

Application of Gamma Frailty Model in Survival of Liver Cirrhosis Patients

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Abstract : Goals and Objectives: A typical analysis of survival data involves the modeling of time-to-event data, such as the time till death. A frailty model is a random effect model for time-to-event data, where the random effect has a multiplicative influence on the baseline hazard function. This article aims to investigate the use of gamma frailty model with concomitant variable in order to individualize the prognostic factors that influence the liver cirrhosis patients' survival times. Methods: During the one-year study period (May 2008-May 2009), data have been used from the recorded information of patients with liver cirrhosis who were scheduled for liver transplantation and were followed up for at least seven years in Imam Khomeini Hospital in Iran. In order to determine the effective factors for cirrhotic patients' survival in the presence of latent variables, the gamma frailty distribution has been applied. In this article, it was considering the parametric model, such as Exponential and Weibull distributions for survival time. Data analysis is performed using R software, and the error level of 0.05 was considered for all tests. Results: 305 patients with liver cirrhosis including 180 (59%) men and 125 (41%) women were studied. The age average of patients was 39.8 years. At the end of the study, 82 (26%) patients died, among them 48 (58%) were men and 34 (42%) women. The main cause of liver cirrhosis was found hepatitis B with 23%, followed by cryptogenic with 22.6% were identified as the second factor. Generally, 7-year's survival was 28.44 months, for dead patients and for censoring was 19.33 and 31.79 months, respectively. Using multi-parametric survival models of progressive and regressive, Exponential and Weibull models with regard to the gamma frailty distribution were fitted to the cirrhosis data. In both models, factors including, age, bilirubin serum, albumin serum, and encephalopathy had a significant effect on survival time of cirrhotic patients. Conclusion: To investigate the effective factors for the time of patients' death with liver cirrhosis in the presence of latent variables, gamma frailty model with parametric distributions seems desirable.

Keywords : frailty model, latent variables, liver cirrhosis, parametric distribution

Conference Title : ICSM 2017 : International Conference on Statistics and Mathematics

Conference Location : Berlin, Germany

Conference Dates : May 21-22, 2017