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ANTI-INFERTILITY ACTION OF CURCUMA ANGUSTIFOLIA ROXB. ON SPERM PARAMETERS IN WISTAR ALBINO RATS.

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ABSTRACTAIM

Experiment has been carried out on Anti-infertility action of *Curcuma angustifolia* Roxb. onSperm parameters in Wistar albino rats. **Materials and Methods:** Rats were administered with emulsified neem oil for 15 days followed by 45 days administration of a test drug in the dosage of 1080 mg/kg and 2160 mg/kg. Change in Sperm parameters,organ and body weight along with histopathological changes has been evaluated. **Result:** There was a significant increase in sperm count,sperm morphology and body weight gain in *Curcuma angustifolia* Roxb. treated group($P < 0.01$). Significant changes are not observed inOrgan weight and histopathology reports. **Conclusion:** The result obtained from the current investigation shows that *Curcuma angustifolia* Roxb. isa good candidate for the management of Male infertility in terms of improving sperm count and body weight and correcting sperm morphology.

KEYWORDS: Male infertility; Tavaksheera; *Curcuma angustifolia* Roxb. , *Marantaarundinacea* L.

INTRODUCTION

Infertility is defined as a disease of male or female reproductive system defined as failure to achieve a pregnancy after 12 months or more of regular unprotected sexual intercourse. According to WHO estimates about 48 million couples and 186 million individuals live with infertility globally. In the male reproductive system problems are due to problems in ejection of semen, absence or low sperm count, or abnormal shape(morphology) and movement (motility) of the sperm.

Current treatment for male infertility in contemporary science involves assisted reproduction and specifically intracytoplasmic sperm injection. (ICSI) and involvement of techniques like scrotal ultrasound, hormone testing, genetic tools, testicular biopsy etc. So there is a need to look into another option like *Rasayana and Vajikarana* drugs.

Tavaksheera of botanical identity *Curcuma angustifolia* Roxb. is mentioned in the majority of Nighantus is found to have *balyā,vrishyā and brihmaṇa* action. It is included in *Rasayana* and Vajīkaraṇa formulations like *vrishyā gutikā, Apathyakara yoga* etc.

Even though there is a difference in opinion about botanical source of *Tavakshīra*, as another drug named *Maranta arundinacea* L. is used as source plant of *Tavakshīra* which is a cultivated variety, *Curcuma angustifolia* Roxb. had been chosen as it grows wild and it could be easily cultivated.

METHODOLOGY

Collection of Plant material and its Authentication

For the study *Curcuma angustifolia* Roxb. has been collected from the germplasm accessions of CTCRI Trivandrum and authenticated. Emulsified neem oil was brought from the local market.

Animal Model

Rats which are healthy and sexually matured Wistar albino rats weighing 150-250 grams were selected. They were kept in ventilated animal houses and have been fed with rat feed. They were allowed for unrestricted access to tap water and ad libitum.

Rhizome powder Preparation

2kg botanically identified fresh rhizome was collected during the month of January 2021 and they were dried in shade for 7 days and made into small slices and sun dried for one day and they were powdered in pulveriser, packed in an airtight container and utilised for anatomical, pharmacognostical and experimental studies. The drug which was powdered with a mesh size of 500-um was utilised for pharmacognostical study and made fine powdered the drug through a 300-um mesh size was utilised for experimental studies.

Selection of animals, grouping and Treatment

Healthy male Wistar albino rats were grouped into 4 different categories, six rats in each group. Group I was been administered with Normal saline and treated as normal control group. Group II administered with Emulsified Neem Oil and served as infertility induced group for 15 days. Group III administered with ENO for 15 days and from 16th day churna of *Curcuma angustifolia* Roxb. was given in single dose for 45 days. Group IV was given with ENO on 15 days and from 16th day churna of *Curcuma angustifolia* Roxb. in double dose was administered for 45 days. Trial drug was administered for group 3 and group 4 for 60 days as suspension with the help of feeding needle.

Experimentation

After 15th day and 60th day of drug administration for group two,group one,three and four, animals were weighed and given anaesthetic ether for general anaesthesia. After anesthetization an incision was put in the inguinal region and cauda epididymal tissue was been identified. The Cauda epididymal tissue was excised out carefully and it has been transferred to normal saline (0. 5 ml) and the tissue was gently teased with the help of forceps in order to liberate the spermatozoa. Cauda epididymis suspension was been incubated at 38 ℃ for 5 minutes before testing and was examined for sperm count,motility and sperm morphology assessment,organ and body weight was alsoassessed.

