Survival Analysis of Patients with Acute Myeloid Leukemia (AML) using Generalized Extreme Value (GEV) distribution

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Background: Acute Myeloid leukemia (AML) is the most prominent acute leukemia in adults. In the United States, we experience over 20,000 cases per year. Over the past decade, improvements in the diagnosis of subtypes of AML and advances in therapeutic approaches have improved the outlook for patients with AML. However, despite these advancements, the survival rate among patients who are less than 65 years of age is only 40 percent.

Purpose: The purpose of the paper is to study if there exists any significant difference in the survival probabilities of male and female AML patients. Also, we want to investigate if there is any parametric probability distribution that best fits the male and female patient survival and compare the survival probabilities with the non-parametric Kaplan-Meier (KM) method.

Methods: We used both parametric and non-parametric statistical methods to perform the survival analysis to assess the survival probabilities of 2015 patients diagnosed with AML.

Results: We found evidence of a statistically significant difference between the mean survival time of male and female patients diagnosed with AML. We performed parametric survival analysis and found a Generalized Extreme Value (GEV) distribution best fitting the data of the survival time for male and female patients. We then estimated the survival probabilities and compared them with the frequently used non-parametric Kaplan-Meier (KM) survival method.

Conclusion: The comparison between the survival probability estimates of the two methods revealed a better survival probability estimate by the parametric method than the Kaplan-Meier. We also compared the median survival time of male and female patients individually with descriptive, parametric, and non-parametric methods of analysis. The parametric survival analysis is more robust and efficient because it is based on a well-defined parametric probabilistic distribution, hence preferred over the non-parametric Kaplan-Meier estimate. This study offers therapeutic significance for further enhancement to treat patients with Acute Myeloid Leukemia.

Biography

Mr. Aditya Chakraborty is a doctoral candidate and a graduate teaching associate (GTA) at the department of mathematics and statistics, University of South Florida (USF). He is also the president of the American Statistical Association (ASA)-USF student chapter. His research interests are mainly analytical, data-driven, and interdisciplinary, involving statistical analysis of real-world phenomena and simulated data, including BIG DATA. His research focuses on performing parametric and non-parametric statistical analysis, non-linear statistical modeling, predictive modeling utilizing artificial intelligence (AI), Bayesian analysis, and the application of machine learning (ML) techniques and algorithms.

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