IAMJ

INTERNATIONAL AYURVEDIC MEDICAL JOURNAL

Research Article ISSN: 2320-5091 Impact Factor: 6.719

EXPERIMENTAL EVALUATION OF THE COMPARATIVE EFFECTS OF PANASA (ARTOCARPUS HETEROPHYLLUS LAM.) PAKWA PHALA AND BEEJA MAJJA ON SPERMATOGENESIS IN WISTAR ALBINO RATS.

Greeshma K.V[1], Mohammed Faisal[2], Sudhakar Bhat[3]

1.PG Scholar, 2. Associate professor PG Department of Dravyaguna, 3. Research officer
Sri Dharmasthala Manjunatheshwara College of Ayurveda Hospital and Research Centre, Kuthpady, Udupi

Corresponding Author: greeshmakvmpm@gmail.com

https://doi.org/10.46607/iamj02p9012024

(Published Online: November 2024)

Open Access

Article Received: 20/10/2024 - **Peer Reviewed:** 17/11/2024 - **Accepted for Publication:** 24/11/2024.

Check for updates

ABSTRACT

Ayurveda is a holistic medicinal system from India that emphasises the balance of mind, body, and spirit for health maintenance. It heavily relies on local flora, herbs, and natural remedies, focusing on personalised treatments. One significant plant in Ayurvedic medicine is ***Artocarpus heterophyllus* Lam,** commonly known as jackfruit or '*Panasa'* in Sanskrit. This plant is widely utilised for its culinary and medicinal properties, including applications such as ***Brmhana, Mamsavardhaka, Balya, Sukrala***, and ***Vrana Ropana***. Jackfruit is rich in proteins, fats, iron, carbohydrates, minerals, calcium, thiamine, niacin, riboflavin, vitamin C, and vitamin A.

Moreover, many classical texts have documented the ***Vrshya*** action of ***Panasa Pakwa Phala*** and ***Beeja Majja***. This study aimed to conduct a comparative experimental evaluation of the ***Vrshya*** effects of ***Panasa Pakwa Phala*** and ***Beeja Majja*** on spermatogenesis. **Objective:** Comparative Experimental study to evaluate Spermatogenic activity of *Pakwa Phala* (Fruit) and *Beeja Majja* (Seed) of *Panasa* (*Artocarpus heterophyllus* Lam.).**Materials and method**: The collection of *Artocarpus heterophyllus* fruits and seeds was done from the natural habitat of the Udupi district and authenticated. The experimental study assessed the comparative spermatogenic activity of *Panasa Pakwa Phala* and *Beeja Majja* upon internal administration. **Result and Discussion:** In the experimental study, rats given *Panasa Pakwa Phala* exhibited a significant increase in body weight, a non-significant increase

in sperm count, sluggish motility, and a decrease in non-motile sperm. Notably, there was a substantial reduction in amorphous head sperm and a non-significant rise in hookless sperm.
Conversely, rats treated with *Panasa Beeja* also showed increased body weight but had different results in sperm motility and morphology, with a significant decrease in normal sperm morphology. This activity profile indicates the presence of a spermatogenesis effect more in the test drug *Panasa Pakwa Phala than in Panasa Beeja*. **Conclusion:** The experimental study demonstrated statistically significant results regarding the internal use of *Panasa Pakwa Phala* and *Beeja Majja*, showing positive effects on various parameters. The spermatogenesis effect is more important with the Panasa Pakwa Phala test drug than *Panasa Beeja*.