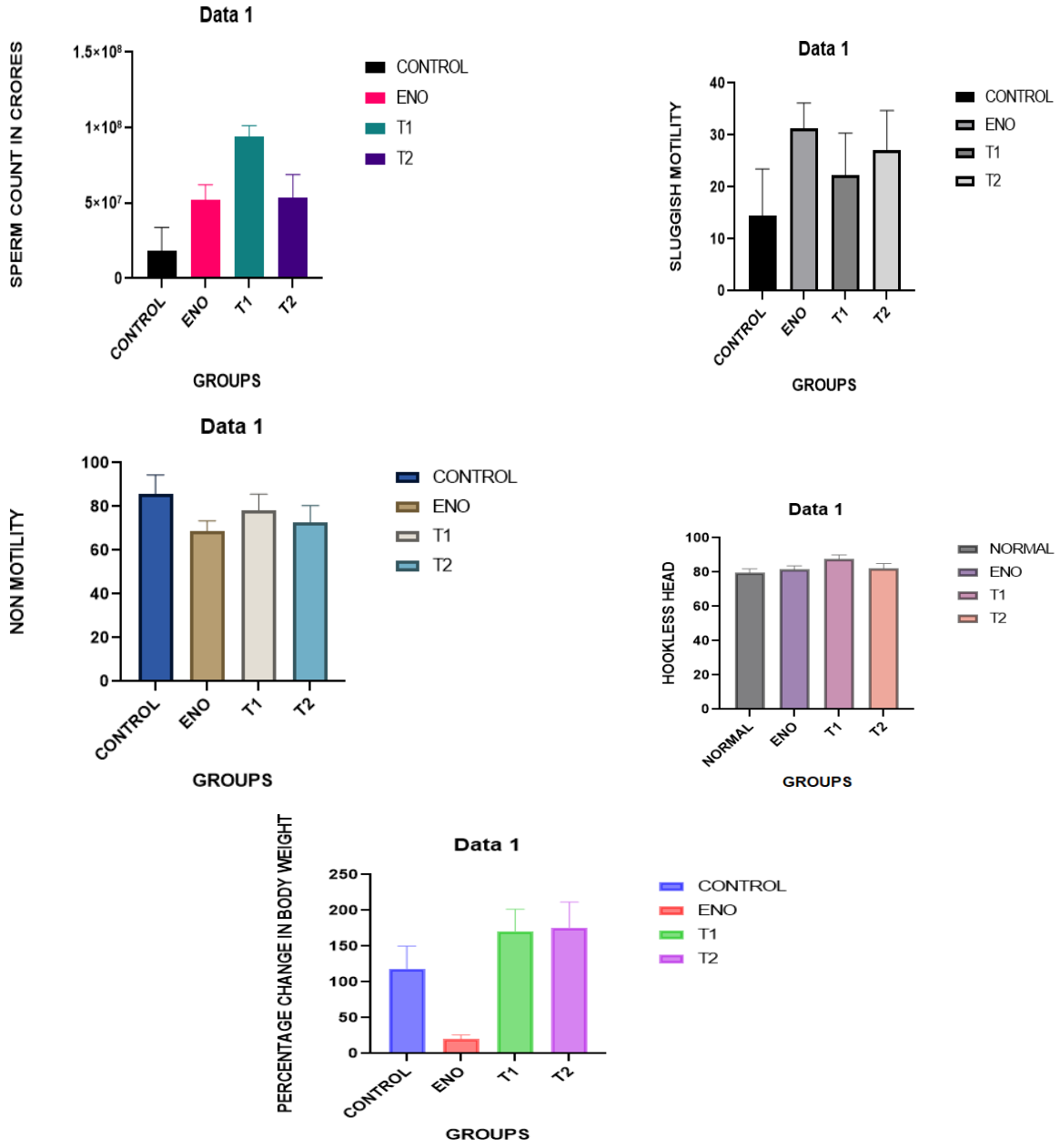
Statistical findings

One-way ANOVA with Dunnett's post-test was performed using GraphPad Prism for Windows to compare the treated groups with control group. Differences were consideredsignificantly when $P < 0.05$.

RESULTS

GROUPS PARAMETERS		Normal control MEAN±SEM	EMULSIFIED NEEM OIL MEAN± SEM	TI MEAN± SEM	T2 MEAN± SEM
SPERMCOUNT	Spermcount	1. 84 ± 0. 62	5. 20 ± 0. 41** 182. 60↑@	9. 31± 0. 29**, 80. 57↑#	5. 37±0. 60, 3. 26,↑#
SPERM MOTILITY	Active motility	00	00	00	00
	Sluggishmotility	14. 5± 3. 66	31. 33± 1. 96** 53. 71↑@	21. 5±2. 91 -31. 37↓#	27. 16± 3. 08 -2. 64↓#
	Non motility	85. 5± 3. 66	68. 66±1. 96** -19. 69↓@	78. 33±2. 97 14. 08↑#	72. 83±3. 08 6. 07↑#
	Normal morphology	79. 66±0. 91	81. 5±0. 88 2. 30↑@	87±0. 85** 6. 74↑#	81. 66±1. 11 0. 19↑#
SPERM MORPHOLOGY	Amorphoushead	1. 66±0. 33	1. 66±0. 33 No change	1. 66±0. 33 No change	1. 66±0. 33 No change
	Hooklesshead	16±0. 57	14±1. 06 -12. 5↓@	10. 16±0. 54** -27. 42↓#	14±0. 93 No change
	Curled tail	0. 66±0. 21	1. 83±0. 30** 177. 27↑@	1. 33±0. 21 -27. 32↓#	1. 5±0. 22 -18. 03↓#
	Absent tail	2±0. 25	1±0. 25* -50↓@	0. 16±0. 16 -84↓#	1. 16±0. 30 16↑#
ORGAN WEIGHT	Testis weight	2. 54±0. 15	2. 79±0. 13 9. 84↑@	2. 83±0. 17 1. 43↑#	3. 17±0. 31 12. 54↑#
	Seminalvesicle weight	0. 54±0. 093	0. 61±0. 09 12. 96↑@	0. 68±0. 10 11. 47↑#	0. 86±0. 17 40. 98↑#
	Prostateweight	0. 61±0. 09	0. 61±0. 03 No change	0. 76±0. 02 24. 59↑#	0. 66±0. 03 8. 19↑#
BODY WEIGHT	Body weight	118. 66±12. 85	20. 33±2. 36** -82. 86↓	150. 89±19. 59** 642. 20	176. 24±14. 43** 766. 89

