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A Study of Mathematical Model for Extended Lognormal Distribution to Obligatory Role of Hypothalamic Neuroestradiol during the Estrogen induced LH surge in Female Ovariectomized Rhesus Monkey

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ABSTRACT

In the present study ,we investigated the role of neurostradiol estrogen's positive feedback effects on the release of GnRH, kisspeptin, and LH on OVX female rhesus monkeys. Negative and positive feedback effects of ovarian 17β-estradiol (E_2) regulating release of gonatropin releasing hormone (GnRH) and luteinzing hormone (LH) are pivotal events in female reproductive function. The proposed model allows for the improvement of the relevance of near –real data and opens broad horizons for the study phenomena that can be addressed through the results obtained. Finally, we conclude that, this paper will be very useful in the future for medical field.

Keywords: Hazard Rate function, log normal distribution, Mixture.

Mathematical subject classification: $62H_{xx}$; $62NO_5$; $90B25$.

1.Introduction:

Since extended normal distribution and extended normal inverse have near-natural representation in the positive era, it was first used to represent environmental data. The representation of study phenomena is close to that of a Gaussian distribution [1].By modifying the form of the natural random variables to lognormal random variables, the distribution resembles that of the regular distribution [2]. The lognormal distribution's upper tail, which is very similar to the pareto distribution, allowed an accurate integral expression of the distribution's characteristic function to be drawn. Which is indicated by researcher Leipnik, R. B. (1991) [4].Our goal in this research is to lay the foundations for analysing and interpreting data, assuming a basic understanding of mathematics and analyses and the ability to apply basic statistical methods.

2. Mathematical Model and assumptions

When it is clear that the distribution is right-handed, the logarithmic distribution is commonly used to assign continuous random sample data, and there are several examples, including income and age variables, as well as flooding if rivers flood.By comparing the abnormal and regular distributions, logarithmic distribution data can be directly extracted from the normal distribution. Logarithmic distribution data derived from the normal distribution by looking at the abnormal

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and normal distribution Y = exp (X) = f(X) by transformation X= log (Y) = $f^{-1}(y)$and the derivativesof $f^{-1}(y)$ the Jacobean with respect to Y is (Y^{-1})
Thus
g_y(Y) = g_x(In(Y)) * Y^{-1} …………………..(2.1)
This is the same as the above lognormal distribution. Y has a lognormal distribution if In(Y) has a regular distribution. If Y is normally distributed, then exp(Y) will be log normally distributed.
If X has a normal distribution with a mean of 0 and a variance of, then the random variable X defined by the relationship Y = log(X) is lognormally distributed and is denoted as lognormal (0, α^2)
The tracking of the modelling of life data of units in which the failure and deviation patterns are very close to the right is typically supported by a logarithmic distribution; the probability density and cumulative distribution function can be formulated as follows:

$$g(\, y, \alpha) = \frac{1}{\alpha\sqrt{2\pi}}\frac{1}{y}\exp\left\{-\frac{1}{2}\left(\frac{In\ y-\beta}{\alpha}\right)^2\right\} \text{………………(2.2)}$$

and

$$G(y, \alpha) = \frac{1}{\alpha\sqrt{2\theta}}\int_0^y \frac{1}{r}\ exp - \frac{1}{2}\left[\frac{In\ r}{\alpha}\right]^2\ dr = \frac{1}{2}[1 + erf\frac{In\ y}{\alpha\sqrt{2}}] \text{ ……………..(2.3)}$$

If the natural logarithm has a normal distribution and its probability density function is given by the following equation, we say the continuous random variable has an irregular distribution with the parameters.