Keywords: *Panasa*; *Vrshya*; Spermatogenesis; Experimental study

INTRODUCTION

Over the centuries, Ayurveda has evolved and diversified, incorporating knowledge from various cultures and regions. Its principles have influenced traditional medicine and complementary and alternative therapies worldwide. The emphasis on natural remedies, personalised care, and preventive health measures resonates with many individuals seeking holistic well-being. Evidence-based medicine is the cornerstone of modern decisions based on the best available evidence from well-designed and conducted research. Experimental trials play a crucial role in this process by rigorously testing the efficacy and safety of drugs, treatments, and interventions before they are introduced into clinical practice. Ayurvedic principles have seeped into many households worldwide, shaping everyday practices such as cooking with herbs and spices, practising yoga and meditation, and relying on natural remedies. Its global popularity highlights its enduring relevance and the recognition of its contributions to traditional medicine over the centuries. Nowadays, it has become essential to prove the efficacy of drugs in any medical condition through experiments and trials. Fertility is a crucial aspect of human life, marking the transition to parenthood, which begins long before conception. It involves ensuring the healthiest possible child in every respect. It is believed that having a child is essential for overcoming *Pitruruna*. The Acharyas have emphasised the significance of fertility by referring to "*Bahupraja Purusha.*"[1] Today, many people worldwide are experiencing issues related to *Shukra Dusti*. According to Ayurveda, fertility depends on four key factors: *Ritu, Kshetra, Ambu*, and *Beeja*. Any issues with these factors can lead to infertility. In Ayurveda, two primary therapies are emphasised for disease prevention and health maintenance, i.e., *Rasayana* and *Vajikarana*. *Rasayana* focuses on rejuvenating the seven dhatus, while *Vajikarana* specifically addresses the *Shukra dhatu*. *Vajikarana Tantra* is one of the branches of Ashtanga Ayurveda that promotes sexual health and treats sexual disorders. The substances used in these therapies are known as *Vrshya Dravyas*, and there are many drugs classified under *Vrshya Karma*. One such substance is Jackfruit, called *Panasa* in classical texts. [2] Botanically, it is identified as *Artocarpus heterophyllus* Lam. and belongs to the Moraceae family. [3] It is mentioned in the Puranas, as well as in the Brihatrayees and Nighantus. *Panasa* has qualities such as *Madhura rasa, Snigdha guna, Sheeta veerya*, and *Madhura vipaka*. It is recognised for properties like *Brmhana, Mamsavrddhikara, Balya, Sukrala*, and *Vrana ropana*. [4]Additionally, nearly all Acharyas have acknowledged the *Vrshya* action of both *Panasa Pakwa Phala* and *Beeja Majja*. Jackfruit contains Protein, Fat, Iron, Carbohydrates, Mineral, Calcium, Thiamine, Niacin, Riboflavin, Vitamin C, Vitamin A. [5]

MATERIALS AND METHODS

1. Drug collection:

Panasa (*Artocarpus heterophyllus* Lam.) and *Beeja* (Seed) will be collected from places in and around Udupi.

2. Experimental study:

Experimentation is essential to the scientific method, enabling scientists to test hypotheses, observe phenomena, and gather empirical evidence that underpins scientific knowledge. Integrating scientific experimentation with traditional knowledge systems like Ayurveda can enhance credibility, broaden acceptance, and deepen understanding. While Ayurveda has a rich history of empirical wisdom, experimental studies can validate its treatments, foster trust among modern practitioners, and drive innovation in therapies. *Panasa Pakwa Phala* and *Panasa Beeja* are the focus of the present study, which has been described as *Vrshya* by various Ayurveda texts. Hence, a comparative experimental study is done to evaluate the spermatogenesis action of *Panasa Pakwa Phala* and its *Beeja majja*.

AIM:

To evaluate the spermatogenic activity of *Panasa Pakwa Phala* and *Beeja Majja* through an experimental animal study.

OBJECTIVES:

1. A comparative experimental study to evaluate the efficacy of *Swarasa* of *Panasa Pakwa Phala* and *Beeja majja* for Spermatogenic activity.
2. To assess the estimation of Sperm motility, count and morphology.
3. To assess the histopathological changes in the Testis, Seminal vesicle and Prostate.

PLAN OF STUDY

Artocarpus heterophyllus, as mentioned above, is claimed to possess *Vrshya* by various texts. Hence, the present study was undertaken to evaluate the experiment's basis. The effects on the different organs like the Testis, Seminal vesicle and Prostate were studied through histopathological studies and assessment of changes in body weight and estimation of sperm motility, count and Morphology.