DATA : MEAN±SEM,P>0. 05, *P<0. 05,P<0. 01**



DISCUSSION

For maintaining healthy spermatozoa seminal quality has got a crucial role. Male infertility is a rising concern in this modern era with increased global decline in semen quality. Decrease in semen quality is a major contributing factor to infertility. Studies Studies in this area have postulated different factors, like exposure to chemicals from industries, usage of pesticides, heavy metals, obesity, alcoholism, tobacco smoking, sedentary lifestyles, poor nutrition intake, oxidative stress, physiological factors, genetic factors etc.

Sperm count

There is a significant increase in sperm count in Trial drug *Curcuma angustifolia* Roxb. in the single dose group than T2 group. The increase in sperm count and quality is correlated with an increase in testosterone levels and less oxidative damage.

Sperm motility

As the semen is collected from the cauda epididymal region it will be negligible for Active motility.

There is significant increase in sluggish motility in the Emulsified neem oil group which shows that consumption of emulsified neem oil shows significant increase in sluggish motility whereas the sluggish motility in T1 and T2 group has reduced.

Sperm motility and morphology parameters are very important in determining sperm characteristics. The alteration in sperm parameters can be attributed to direct effect on the testicular tissue which leads to reproductive dysfunction such as reduced sperm count, motility and morphology. Here intake of *Curcuma angustifolia* Roxb. in single and double dose has reduced sluggish motility.

There is also significant increase in non-motility in

Curcuma angustifolia Roxb. single dose and double dose group. The decrease in sperm count and quality is correlated with decrease in testosterone levels and oxidative damage as evident from suppressed antioxidant enzyme activities.

Sperm morphology

There are reversible changes in normal morphology of the sperm in a single dose of *Curcuma angustifolia* Roxb. group when compared to Emulsified neem oil group which was found to be significant. There was a significant increase in the hookless head of the sperm which reveals that morphology related to the head portion has been corrected.

Discussion on Organ weight

There is non significant increase in testis and seminal vesicle organ weight and no change in prostate weight of emulsified neem oil administered group when compared with normal control. There is non significant increase in organ weight in the T1(*Curcuma angustifolia* Roxb. single dose) and T2(*Curcuma angustifolia* Roxb. double dose)group when compared with the Emulsified neem oil group.

Change in Body Weight Gain

There is a significant increase in body weight in the Emulsified Neem Oil treated group when compared with normal control groups. There is significant increase in body weight in Single dose and Double dose of trial drug *Curcuma angustifolia* Roxb.

There are some studies which show no relation between obesity and sperm concentration, motility or morphology in men, even when serum reproductive hormone levels are altered.

In this study body weight has been significantly increased in Emulsified neem oil group,T1 and T2 group which reduced sperm motility.

Histopathological changes

Histopathology involves diagnosis and study of diseases related to the tissues, and it alsinvolves examining tissues and/or cells under a microscope. It is helpful in knowing the correct diagnosis and about the toxicity level of the samples tested.

- **Testis**

Very minimal histological changes are seen in T1,T2,T3. (These histological changes usually seen in very few tubules of normal animals also).

Compared with normal, there are no significant histological changes between the groups. T2 shows slightly more elongated spermatids in 1 slide.

- **Seminal Vesicle**

No histological changes like apoptotic cells in epithelium, inflammation and reduced secretions seen in any of the slides of four groups.

- **Prostate**

All groups including normal show very minimal histological changes.

CONCLUSION

1. The in-vivo study proved that the drug *Curcuma angustifolia* Roxb. is having actionon increasing Sperm Count and correcting the Sperm morphology which specifies thatthe drug possesses Vrishya action.
2. The trial drug did not show a significant decrease on Sluggish motility and also showed a non-significant increase on non-motility of sperms. . So we can conclude that there is no observable improvement with respect to the sperm motility.
3. The ponderal changes show that the drug is having Brihmana action.