Short Communication

Role of Biostatistics technique and Its Improvement in the Medical Research Field

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Abstract

Background: Biostatistics is the most powerful subject and its tools are using to prove or disprove in the scientific field. Biostatistics is the back-bone in medical research. In this article, I have pointed out, What is the role of biostatistics and biostatistician in the scientific research?, what are all the new techniques, methods, knowledge and skills are to be needed to solve in the newer problems.

Methods: In this short communication study, I have to try to explain the concepts of biostatistics, its techniques and applications. A biostatistician is an expert person who applies the statistical and mathematical tools and methods to analyze the biomedical, clinical, and public health related data. They are working in a crucial role in the deciding the study design, data accuracy, analyzing and results, and interpreting the results/findings and then give an idea/suggestion to the healthcare professionals.

Findings and Role of a Biostatistician: Biostatistics is the back-borne in medication education and its research areas. It transforms the results in numerical to valuable results of respective studies. There is a vast difference in between traditional statistical techniques and in the modern statistical techniques. Because, nowadays all biostatisticians are using the recent and advanced methods like artificial intelligence, data mining, bootstrap methods, and deep learning methods in the recent studies.

Conclusion: From this article, I have pointed out biostatisticians need in the health care settings and related field. Nevertheless, biostatisticians are trying to solve in good manner in the medical research, and help to the development of health care departments and to help to the state and central government in many ways.

Keywords: biostatistics, biostatisticians, data, data analysis, results, interpretation

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Introduction

Biostatistics tools and techniques are very much useful and essential in the medical research to prove scientifically. [1] Biostatistics is the backbone of any scientific research by giving new results with high precision, reliability (consistency), and validity (accuracy). We must emphasize the importance of Biostatistics and to insist its importance, learning its concepts, components, applications in a longer manner, and working for the related field. It is very much important and essential in biomedical and clinical research by providing the tools and research methods needs to prove the study design strongly through experiments by conducting governing high sensitive and careful collection of data, compilation, organization, analysis, results writing and its clear interpretation. [2] It helps to find the natural history of a particular disease, association between any variables, to find the calculated sample size adequately for the respective research/study, to reduce the sampling error, to minimize the bias, testing of hypothesis, to find the correlation between any two variables, association between more than two groups, to find the repeated measures, to predict the influencing variables, to find the area under the curve with some assumptions, and to ensure the results and it would be generalized. [3] Biostatistical tools and techniques are very much essential to do the external validity and various applications for the new research findings. In this article, I have pointed out and the main aim to explore, what is the role of Biostatistics and Statistician/Biostatistician in the scientific research? and what are all the new techniques, methods, knowledge and skills are to be needed to solve the newer problems in the new areas of research in the future years?. [4 – 5]

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Methods

A biostatistician is an expert person who applies the statistical and mathematical tools and methods to analyze the biomedical, clinical, and public health related data. They are working in a crucial role in the deciding the study design to the concern research/study, ensuring the relevant data accuracy, analyzing the collected research data and drawing the results, and to interpreting the results/findings and to give the idea/suggestion to the healthcare professionals to take appropriate decisions and to implement in the medical interventions/innovations.

Findings and Roles of a biostatistician

The main and major responsibilities of a biostatistician are as follows: [5]

Design of the study: Deciding the study design including forming/correcting the primary and secondary objectives, fixing the adequate minimum calculated sample size, and to finalize the proper and appropriate methodologies or methods.

Data Collection and Analysis of collected data: A biostatistician has to collect, organize, and to analyze the collected huge amount of data (raw data) by the way of primary or secondary data collection method for the epidemiological studies, lab based studies and various clinical studies.

Application of data analysis software: By using the most powerful specialized statistical softwares like SPSS, EpiInfo, MedCalc, Ggrph, Statulator, STAT, SysStat, SAS, R-Software and Python etc., to the purpose of data analysis, to visualize the analyzed results, and to interpret the complicated collect data for the respective studies.

Preparing reports and Compliance: To prepare proper reports and summarize the findings for the relevant research/study for the Institutional Research Committee / Scientific Research Committee for the concerned College/Insitution/Univeristies.

Major collaborations with faculties / researchers / health professionals: Biostatisticians are working with the scientists, researchers, health care professionals (doctors/nursing/other health care professionals), epidemiologists and entomologists to explore/elaborate the results of the relevant studies/researches and to support Evidence – Based Medicine.

Working in the major/main fields: [6]

Epidemiology: In this field, to study about the disease patterns and the directly significant risk factors for a particular study.

Environmental Health and Public Health: Analyzing what are all the environmental factors impact on human health? And what are all the existing methods for solving the problem? It is monitoring the population health, identify trends, and guide the public health findings/interventions and to make necessary policies.

Bioinformatics and Genomics: Analyzing and drawing the meaningful and to take the correct actions from the genetic related studies. To solve the challenges and difficulties in the bioinformatics area, health care settings and in other areas.

Clinical Trials: To make the comparison of testing with Gold Stand/previous existing methods to testing the new drugs/treatments/methods/procedures for safety and efficacy/efficiency.

Calculating the various drugs, treatments efficacy and its safety: It evaluates the effectiveness and safety of new drugs, interventions, taking decisions on the clinical findings, and making policies and simultaneously helps to the development of medical therapies.

Other types of uses of biostatistics: It is very much useful in the evaluation of the quality of the treatment/methods which is available in the health care settings and its performance also. Like this, biostatistics tools and its applications are very much useful to improve the medical practices for better quality of the patients' care.

The role of Biostatistics in the Medical Education and Research Areas: [7 – 8]

Biostatistics is the back-borne in medication education and its research areas. It transforms the results in numerical to valuable results of respective studies. There is a vast difference in between traditional statistical techniques and in the modern statistical techniques. Because, nowadays all biostatisticians are using the recent and advanced methods like artificial intelligence, data mining, bootstrap methods, and deep learning methods in the recent studies. These types of step-by-step transitions are very much useful in high and big data studies in the way of collected mass data, types, velocity of the real time data of the medical research. Biostatisticians are to help to the medical students, researchers, and scientists to prepare their research proposals, check their research title, objectives – Primary and Secondary objectives, sample size calculations based on their primary objective and depending on their study/research, to mention the relevant statistical tests/analysis according to their objectives, and to fix the level of significant. These important steps to be done before conducting their study/research.

Moreover, Artificial Intelligence (AI) and Machine Learning (ML) methods are the important and essential tools to work/solve the critical data or complex data in the medical research. [9] These recent methods are very much useful in the finding of hidden genetic factors, and it is exploring the environmental factors on health outcomes. Moreover statistician / biostatisticians are facing critical situation due to big data, data origins are vary and its sources are different. Biostatisticians are compiling and merge the different types of databases of the patients into a single and valuable database. [10] It is a very difficult task to them. In this they are facing difficulties through planning of statistical analysis, different programming based on the different patients' data, and interprets the analyzed results with the knowledge of biomedical / medical

related terms and context for a valid analysis and it is a meaningful one.

Conclusions

From this I have concluded that in the modern world biostatisticians are need to use new methods of analysis with new techniques, methods and statistical applications in the health care related data. These things are very much useful to analyze the huge set of data. Nowadays, the data sources are available in very large manners in the health care setting and other area related to health care. Nevertheless, biostatisticians are continuously helping in good manner and help to the development of health care departments and to the planning commission as well as to the state and central government to make the policies related to health care and other important purposes.

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