Experimental Animals:

The Wistar male albino rats were obtained from the Animal house attached to the pharmacology laboratory of SDM Research Center Udupi. The experimental protocol was approved by the institutional animal ethical committee (SDMCRA/IAEC/SU-D-2 on 11/09/2022). Rats were fed a standard rat diet and water and libitum throughout the study. They were acclimatised to the laboratory conditions for two weeks before experimentation. The experimental rats were maintained on a 12:12h light and dark cycle, with a temperature of 25°C and a relative humidity of approximately 50%.

INCLUSION CRITERIA:

Healthy male albino rats weighing 150g and 200g were randomly selected for the study.

EXCLUSION CRITERIA:

- Rats are below 150 grams and above 200 grams.
- Rats which are diseased.
- Rats were subjected to other experiments.

Animal grouping:

Table 1: Animal grouping

Sl No:	Group	No: of rats	Drug	Purpose
1	Normal control	8	No drug	To observe the changes occurring in groups and also to compare with other groups
2	Standard	8	Testosterone propionate	To assess the spermatogenic activity
3	Test drug 1	8	*Panasa Pakwa Phala*	To assess the spermatogenic activity
4	Test drug 2	8	*Panasa Beeja*	To assess the spermatogenic activity

TEST DRUG:

Raw drugs were authenticated by evaluating their quality using various parameters, such as their Phar-

macognostic characters, which were done at SDM Research for Ayurveda and Ayurvedic Sciences, Udupi.

Dose fixation for experimental groups: According to the classical textbook of Bhaishajya Kalpana, the dose of *Panasa Pakwa Phala Swarasa* for human use is ½ *Pala* (24ml), and the dose of *Panasa Beeja Churna* for human use is 1 *Karsha* (12gm). [6] The rat dose was calculated from the adult dose based on body surface area ratio by referring to Paget and Barn's table—1964.

Drug test: Oral

1) ***Phala:***

Human Dose= ½ *Pala* (24 ml)

Dose fixation = Human dose x 0.018 x 5

= 24 x 0.018 x 5

= 2.16 ml/kg rat body weight

2) ***Beeja:***

Human Dose= 1 Karsha (12 g)

Dose fixation = Human dose x 0.018 x 5

= 12 x 0.018 x 5

= 0.00108g/kg rat body weight

Mode of administration:

The calculated dose was 2.16ml/kg body weight for *Pakwa Phala* and for *Beeja* 2.16 gm with 20 ml of distilled water made into a stock solution, considered a therapeutic dose (TED). The test drugs were administered orally with the help of a feeding needle.

Duration of the study:

The dose will be given for 60 days.

EXPERIMENTAL PROCEDURE:

The experiments were performed in four groups of eight rats. The first group was kept as a control group, and they administered water and a regular diet. The second group was kept as a standard and administered Testosterone propionate. The third group was kept as the first test drug and administered *Panasa Pakwa Phala*. The fourth group was kept as the second test drug and administered *Panasa Beeja*.

After 60 days of drug administration, animals of four groups were weighed and given ether for general anaesthesia. After anaesthetisation, an incision was made in the inguinal region, and cauda epididymal tissue was identified. Cauda epididymal tissue was exercising carefully and transferred to normal saline (0.5 ml), and it was teased gently with forces to liberate the spermatozoa. The cauda epididymis suspension was incubated at 38 ℃ for 5 minutes before testing and examined for sperm count, motility, and morphology assessment.

STATISTICAL ANALYSIS: [7]

The obtained data are expressed in Mean ± SEM. The data were analysed using a one-way ANOVA followed by Dunnett's multiple t-test. Significance levels were determined and interpreted with Graph Pad 3 Instat software. A p-value of less than 0.05 was considered statistically significant.