$$g(y, \beta, \alpha) = \{\frac{1}{\tau\sqrt{2\theta}}\frac{1}{y}\exp\left\{\begin{pmatrix}\left\{-\frac{1}{2}\left(\frac{In\ y-\beta}{\tau}\right)^2\right\} \\ 0; x\ \leq 0\end{pmatrix} - \frac{1}{2}\left(\frac{In\ y-\beta}{\tau}\right)^2\right\}; y > 0 \text{ ………………….(2.4)}$$

where π is the mean of log (y) and τ is the standard deviation of log (y).
It is possible therefore to write directly the cdf

$$f(\, x, \mu, \sigma) = \frac{1}{\sigma\sqrt{2\pi}}\int_0^x \frac{1}{x}\exp\left\{-\frac{1}{2}\left(\frac{In\ x-\mu}{\sigma}\right)^2\right\}dt = \frac{1}{2}[1 + erf\left[\frac{In\ x-\mu}{\sigma\sqrt{2}}\right]] \text{ ………..(2.5)}$$

2.1 characteristics of the Extended Lognormal Distribution
The logarithmic distribution is transformed into a probability distribution, creating a natural record of the sample values at alignment. The logarithmic variable has a natural distribution, and its probability density function is defined as

$$g(y, \beta, \pi) = \frac{1}{y\mu\sqrt{2\theta}}\exp\left\{-\frac{1}{2}\left(\frac{In\ y-\pi}{\mu}\right)^2\right\} \text{ …………….(6)}$$

Where π and μ are the mean and the standard deviation of on (y) respectively.

3. Application

Estradiol (E 2), which is mainly released by the ovaries, controls the release of gonatropin releasing hormone (GnRH) and gonotropins by feeding back to the hypothalamus and anterior pituitary. In addition to the ovary, the brain is also a source of (E_2) synthesis release. This neuroestradiol modulates various neuronal functions (1). Since prolonged EB infusion into the median eminence causes a sustained increase in GnRH and LH release, it is similar to the preovulatory surge (7).We hypothesised that preovulatoryGnRH and LH surges include neuroestradiol release in the median eminence.. During the late follicular phase, the

