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ON EFFECT OF BRIEF LOW- AND HIGH-INTENSITY EXERCISE ON CIRCULATING GH OF YOUNG HEALTHY MEN USING MATHEMATICAL MODEL OF WGED

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Abstract

This paper deals with real life problem using generalization of Weibull-G exponential distribution (WGED) with three parameters which one of the famous distribution. WGED of medical real time data acquires some statistical properties, which are probability-density function $f(x)$, hazard-rate function $h(x)$ and survival function $s(x)$. This work aims at finding some results related to life-time using 3-parameter WGED. The probability function, hazard-rate function, survival function corresponding to life time has been investigated in the Effect of Brief Low and High-Intensity Exercise on Circulating GH of its Proteolysis in Young Healthy Men. The consequence of the current study regarding life-time data is that interim control, low-intensity exercise and high-intensity exercise, at 10 min into recovery activity decreased an acute exercise induced GH release.

1. Introduction

The WD mathematical models were occupied to elucidate various types of noticed falling of elements and events. WD analyses are engaged on one failure class and its uses are well-recognized for real life medical issues. In Wais, P., 2017 [9], there are many supplementary WD related models that are usable together with three, two-parameter WD mathematical models. Medical, insurance, science, engineering, and finance fields adopt a lot of standard distributions (D). Rinne, H., 2008 [8] has generalized these standard

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D which produced many compound D that are more malleable than base line Ds. This led to the development of new kinds of distributions.

A distinguished continuous function of the stochastic model, exponential dis areal life-time data analysis model. The flexibility of the exponential Dpaved way to the development of beta ED [4], generalized exponential distribution [2]. Nofal, Z. M et al. 2017 [6] has introduced the Kumaraswamy exponential distribution. Then many real life problems were investigated by these distribution models. The inverse-exponential distribution was introduced by Marcelo, B., et al., 2014 [3]. In this paper, WG family of D of the real life-time data is developed. S. Nasiru 2016 [5] were investigated 3 different forms of such class of D. Gupta et al., investigated exponential WD. WGED has many benefits that offers investigation the life-time medical issues. Further, in this paper graphical solutions for real life-time data analysis of human problems is obtained.

2. Methodology

2.1 Mathematical model

2.1.1 Weibull G-Exponential Distribution (WGED). WGED is an incredible D of WDs two-parameter with the shape criteria equal to 1 [Gupta, R. D. and Kundu, D. 2001 and 1999 [1, 2]]. WGED in a r.v. X possess the ED with parameters $\lambda > 0$ if its p.d.f is specified by $g(x) = \lambda_e{}^{-\lambda x},\ x > 0,$

c.d.f,

$$G(x) = 1 - e^{-\lambda x},\ x > 0,$$

survival function,

$$S(x) = G(x) = 1 - e^{-\lambda x},\ x > 0,$$

and hazard function $h(x) = \lambda$ is WD initiated by Weibullis one of the approved distributions for the modeling situation with monotonic falling rates. If $G(x)$ is the base-line c.d.f of a r.v. with the Weibull c.d.f then p.d.f $g(x)$ is

$$F(x; a, b) = 1 - e^{-ax^b}, \; x \geq 0, \tag{1.1}$$

where the criteria viz. a, b are assured, depends on the density. By replacing with ratio $\frac{G(x)}{1 - G(x)}$ the c.d.f of WGED is,

$$1 - e^{-a[G(x;\lambda)/1-G(x;\lambda)]^b}, \; x \geq 0, \; a, \; b \geq 0$$

$$= 1 - e^{-a[G(x;\lambda)/1-G(x;\lambda)]^b}, \; x \geq 0, \; a, \; b \geq 0 \tag{1.2}$$

$G(x; \lambda)$ is a baseline c.d.f, which relies on a criteria λ. The parallel personal p.d.f is

$$f(x; a, b, \lambda) = ab\, g(x; \lambda) \frac{[G(x; \lambda)]^{b-1}}{[1 - G(x; \lambda)]^{b+1}} e^{-a\left[\frac{G(x;\lambda)}{1-G(x;\lambda)}\right]^b} \tag{1.3}$$

$\Pr(Y \leq x) = \Pr\left(X \leq \frac{G(x)}{1 - G(x)}\right) = F(x; a, b, \lambda)$ (1.2). WG-family's survival function is

$$R(x; a, b, \lambda) = 1 - F(x; a, b, \lambda) = e^{-a\left[\frac{G(x)}{1-G(x)}\right]^b}$$

The HR function of the WG family is

$$h(x; a, b, \lambda) = \frac{f(x; a, b, \lambda)}{1 - F(x; a, b, \lambda)} = \frac{abg(x; \lambda)\,[G(x; \lambda)]^{b-1}}{[1 - G(x; \lambda)]^{b+1}}$$

$$= \frac{abg(x; \lambda)\,[G(x; \lambda)]^{b-1}}{[1 - G(x; \lambda)]^{b}}$$

where, $h(x; \lambda) = \frac{g(x; \lambda)}{1 - G(x; \lambda)}$ the multiplying quantity $\frac{abg(x; \lambda)\,[G(x; \lambda)]^{b-1}}{[1 - G(x; \lambda)]^{b}}$ works as a correction factor for HR function of the baseline model Equation (1.2).