OBSERVATIONS AND RESULTS:

Table No: 2 Effect of *Panasa* and *Panasa Beeja* on weight

Groups	Body Weight	Testis Absolute Weight /CETSMEAN±SEM	Prostate Absolute Weight /CETSMEAN±SEM	Seminal Vesicles Absolute Weight /CETSMEAN±SEM
Control	25.49± 3.45	2.66±0.07	0.49±0.02	0.48±0.01
Standard	1.46±3.64**	3.09±0.06*	0.86±0.12**	0.85±0.08**
Test 1	66.15±7.29**	3.00±0.09	0.65±0.05	0.86±0.05**
Test 2	51.84±9.23*	2.60±0.14	0.68±0.07	0.74±0.06*

Data MEAN ± SEM, *P<0.05,*P<0.01,

EFFECT OF TEST DRUG ON SPERMATOGENESIS

1. **Sperm Count:**

Table No: 3 Effect of *Panasa* and *Panasa Beeja* on Sperm Count

GROUP	Sperm count million/CETSMEAN±SEM	% CHANGE
CONTROL	2.38 ±0.43	
STANDARD	20.02±7.28 **	741.176↑
TEST 1	3.873±0.4005	62.60↑
TEST 2	3.317±0.7037	39.075↑

Data MEAN ± SEM, **P<0.01

C The ETS-Caudal epididymal tissue suspension

2. **Sperm Motility**

Table No. Effect of *Panasa* and *Panasa Beeja* on Sluggish Motility and Non-Motility

GROUP	Sluggish Motility/CETSMEAN±SEM	No Motility /CETSMEAN±SEM
CONTROL	27±1.604	73±1.604
STANDARD	21.875±2.453	78.125±2.453
TEST 1	29.285±2.901	70.714±2.901
TEST 2	24.5714±1.510	75.428±1.510

3. **Sperm Morphology:**

Table No: 5 Effect of *Panasa* and *Panasa Beeja* on Sperm Morphology

GROUP	Normal/ CETSMEAN±SEM	Amorphous Head/ CETSMEAN±SEM	Hookless/ CETSMEAN±SEM	Swollen neck/ CETSMEAN±SEM
CONTROL	85.125±0.8543	1.875±0.2950	13±0.86	0±0.00
STANDARD	84±0.7071	2.25±0.31	13.75±0.88	0±0.00
TEST 1	84.857±1.056	0.71428±0.28*	13.14±0.88	0.42±0.20
TEST 2	79.571±0.7825**	2.142±0.26	17.28±0.74**	0.42±0.20

Data MEAN ± SEM, **P<0.01

Histopathology Report

In the tests, **control (C)** shows no histological changes, with intact seminiferous tubules and germ cells, though one slide shows exfoliation of germ cells into the lumen. **Standard (S)** reveals a slight increase in spermatozoa compared to the control, with no other changes. **Test Drug 1 (T1)** causes germ cells to slough into the lumen and degeneration of tubules with depletion of germ cells, although a slight increase in spermatozoa is noted in some slides. **Test Drug 2 (T2)** also shows exfoliation and degeneration of germ cells with a slight spermatozoon increase in one slide. In the prostate, **control (C)** exhibits no histological changes. **Standard (S)** shows an increase in secretion in two slides compared to the control, while **T1** significantly increases secretion in all slides, suggesting a stimulatory effect. **T2** shows a moderate increase in secretion in two slides.

Control (C) is standard in the seminal vesicle with no histological changes. Both **Standard (S)** and **Test Drug 1 (T1)** show no increase in secretion compared to control, while **Test Drug 2 (T2)** also shows no significant effect on secretion. In summary, **Standard** has a slight positive impact on sperm production and prostate secretion. At the same time, **Test Drugs**

1 and 2 show adverse effects on testicular tissue but minimal effects on prostate and seminal vesicle function.

