The Impact of Action Bitters on Kidney Function of Albino Wister Rats

Dagogo Samuel Allen Wokoma and Innocent Uchenna Amadi

Department of Mathematics/Statistics, School of Science and Technology, Captain Elechi Amadi Polytechnic, P. M. B. 5936, Rumuola, Port Harcourt, Rivers State, Nigeria.
dagywoksy@gmail.com

Abstract: This paper presents one way ANOVA method of analysis which is empirical. From the analysis results showed that Action bitters does not have bad effects in the kidney function of Albino Wister rats. In the same vein, a non parametric test discovered by Kolmogorov Smirnov (KS) was performed; the test revealed that the data-set was drawn from a common distribution. Therefore, the paper presented here has profound implication for future studies which may be useful to animal scientists and to the society at large.

[Wokoma, D.S.A. and Amadi, I. U. **The Impact of Action Bitters on Kidney Function of Albino Wister Rats.** *World Rural Observ* 2019;11(4):68-71]. ISSN: 1944-6543 (Print); ISSN: 1944-6551 (Online). http://www.sciencepub.net/rural. 11. doi:10.7537/marswro110419.11.

Keywords: ANOVA, Wister rats, Action bitters, Kolmogorov Smirnov, Statistics.

1. Introduction

Action bitters are made up of various chemical components extracted from herbs and roots that have the same facial appearance of bitter taste and act to increase the vital energy centered in the body see Hoffmann (2000; 2003) and Mcdonald (2014). However, action bitters is traditionally prepared for human consumption and for medicinal purposes. Thus, the significance of statistical analysis cannot be over emphasized as its applications are many in real life situations.

In statistics, studies involve where there are rooms to bring in some measures of control by imposing one or more conditions on experimental units and recording or determining the effect on the response variable (Essi, 2009). The aim of this paper is to evaluate the effect of action bitters on the kidney function of albino Wister rats. Recently, some writers have shown a kin interest in studying the effects of bitters on the kidney function of Albino Wister rats which is a particular species of rats in the rats kingdom (Anonye *et al.*, 2017; Ekonye *et al.* (2008). The advantage of this present analysis over the previous is that, Goodness –of-fit test was used to ascertain a class of probability distributions, the random process which generated the data.

2. Materials and Methods

The data is of secondary data collected from bio-tech diagnostics, diamond house, No 620 Ikwerri road Rumuigbo, Port Harcourt. The experiment was carried out using different chemical components such as Urea, Creatinine, Chloride, potassium and sodium.

The model for the analysis is given below:

$$Y_{ij} = \mu + \tau_i + \varepsilon_{ij}, i = 1,2,...,t, \; j = 1,2,...,r \tag{1.1}$$

Where,

Y_{ij} is the observation or response of the ith treatment in jth replicate

μ is the overall mean,

τ_i is the effect of treatment i and

ε_{ij} is the error associated with the observation Y_{ij}

2.1 Model assumptions

i. The statistical random variables are normally distributed

ii. They are independent

iii. The error term of the variance is constant

iv. The error term for instance, follows $N(0,\sigma^2)$

2.2 The derivation of the total sum of squares From (1.1)

$$Y_{ij} = \mu = \tau_i + e_{ij}$$

$$\left(Y_{ij} - \bar{Y}_{..}\right) = \left(\bar{Y}_i - \bar{Y}_{..}\right) + \left(Y_{ij} - \bar{Y}_i\right)$$

Summing up and squaring b0th sides

$$\sum_{i=1}^{t}\sum_{j=1}^{r}\left(Y_{ij} - \bar{Y}_{..}\right)^2 = \sum_{i=1}^{t}\sum_{j=1}^{r}\left[\left(\bar{Y}_i - \bar{Y}_{..}\right) + \left(Y_{ij} - \bar{Y}_j\right)\right]^2$$

$$\sum_{i=1}^{t}\sum_{j=1}^{r}\left(Y_{ij} - \bar{Y}_{..}\right)^2 = r\sum_{i=1}^{t}\left(Y_i - Y_{..}\right)^2 + \sum_{i=1}^{t}\sum_{j=1}^{r}\left(Y_{ij} - Y_i\right)^2 + 2\sum_{i=1}^{t}\sum_{j=1}^{r}\left(\bar{Y}_i - \bar{Y}_{..}\right)\left(Y_{ij} - \bar{Y}_i\right)$$