The exponential function using by power series,

$$e^{-a\left[\frac{G(x)}{1-G(x)}\right]^{b}} = \sum_{i=0}^{\infty} \frac{(-1)^i a^i}{i!} \left(\frac{G(x;\lambda)}{1-G(x;\lambda)}\right)^{ib} \tag{1.5}$$

$$f(x; a,\ b,\ \lambda) = \sum_{i=0}^{\infty} \frac{(-1)^i a^i}{i!} \frac{[G(x;\lambda)]^{b(i+1)-1}}{[1-G(x;\lambda)]^{b(i+1)-1}} \tag{1.6}$$

Using the generalized binomial theorem,

$$f(x; a,\ b,\ \lambda) = \sum_{i=0}^{\infty}\sum_{i=1}^{\infty} \frac{(-1)^i a^{i+1} b\Gamma}{\Gamma(b(i+1)+j+1)} \frac{(b(i+1)+j+1)}{j!}$$

$$\times\, g(x,\ \lambda)\,[G(x;\lambda)]^{b(i+1)+j-1} \tag{1.7}$$

The 3 parameter WGED is dealt within the above equations. The WGED is

$$F(x; a,\ b,\ \lambda) = 1 - e^{-a[e^{\lambda x}-1]},\ x > 0,\ a,\ b,\ \lambda > 0$$

The consequent p.d.f is

$$f(x; a,\ b,\ \lambda) = ab\lambda e^{\lambda x}[e^{\lambda x}-1]^{b-1} e^{-a[e^{\lambda x}-1]^{b}},\ x > 0. \tag{1.8}$$

Where $a,\ b > 0$ and λ is selected positive values which is > 0.

$$s(x; a,\ b,\ \lambda) = 1 - F(x; a,\ b,\ \lambda)$$

$$= e^{-a[e^{\lambda x}-1]^{b}},\ x > 0. \tag{1.9}$$

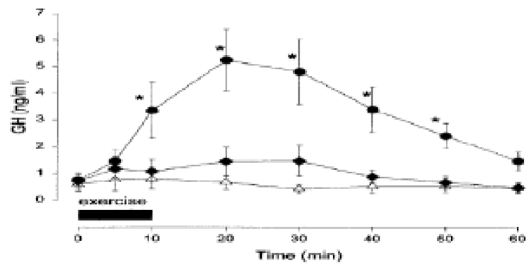
$$h(x; a,\ b,\ \lambda) = ab\lambda e^{\lambda x}[e^{\lambda x}-1]^{b-1} \tag{1.10}$$

3. Results

3.1. Application

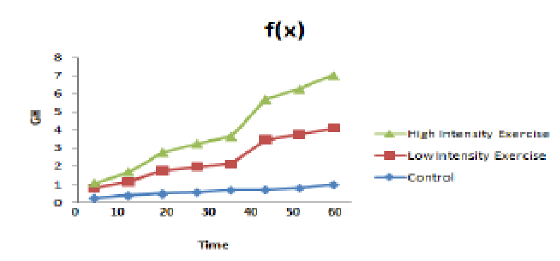
To investigate a WGED, the real life-time data was taken from the Adam J et al., 1996 [8]. Ten Healthy adult male volunteers aged 20 to 34-yr-old (mean 27.5 2 1.7) were considered. These individual were not competitive athletes, but they performed some individual exercise. Institutional Human

Subjects Committee, approved the participants and they granted informed approval. Here, data (shown in Figure 1 [8]) is obtained. GH levels remained constant during the control session and no significant increase was observed from pre exercise baseline during low-intensity exercise.



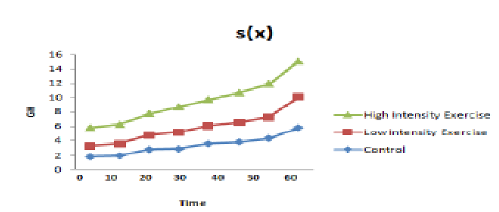
Medical Figure 1.

3.2 Mathematical Results



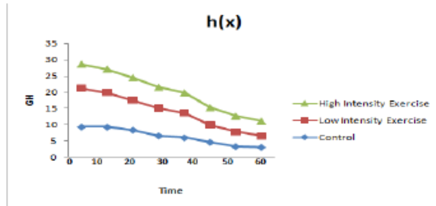
Mathematical Figure 1.

Shows the WGED p.d.f plots for the effect of brief exercise on circulating GH for control, low intensity, high intensity which are increased at different time 0, 10, 20, 30, 40, 50, 60 min.



Mathematical Figure 2.

shows the WGED survival function plots in response to effect of brief exercise on circulating GH for control, low, high intensity which are increased at different time 0, 10, 20, 30, 40, 50, 60 min.



Mathematical Figure 3.

Gives the WGED hazard function plots for the effect of brief exercise on circulating GH for control, low, high intensity which are decreased at different time 0, 10, 20, 30, 40, 50, 60 min.

4. The Conclusion

In the current paper, the WGED was employed to analyse effect of brief exercise on circulating GH for control, low intensity, high intensity which are increased at different time 0,10,20,30,40,50,60 min(mathematical figures 1-3). These findings will enhance the understandings of secretary hormones (growth hormone) in the human endocrine system and further studies are need for clear elucidation. In conclusion, we have used the mathematical expressions with its necessary statistical distributions to analyze the life-time data that will deliberate the better understandings and this could be a narrative loom to analyze the life-time data in the future.

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