Photomicrographs section of the Prostate

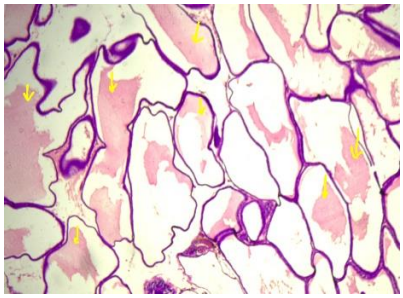

Figure 1 a- Control

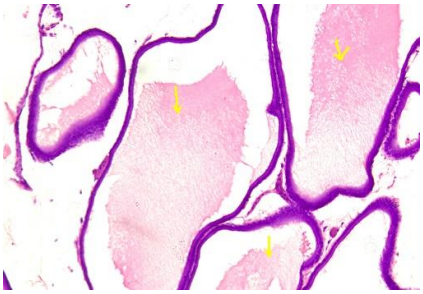

Figure 1 b- Control

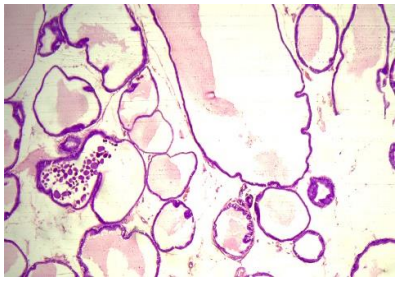

Figure 2 a- Standard

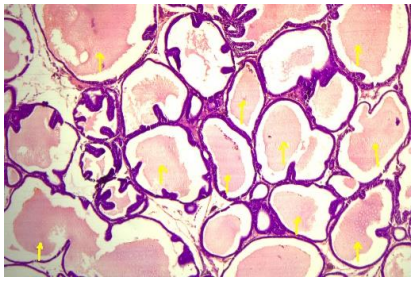

Figure 2 b - Standard

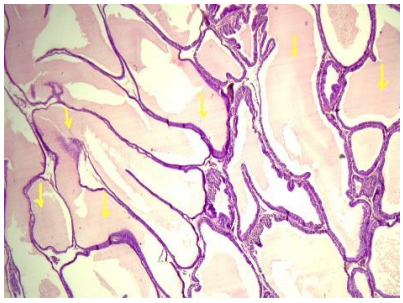

Figure 3 a- Test drug 1

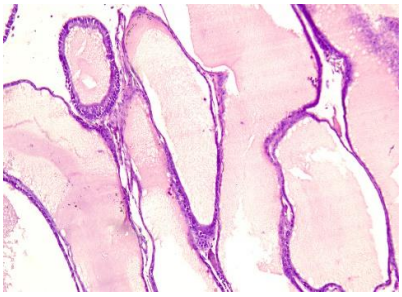

Figure 3 b - Test drug 1

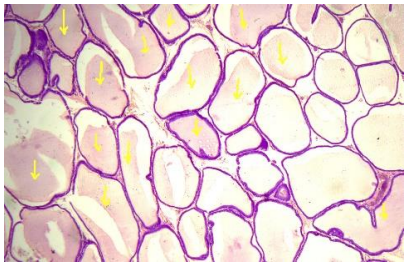

Figure 4 a - Test drug 2

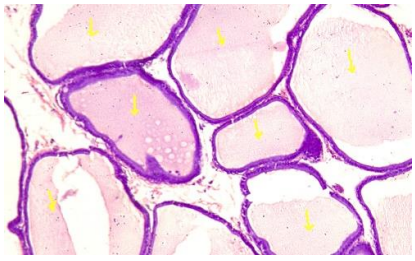

Figure 4 b - Test drug 2

Photomicrographs section of the Seminal vesicle

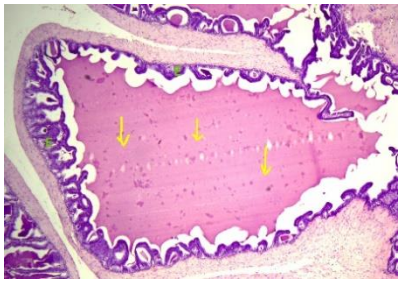

Figure 5 a- Control

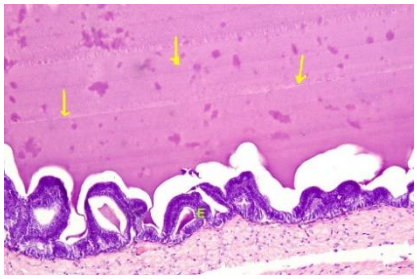

Figure 5 b - Control

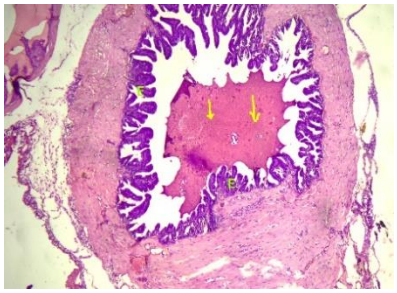

Figure 6 a -Standard

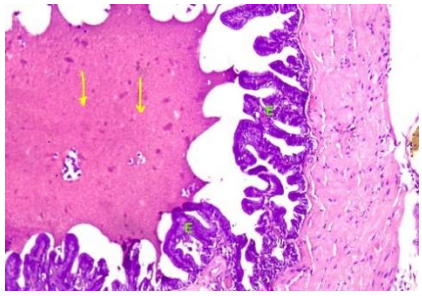

Figure 6 b -Standard

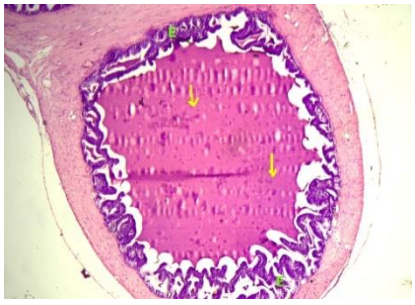