Cross products terms equal to zero, we obtain

$$\sum_{i=1}^{t}\sum_{j=1}^{r}\left(Y_{ij}-\overline{Y}_{..}\right)^2 = r\sum_{i=1}^{t}\left(Y_{i}-Y_{..}\right)^2+\sum_{i=1}^{t}\sum_{j=1}^{r}\left(Y_{ij}-Y_{i}\right)^2 \quad (1.2)$$

$$SS_T = \sum_{i=1}^{t}\sum_{j=1}^{r}\left(Y_{ij}-\overline{Y}_{..}\right)^2 = \sum_{i=1}^{t}\sum_{j=1}^{r}Y_{ij}^{2}-\frac{T^2}{rt} \quad (1.3)$$

Where SS_T represents Total sum of squares

$$SS_{TRT} = r\sum_{i=1}^{t}\left(Y_i-\overline{Y}_{..}\right)^2 = \frac{\sum_{i=1}^{t}\tau_i^{2}}{r}-\frac{T^2}{rt} \quad (1.4)$$

SS_{TRT} represents treatment sum of squares

$$SS_E = SS_T - SS_{TRT} \quad (1.5)$$

SS_E represents sum of squares error

$\frac{T^2}{rt}$ is called the correction factor (CF)

3. Results and Discussions

Table 1: The Sample Data

S/NO	Urea	Creatinine	Chloride	Potassium	Sodium	
1.	49.5	489.8	768	28.3	565	
2.	44.8	361.9	740	27.4	508	
3.	55.5	481.1	735	35.3	537	
4.	52.7	577.4	709	25.3	619	
5.	102.7	1154.2	1307	50.2	874	
Total	**305.2**	**3064.4**	**4259**	**166.5**	**3103**	**10898.1**
Mean	61.04	612.88	851.8	33.3	620.6	

Required to test:

H_0: Action bitters have bad effects on the kidney function of Albino wister rats

H_1: Action bitters does not have bad effects on the kidney function of Albino wister rats

H_i: $\tau i \neq 0$ for at least one value of i is different.

Level of significant $\alpha = 0.01$

Decision rule: Reject Ho if $F_{cal} > F_{tab}\ (v_1, v_2)$

Table 2: Anova: Single Factor

SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
Column 1	5	305.2	61.04	558.178		
Column 2	5	3064.4	612.88	97447.95		
Column 3	5	4259	851.8	65190.7		
Column 4	5	166.5	33.3	103.355		
Column 5	5	3103	620.6	21743.3		
ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	2705078	4	676269.5	18.27326	1.85E-06	2.866081
Within Groups	740173.9	20	37008.7			
Total	3445252	24				

Decision: since $F_{cal} = 18.27 > F_{tab}$ (4.20) = 2.87, we reject H_O: and accept H_i: We therefore conclude that the Action bitter does have any bad effect on the kidney function of Albino Wister rats. In the analysis of section 3.1 and 3.2 all the rigors of implementing completely Randomized Design in other to enhance efficiency in results was handled properly. The test for goodness of fit was carried out using F-statistics. The F-calculated >F-tabulated (i.e 18.27 > 2.87). This goes to mean that the result was not attributed due to chance. Therefore, H_O was rejected.

3.1: Kolmogorov Smirnov (KS) Goodness –of-fit test

$$H_0 : \text{The data-set comes from a common distribution}$$

$$H_1 : \text{The data-set does not comes from a common distribution}$$

The data-set was subjected to a non parametric test called Kolmogrov Smirnov (KS) results showed that the data comes from a common distribution with 0.01 level of significance. That is to say that the result is statistically significant.