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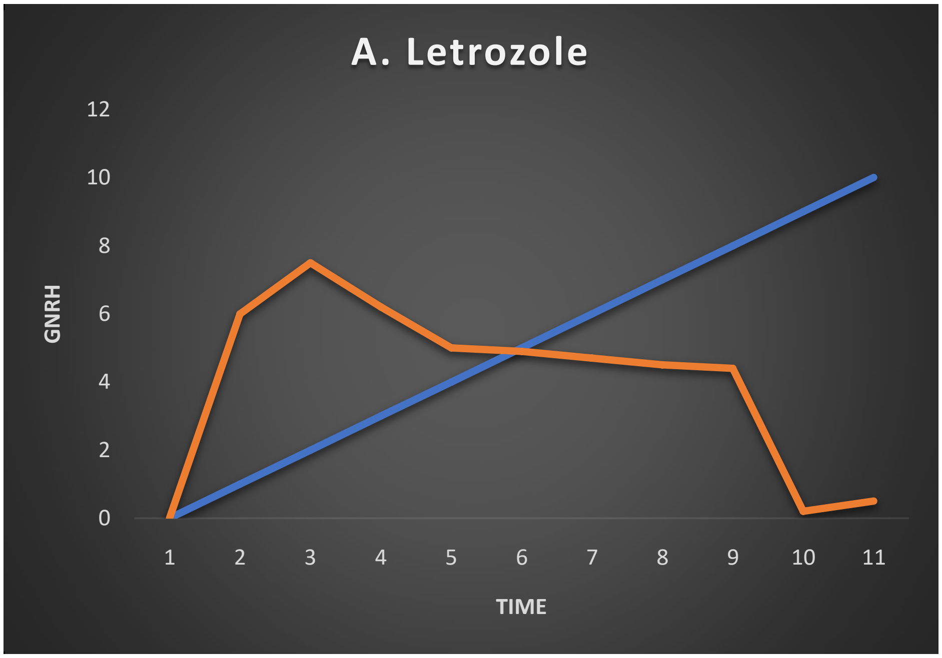
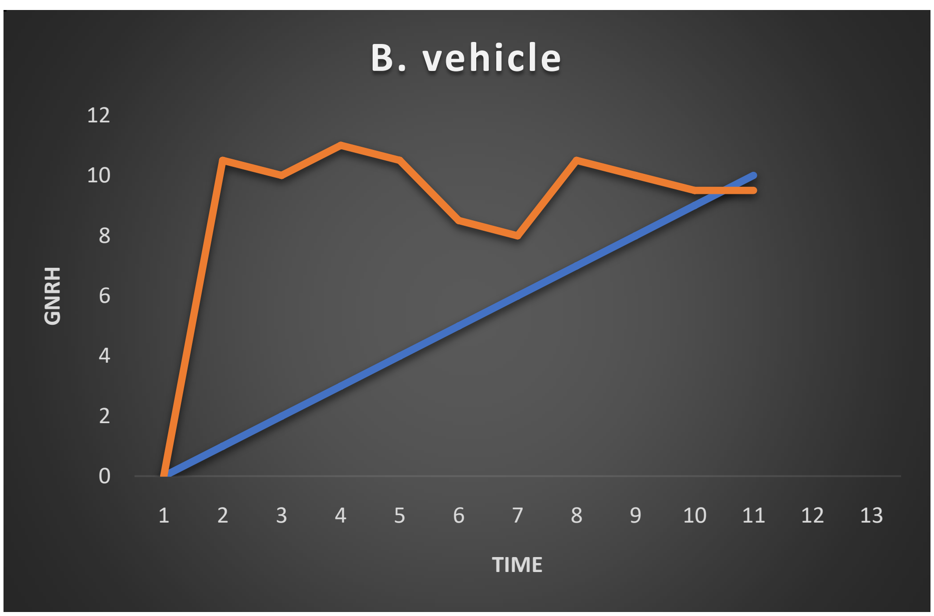
prevulatorygonotropin surge is initiated by increased levels of circulating E_2 and progesterone from the preovulatory follicles. In OVX nonhuman primates, two separate (E_2) replacement strategies are used for inducing GnRH / LH surges in OVX nonhuman primates. Both methods are successful in inducing an LH surge, which mimics the preovulatory LH surge (9). GnRH and LH spikes in primates caused by systemic EB administration have a 24-hour delay and last 36-60 hours (5,6&8). These two GnRH / LH surge models were used.





