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EFFECT OF PHYLLANTHUS AMARUS ON BREEDING EFFICIENCY OF FEMALE ALBINO RATS

H. E. ETTA, P. B.UDOH, B. O. ASUQUO, and B. OKON.

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ABSTRACT

Effect of *P. amarus* whole plant extract on breeding efficiency of female albino rate was studied. A total of twenty four (24) sexually matured female albino rats were treated with different concentrations of the ethanol extract of the whole plant of *P. amarus*. The female rats were mated with normal male rats of reproductive age after every administration. The different concentrations of the extract served as treatment. Under Complete Randomized Design (CRD), parameters studied were growth rate, litter sizes and weights at birth and weaning. Dominant Lethal Mutation Index and conception rates were also calculated with appropriate formulae. The result showed significant ($p<0.05$) reduction in the litter size at birth and weaning, due to administered doses of the extract. Litter weight at birth showed no significant ($p>0.05$) different. No runts or stillbirths were recorded. There was no significant ($p>0.05$) change in body weight of extract fed (treated) animals indicating no alteration in general metabolic status. Conception rates were negatively correlated with doses of treatment, with higher doses showing lower rates. Dominant Lethal Mutation index showed increase in Mutation with increase in concentration of extract. Pre-weaning litter sizes remained the same as litter size at birth, indicating that there was no mortality. This study suggests that a component or components of the herb. *P. amarus* may affect the internal milieu that governs breeding efficiency in female albino rats.

KEYWORDS: *Phyllanthus amarus*; breeding efficiency; female albino rats.

INTRODUCTION

There is so much being said about this wonder herb *Phyllanthus amarus* that one is forced to wonder if medical science has finally found the cure for all ailments (Lui and Huang, 2001). Infusions, teas, tablets and capsules of *Phyllanthus amarus*, are being consumed world wide (Srivdya *et al*, 1995) to treat a broad spectrum of disorders which include HIV (Japan), kidney and Gall stones (Spain), Colic, Malaria, Flu, Tumours and Jaundice (Brazil) (Thyagarajan *et al*, 1998). Here in Nigeria, *P. amarus* is used to treat malaria, diabetes, mental disorders and as an abortifacient drug (Adedapo, *et al* 2003).

Based on its various uses, the effect of the herb on the breeding efficiency of female albino rats was studied. Breeding efficiency encompasses a wide range of characteristics. How well an animal nurtures and cares for its young before and after birth up to the weaning age is termed Breeding Efficiency. (Dalton, 1982).

MATERIAL AND METHODS

The experiment was carried out in the Zoology experimental animal house of the University of Calabar. Twenty for (24) female and twelve (12) male sexually matured colony bred albino rats weighing between 120g and 150g, were used for this research. Three doses of the *P. amarus* extract was fed intraperitonially to the female rats in three treatment groups. The doses were 100mg/kg bw for treatment. Gp 1. 150mg/kg bw for treatment Gp II. 200mg/kg bw for treatment Gp. III. The control female rats in treatment Gp IV had no extract administered to them. *Phyllanthus amarus* plant was harvested from a farm in Calabar South LGA of Cross River State. They were air-dried for three days at room temperature and ground to powder in a manual grinder. A fixed quantity of 10g of the powder was dissolved in 10ml ethanol and allowed to stand for 48hrs. After which the solution was sieved and allowed to stand for another 48hrs to evaporate the ethanol completely. This was then used to prepare the three dosages of the extract on the basis of the body weight of the rats. Six female and three male albino rats were assigned per treatment under completely Randomized Design (CRD) arrangement.

After a two-week acclimatization period, the female rats within each treatment group were given the extract intraperitionially for a period of 15 days before mating for the first litter parameters. Female rats were mated to normal males within the treatment group at a ratio of 2:1 (female: male) for three days to ensure copulation. A parturition period of 21 days was allowed before the litter sizes and weights at birth were recorded. The conception rates of the female rats were calculated after pregnancy was confirmed.

A total of three litters (parities) were studied using the same mating arrangement. Three female rats from each group and the control were sacrificed 14 days after the extract was administered to the last parity. This was to count implantations on the horns of the uteri to determine the dominant lethal mutation index. The following formulae were used to calculate the corresponding parameters:

Conception rates:

$$\frac{\text{No. of preg. Females}}{\text{Total No. of female mated}} \times \frac{100}{1}$$

(Ostle, 1996).

Absolute growth rate:

$$\frac{Wi - Wj}{T}$$

Where Wi = final wt.
Wj = initial wt.
T = time under observation (days)

(Mullan, 2001)

D.L.M.I: -

$$1 - \frac{\text{Mean life implant in treated gp}}{\text{Mean life implant in control gp.}}$$

(Montgomery, 1976)

The analytical design used for this work was the complete randomized design (CRD) using the linear model;

$$Yij = \mu + Tj + eij$$

Where:

Yij represents any individual observation
μ represents the overall mean
Tj represents the treatment mean
Eij represent the experimental error

(Obi, 2002).

H. E. Etta, Department. of Genetics and Biotechnology, University of Calabar, Nigeria
P. B. Udoh, Department of Environmental Biology and Zoology, University of Calabar Nigeria
B. O. Asuquo, Department. of Animal Science, University of Calabar, Calabar, Nigeria
B. Okon, Department of Animal Science, University of Calabar, Calabar, Nigeria

Analysis of variance at 5% ($p<0.05$) probability was used to analyze data collected on the body weight of treated rats, litter weight and size at birth and at weaning. Level of significance were tested using least significance difference (LSD) technique. Students t-test was used to test for significance among the dominant lethal mutation indices.