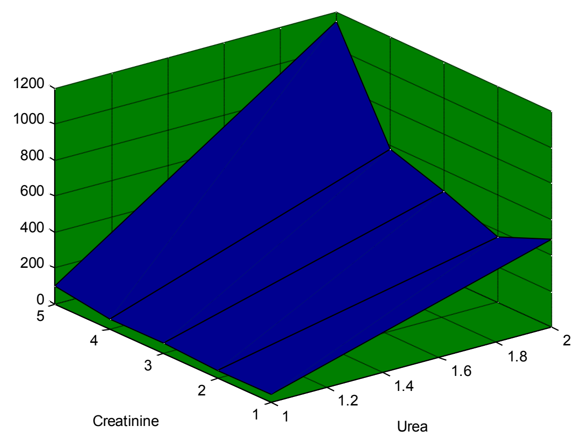

Figure 1: The mesh-surface view of Urea and Creatinine

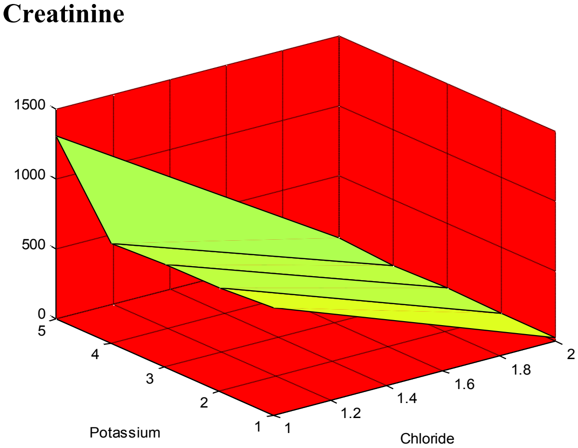

Figure 2: The mesh-surface view of Chloride and Potassium

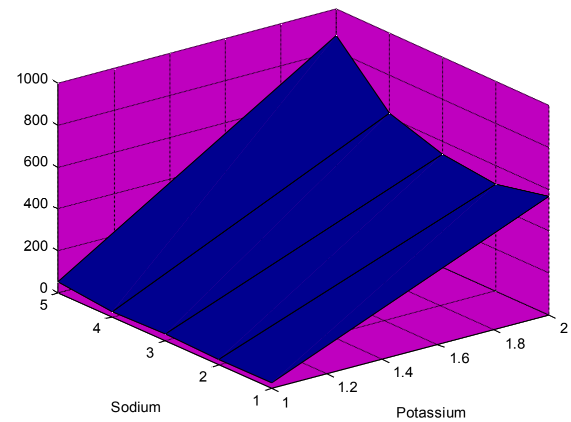

Figure 3: The mesh-surface view of Potassium and Sodium

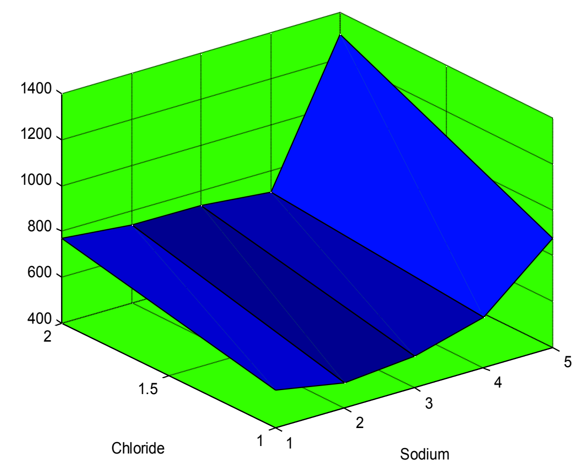

Figure 4: The mesh-surface view of Sodium and Chloride

In Figures 1, 2, 3 and 4 are displayed to show several behavioral concepts between the chemical substances. Clearly, the plot portrays their uniqueness and relationships when combined to each other. This goes to mean that results obtained by these reagents were not obtained by chance. That is to say that the model is reliable in proven that, Action bitters do not have bad effects on the kidney function of Albino wistar rats.

4. Conclusion

This paper adopted ANOVA method of analysis which is good in experimental design and real life applications. The result of this analysis has shown that action bitters have no bad effect on the kidney function of Albino Wister rates. Therefore the model was also subjected to goodness of fit test using Kolmogorov; the test revealed that the data-set was drawn from a common distribution.

References

1. Ekong, M. B., Igiri, A. O. and Egwu, A. O. (2008). Histomorphologic alterations of the cerebellum of wistar rats following Amodiaquine plus Artesunate administration, the original work. *International journal of medicin*e, 4(2):15-18.
2. Essi, I. D. (2009*). Fundamentals of statistics*. Geocelia publishing, Urualla street mile 1 Diobu Port Harcourt, Nigeria.
3. Hoffmann, D. (2000). *Healthy digestion: A National approach to relieving indigestion gas heartburn constipation,* colites and more (1st edition). Storey publishing, LLC, Massachusetts. 1-123.
4. Hoffmann, D. (2003). *Medical herbalism: The science and practice of herbal medicine* (1st edition). Hecling arts press, Vermont 1-672.
5. McDonald, J. (2014). Blessed butters.141-154. http://www.herbcraft.org/bittery.

12/25/2019