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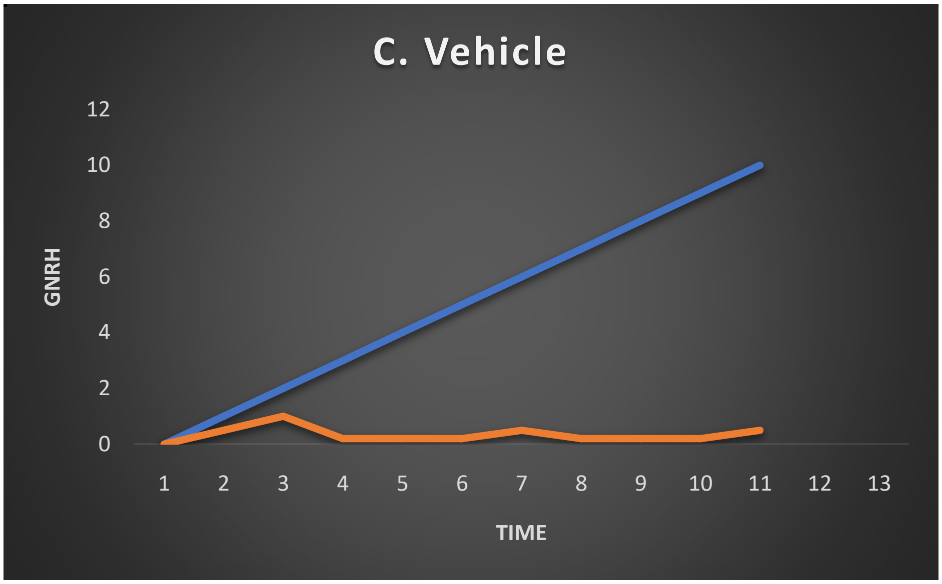
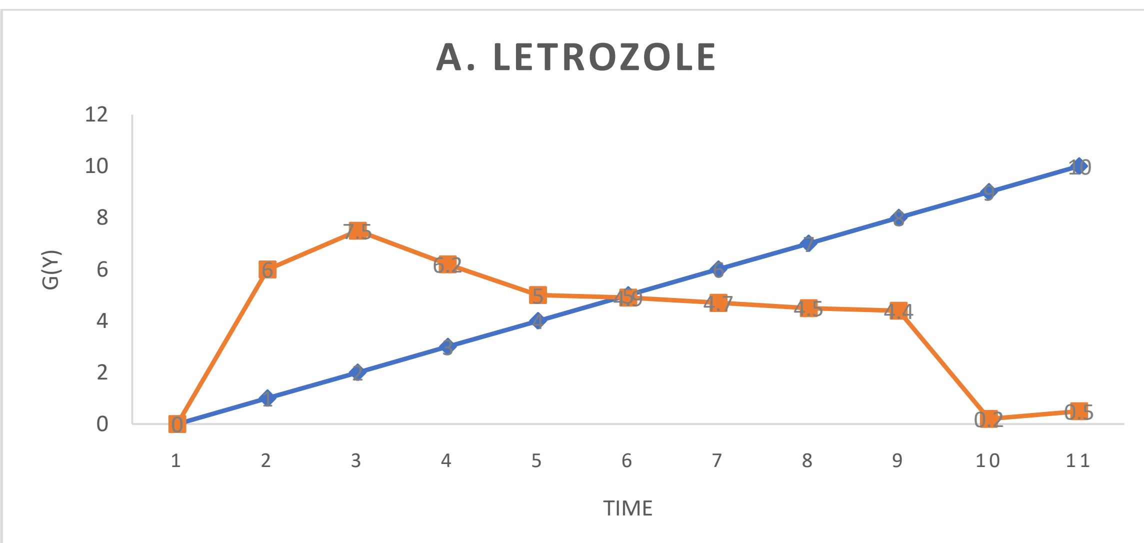


Figure 3.1

The effect of letrozole infusion into the median eminence on EB induced GnRH and kisspeptin surges, examined using microdialysis in OVX female monkeys.

To determine this possibility, we examined the effects of letrozole infusion into the median eminence on the EB-induced surge of GnRH using a microdialysis method. GnRH levels were higher over oil control during the corresponding period.fig A and B. similarly, EB induced kisspeptin surges. Letrozole infusion into the median eminence suppressed GnRHrelease.whereas vehicle infushion had no effect on GnRH release.

