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A MATHEMATICAL MODEL FOR ANALYSIS OF PROGNOSTICATION OF NASOPHARYNGEAL CARCINOMA

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Abstract In this manuscript, we introduce the Weibull model analyze molecular prognostication of nasopharyngeal carcinoma. It has numerous applications in various field such as period of existences. A two parameter Weibull distribution depends on having acceptable statistical estimates. We found that plasma/serum rapidly stimulates the variables. This will be very useful to in the field of medicine. Finally we conclude that the Weibull distribution two parameter model is well fitted to analyze medical data mathematically. It is useful for medical professionals.

Keywords: Foundations Stochastic Process, Multivariate analysis, Applications to biology and medical sciences

Mathematical Subject AMS Classification: 60GXX, 62HXX, 62PXX

1. Introduction

The Weibull two parameter distribution model has an extensive range of applications including life testing, trial and error. In this area covered such as reliability analysis applied statistics. We apply medical data from the mathematical model to calculate the level of the cancer inactive duration. If the hazard rate changes complete time rate duration, the probability of failure rate calculated [2,4,7-10]. In this model it will help to the population level inferences about the cancer inactive duration depends times to help grownup effective procedure.

2. Mathematical Model and Assumptions

M: Independent failure times of m individuals

T: An arbitrary individual of failure time with respect to random variable.

The probability density function (pdf) $\phi(t)$ and survival function S(t) defined as follow

$$\phi(t;\alpha,\beta)=\begin{cases}\beta\alpha^{\beta}t^{\beta-1}e^{-(t\alpha)^{\beta}}, & t\geq 0,\beta>0,\alpha>0,\\ 0, & t<0.\end{cases} \tag{2.1}$$

$$S(t)=e^{-(\alpha t)^{\beta}}. \tag{2.2}$$

If $\beta=1$, the lifetime is memory less. When $\beta\neq 1$, the probability of survival dependent on past survival, If $\beta<1$ this represents a decreasing hazard rate. Therefore, the survival failure time permits us to approximate the level of cancer ideal period of existence.

Extension of Weibull model is the period of existence is defined as the time between pre initial stage and past initial stage. The conditional probability of surviving maximum time is $(v+t)$, the time of diagnostics of the function as follows

$$S(u+t\,|\,u)=e^{-\alpha^{\beta}\left[(u+t)^{\beta}-u^{\beta}\right]},\ 0<t. \tag{2.3}$$

Weibull model the level of the existence period is depend on parameter. The approximate likelihood value of the period of existence $\hat{v}$, can be estimated using the following results

$$\hat{v}=\frac{\left(-(\beta-1)/\beta\right)-a}{b}. \tag{2.4}$$

$$\ln\left[-\ln\hat{S}(v+t\,|\,v)\right]=-\underbrace{\beta\ln(\alpha)}_{\text{intercept}}+\underbrace{\beta}_{\text{slope}}\ln(v+t_i). \tag{2.5}$$

$$\ln\hat{S}(v+t\,|\,v)a+b(v+t_i). \tag{2.6}$$

3. Applications

In this application part, we shall discuss the EBV DNA can be produced in the plasma and serum of NPC patients [1-3,5,6]. In particular, the classification of circulating EBV DNA offers very good methodology for follow up the continuous progress of these points. We examined whether this prognostics effects of plasma and serum of NPC concentration may be independent of staging system. Most probably the NPC deaths found in stages III and IV, in this test was only performed for those two advanced stages. Finally we conclude that our medical figure (Fig. 1) indicates the serum EBV DNA is well fitted for both stage III and stage IV.

