part in medical researches and experiments. Furthermore, new treatment regimen such as vaccines for certain type of diseases, prevalence rates, success rates of treatment and others undergo a process wherein data are collected, validated and analyzed by the use of statistics before it will be introduced to the public; thus, statistical methods and tools are paramount in conducting medical research experiments.

Medicine as either the science or study of body systems and disease, and its application had reached its current status with the aid of data analysis. As statistics and medicine became more sophisticated as compared to how it started centuries ago, these two different body of knowledge needs to be unified to produce a desirable effect to human kind. Physicians, researchers and scientists use statistics to add certainty of the result of their studies.

2. Discussion

Statistics is defined as branch of applied mathematics and can be regarded as a mathematics applied to observation (Fisher, 1958). Another definition is "the science and practice of developing knowledge through the use of empirical quantitative data" and many conclude that "statistical practice involves rational decision making in situations of uncertainty" (Argyropoulos, 2005).

Due to the absence or limited scientific evidences on the early period of medicine, empiricism is practiced. Hippocrates (˜400 BC) started with a meticulous collection of clinical case descriptions and outcomes. They used inductive approach to medical science wherein reasoning is derived from detailed facts to arrive to a general principle. Hippocratic medicine is known for the use of "case- based reasoning" which is either qualitative or quantitative. Only after approximately 500 years when a number of alternative systems to solve problems appeared. On this age, the idea of evaluating the evidence of a study was born. Thence, evidence was included in scientific studies. As time and years drifted, after numerous studies had been made, probabilistic ideas of Galen came into account. Galen's work question on How can we assert that the empirical weight of evidence points towards a particular cause of a disease or an efficacious treatment (Galen, 1944). The statistical ideas of Galen deals not only with experience and observation but also to the counts of cases.

As science and technology develops over years, statistical science was created. The use of modern numerals and zero in India (500 AD), establishment of rules for adding, subtracting, multiplying, and dividing (Khowarizimi 800 AD), the introduction of numerical system in Europe (1202 AD), and the development of mathematical analysis and differential calculus (Isaac Newton and Gottfried Wilhelm von Leibniz in 17th century) gave rise to the birth of the concept of probability in 18th century. Probability is a measure or estimation of how likely it is that something will happen or that a statement is true. The higher the probability, the more likely the event is to happen, or, in a longer series of samples, the greater the number of times such event is expected to happen. Probabilistic inference is used in medicine albeit it was a debate when it was first introduced into the field.

Statistics widened the horizon of medical studies. Various theories were postulated and used for studies. This is to include Bayes theory. It is a method by which we might judge concerning the probability that an event has to happen, in given circumstances, upon supposition that we know nothing concerning about it but that, under the same circumstances, it has happened a certain number of times, and failed a certain other number of times (Bayes 1764).

Other methods were also used. In fact, in between 1822-1827 where there is an outbreak of typhoid fever, Pierre- Charles Alexander Louis conducted a case-control study. At that time, they tested the efficacy of bloodletting which was the standard treatment used during that age and they concluded that bloodletting is not helpful. Louis was not recognized in his work however, he spread words about his approach. Subsequently, his method was adopted by his students to study an epidemic of highly malignant fever which gave birth to Evidence- based Medicine.

In connection to that, Evidenced- based Medicine (EBM) or more comprehensively evidence-based health care (EBHC) requires the health care practitioners consider all evidence about whether a treatment works. As Machin and Campbell (2005) stress out, this requires the systematic assembly of all evidence followed by a critical appraisal of this evidence.

In 1958, Fisher, R. A. wrote in his work Statistical Methods for Research Workers that " to call in the statistician after the experiment is done may be no more than asking him to perform a post-mortem examination: he may be able to say what the experiment died of". It simply foretells us that statisticians must be consulted from the very beginning of the study. Statistics is not just deal with the evaluation of results but it also with the collection of data, sample selection, data analysis and effectiveness of the result. Statistical techniques and tools adds reliability of the study results.

In the year 1946, the first modern clinical trial was conducted. It is sponsored by the British Medical Research Council. The trial aimed to study the effectiveness of streptomycin as TB treatment. The researchers used randomized, controlled, and multi-center comparison between two groups (MRC, 1948). The aforementioned clinical trial has been succeeded by numerous studies and experiments. In connection to that, it is necessary to run trials to evaluate or to measure the effectiveness of any form of drugs for instance. Trials must be conducted in a wide variety of subjects. This helps gage the effectiveness of medication as compared to a placebo at the same time, with the use of statistical analysis, pharmaceutical companies and medical practitioners can judge whether that particular drug is an effective treatment for the majority of the patients or not.

On the other hand, double-blind design is also used in some clinical trials. Double-blind experiment is applicable to living, conscious human subjects. In this case, neither the researcher nor the samples of the population know who belong to the control group. Researchers may be permitted to know which is from the control group or test group after all the data are collected. This design lessens the influence of prejudices and unintentional physical cues on the results (Hayashi C., 1992).

The School of Global Public Health defines biostatistics as "the science of obtaining, analyzing and interpreting data in order to understand and improve human health". It provides information about the health status of a given country or community through birth rates, and mortality, and morbidity rates.

3. Conclusion

It has been centuries since medicine and its concept were introduced. Since then, its contribution to the society has become undeniably great and indisputable. From the beginning of the discovery of medicine until its present status, we can say that medicine as a body of knowledge had undergone numerous challenges. It is suffice to claim that it surpasses its endeavors with the aid of statistics. Statistics had brought medicine a finite justification of its clinical trials, studies and experiments.

Statistics plays an integral part in the field of medicine in various ways. It is considered as the core of medical research in the sense that it involves significant amount of statistics starting from surveillance and monitoring of health and disease, establishing causes of disease or factors associated with death or disease, detecting disease, preventing death or disease and evaluating treatments for diseases. Albeit absolute certainty in this field is very rare due to individual differences of the samples.

The likelihood of an individual produce a certain reaction from a particular drug may differ from other individual. Despite that human beings share similar organs and chemical composition, how we are bonded may be different from one person to the other. Therefore, without apt statistical analysis, effective treatments may not be offered, while ineffective ones could be. If statistics does not have an impact in medicine, then there would be no scientific studies that involves statistical methods being conducted up to the present thus, everything will not have a basis and will remain dubious.

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