4.Mathematical results



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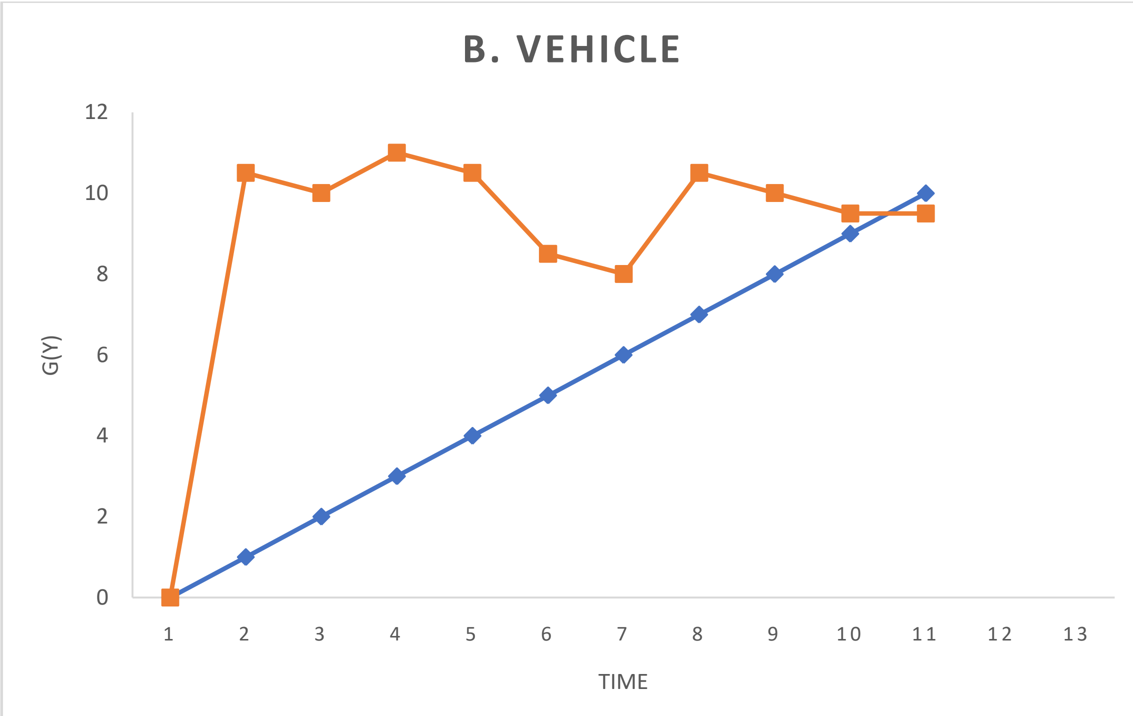

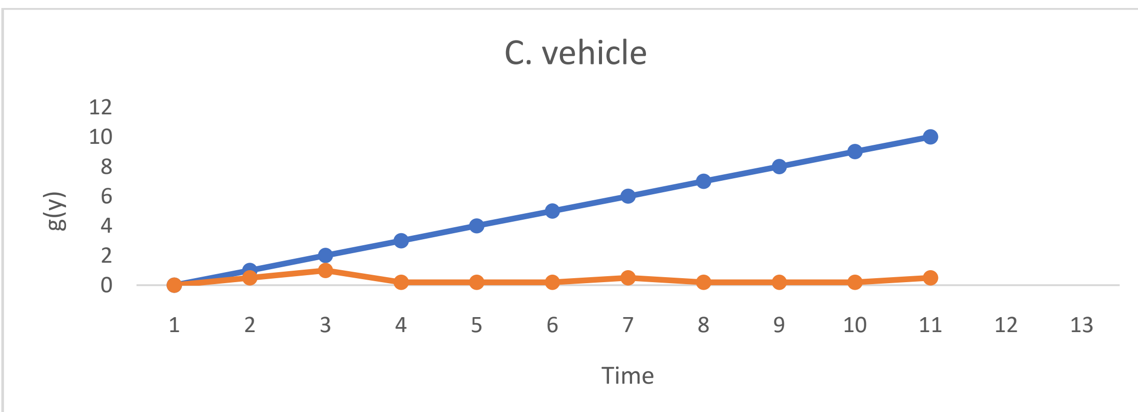

5.Conclusion

The results from this study indicate that a nonovarian source of E_2 , namely neuroestradiol, stimulates GnRH release. Moreover, the augmentation of GnRH release by neuroestradiol, locally synthesized in the median eminence, is an integral part of the positive feedback effects of E_2. The skewness of the logarithm of data shiuld be greater than zero normal, so it could not be accepted as the best.Finally, we conclude that a mathematical model is coinciding with application part and conclusion is compared with medical field. This paper will be very useful for medical field in future.

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Conflict of Interests

The authors declare that there is no conflict of interests.

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