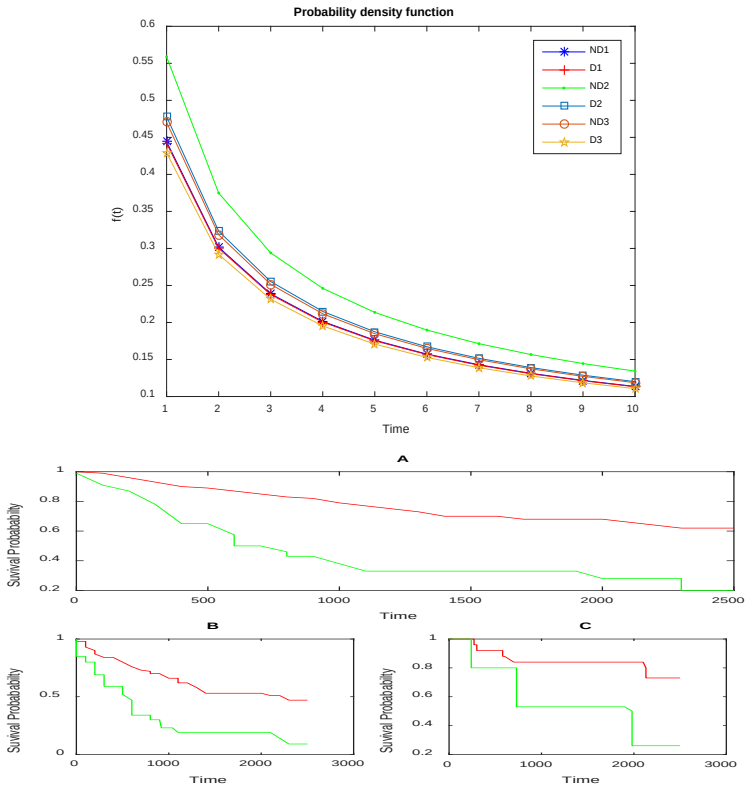
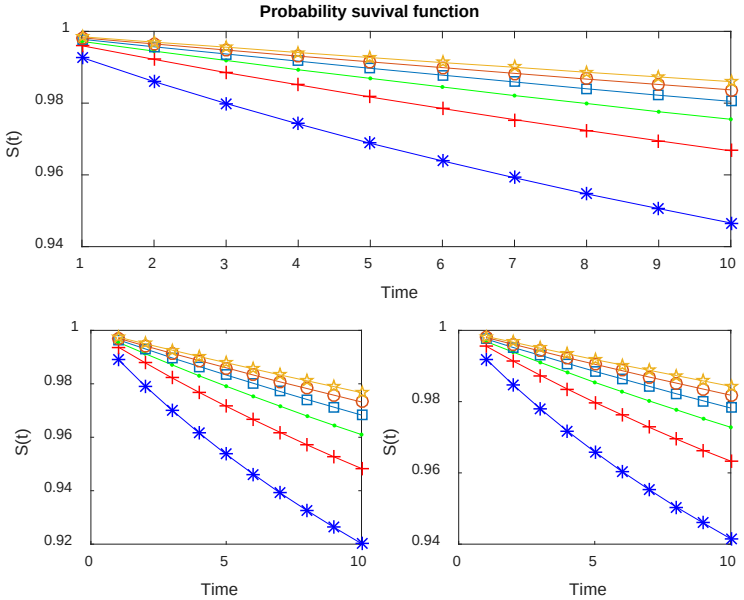


Fig. 1. Survival analysis for NPC patients

4. Mathematical results and Discussion

The plot of probability density function of plasma/serum EBV DNA (A) in NPC dose shows superiority then the functions plasma/serum EBV DNA (B,C) dose and plasma/serum EBV DNA control. The plot of the plasma/serum EBV DNA dose function initially monotonically increasing upto t=10 hours and then decreasing monotonically. The rate or decreasing is comparatively good than plasma/serum EBV DNA doses and control functions. After that plasma/serum EBV DNA (A) does to patients, plasma/serum EBV DNA levels are suppressed as time goes on.



The plot of probability survival function of plasma/serum EBV DNA (A) dose dominates the plasma/serum EBV DNA (B,C) doses and control survival functions in the specified range. The probability survival function of plasma/serum EBV DNA (A) doses decrease rapidly than plasma/serum EBV DNA (B,C) and control function. The probability of suppression of plasma/serum EBV DNA levels after that plasma/serum EBV DNA (B,C) doses beyond any given specified times is higher than other two cases plasma/serum EBV DNA (B,C) dose and control.

5. Conclusion:

We used two parameter Weibull distribution model to analyse the molecular Prognostication of Nasopharyngeal carcinoma. Here we have plotted probability density function and probability survival function for selected medical data. The overall sample data will fitted with our distribution due to the change of the two parameters plasma/serum EBV DNA is just one fact of the increasingly recognized phenomenon of circulating tumor derived DNA in plasma and serum. Finally we conclude that the Weibull distribution two parameter model is well fitted to analyse medical data mathematically. It is useful for medical professionals.

Conflict of interest:

There is no conflict of interest to affirm this publication.

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