RESULTS AND DISCUSSIONS

Absolute growth rate, conception rate (%) and dominant lethal mutation index.

Table I, show these results. From the table, absolute growth rate values of the treated rats show that the herb *P. amarus* did not affect their body weights. This trend corresponds with observation of Singh (1990) who reported that the body weight of the rts were not affect when treated with *S. Sesban* seeds to test for fertility control of female rats. Rao and Alice (2001) also had similar results in their research on the contraceptive effects of *P.amarus* in female mice. These may be an indication that herbs that confer anti-fertility effects on female rats do not affect their body weights. Conception rates decreased with increase in doses of extract. Group II rats in the 3rd parity did not conceive at all. These results show the anti implantation effect of *P. amarus* on female albino rats which could be as a result of a component or components in either the roots, or stem or leaves of the herb. The Dominant Lathal Mutation Index result showed increase in mutation with increase in doses of *P. amarus* administered. There was no mutation in the control group (IV). Implantation on the utern horn reduced as the dose was being increased from 100mg/kg bw to 200mg/kg bw.

Table 1: Absolute growth rates (±SE), Conception rates (%) and dominant lithal mutation index

Parameters	Parity 1				Parity 2				Parity			
	100mg/kg	150mg /kg	200mg/kg	0mg/kg	100mg /kg	150mg /kg	200mg /kg	0mg/kg	100mg /kg	150mg /kg	200mg /kg	Omg/kg
Absolute	I	II	III	IV	I	II	III	IV	I	II	III	IV
Growth	0.0067 ±0.3	0.047 ±0.00	0.027 ±0.6	0.053 ±0.3	0.029 ±0.4	0.013 ±0.8	0.021 ±0.7	0.23 ±0.01	0.46 ±0.01	0.43 ±0.5	0.47 ±0.5	0.48 ±0.32
Conception Rate (%)	83.3	83.3	66.67	100.0	66.67	33.3	0.0	100.0	66.7	0.0	33.3	100.0
D.L.M.I.									0.23	0.5	0.76	1.00

Litter size and weight at birth:

On table 2, the result for litter size and weight at birth have been shown. Litter sizes decreased with increase in the doses of the herb administered (100mg/kg bw, 150mg/kg bw and 200mg/kg bw) showing that litter sizes were dependent. This corresponds with investigation of Ghosh and Bhattachanya (2004) on anti implantation activities of *Thespesia* seed extract on female rats. Genetic mutation in the mother rats as a result of the administered herb may have caused this decrease in litter sizes. Litter birth weight also decreases with increase in administered doses. (Table 2).

Table 2: Litter size and weight (g) at birth (MEAN *±SE)

PARITY	GPI		GPII		GPIII		GPIV	
	SIZE	WEIGHT	SIZE	WEIGHT	SIZE	WEIGHT	SIZE	WEIGHT
1.	5.5	47.0	5.0	45.08	4.5	45.0	10.0	56.6
2.	6.0	55.0	5.2	35.0	0.0	0.0	9.3	58.0
3.	7.0	48.02	0.0	0.0	5.4	40.1	8.5	60.02
	X 6.2ab±0.42		3.4a±0.7		3.3a±0.1		9.3b±0.45	

* means followed by same case letters indicate no significance ($p>0.05$)

Litter size and weight at weaning

Table 3 shows these results. There was a steady decrease in size of pups at weaning, which was the same for litter size at birth, thus this could be an indication that the herb dose not contain principles that can harm the pups. The weight at weaning was not dose dependent but the trend obtained as shown on the table could be due to some environmental influence. (Table 3).

Table 3: Litter size and weight (g) at birth (MEAN *±SE)

PARITY	GPI		GPII		GPIII		GPIV	
	SIZE	WEIGHT	SIZE	WEIGHT	SIZE	WEIGHT	SIZE	WEIGHT
1.	5.5	178.15	5.0	105.51	4.5	129.4	10.0	178.0
2.	6.0	166.6	5.2	104.28	0.0	0.0	9.3	166.8
3.	7.0	133.62	0.0	0.0	5.4	108.3	8.5	145.62
	X 6.2ab±0.42	159.4±1.0	3.4a±0.7	69.93±0.83	3.3a±0.1	79.18a±0.34	9.3b±0.45	163.47b±0.51

SUMMARY AND CONCLUSION

Twenty-four (24) female albino rats were used as mammalian models to demonstrate the effect of the herb *P. amarus* extract on the breeding efficiency of female rats of reproductive age. The result of this study showed no effect of the extract on the body weight of treated rats. Conception rates were affected by doses administered. D.L.M.I. showed a number of early foetal deaths and non-implantation on the horns of the uteri. Litter size at birth and weaning decreased with increase in doses administered. Litter weights at birth were also dose dependent, but at weaning, the litter weight could have been affected by other factors other than the administered herb extract. There was no-pre-weaning mortality of pups.

It is obvious from this study that at high doses, the whole plant extract of *P. amarus* affected the conception rates, dominant lethal mutation index, litter size and birth weight of female albino rats. A component or components of the extracts could have altered the normal ovarian cycle of the female rats hampering implantations on the uterine horns, and reducing rates of conception which then affected both litter sizes and birth weight of rats that successfully kindled.

It then appears that if the herb extract of *P. amarus* could reduce litter sizes in the female albino rats from a normal size of about 12 to 4, then it may also prevent conception in larger laboratory animals.

Thus this research project can therefore be used as a basis for further studies and chemical trials of the herbs on higher mammals like guinea pigs and monkeys to ascertain tolerable doses for treating particular ailments.

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