Figure 7 a - Test drug 1

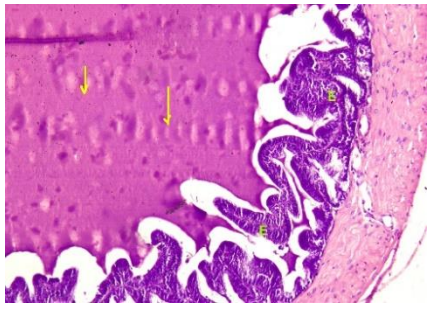

Figure 7 b - Test drug 1

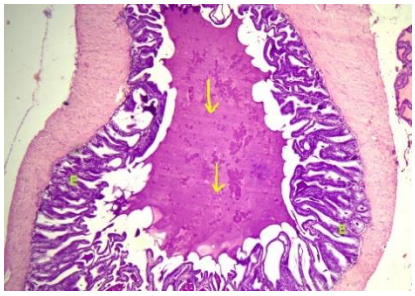

Figure 8 a - Test drug 2

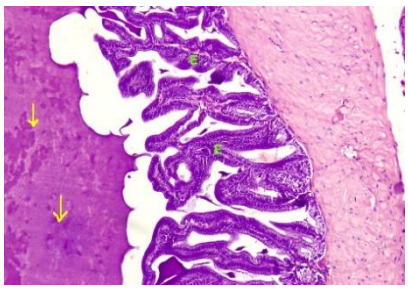

Figure 8 b - Test drug 2

Photomicrographs section of the Testis

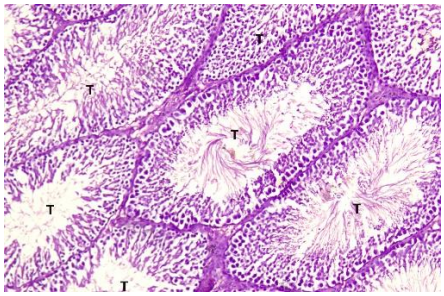

Figure 9 a - Control

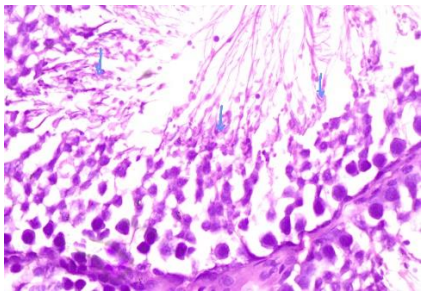

Figure 9 b - Control

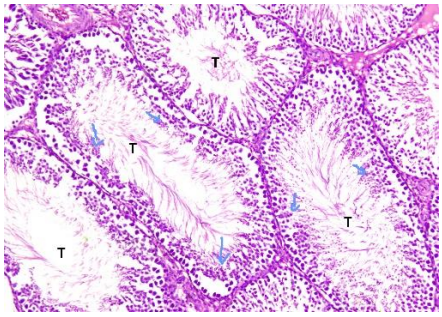

Figure 10 a - Standard

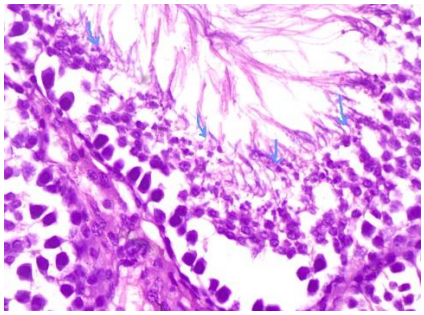

Figure 10 b -Standard

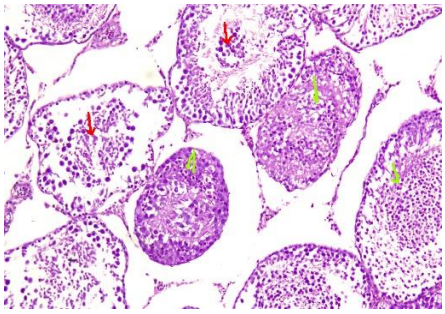

Figure 11 a - Test drug 1

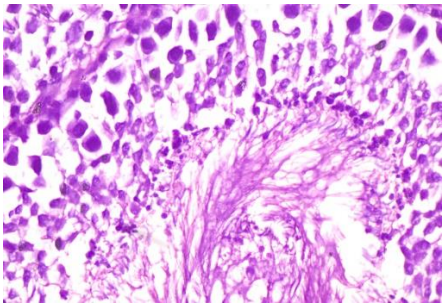

Figure 11 b - Test drug 1

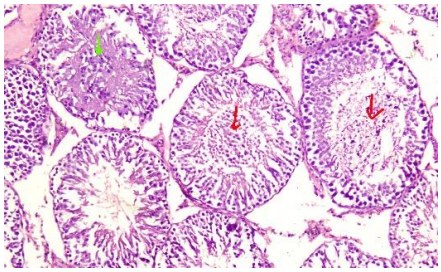

Figure 12 a - Test drug 2

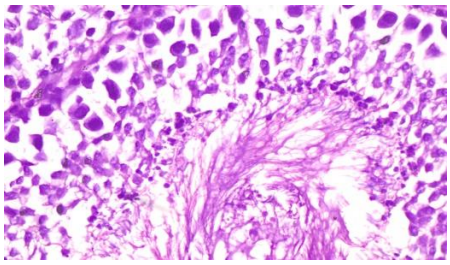

Figure 12 b -Test drug 2

DISCUSSION

During embryo development, primordial germ cells migrate into tests, transforming into immature germ cells known as spermatogonia. These cells are located in two or three layers along the inner surfaces of the seminiferous tubules. To form sperm, spermatogonia undergo mitotic division at puberty, continuously proliferating and differentiating through specific stages. Spermatogenesis is the process by which sperm develops from stem cell-derived spermatogonia. This process involves the proliferation of stem cells into differentiating germ cells, followed by meiosis and the maturation of these cells into spermatozoa. Initially, primary spermatogonia divides into secondary spermatogonia, which then undergoes

meiosis to form spermatocytes and spermatids. These spermatids mature into spermatozoa. The process occurs in distinct stages and is regulated by Sertoli cells, which support and guide germ cell development. Sertoli cells assist in transporting germ cells from the basement membrane to the lumen of the seminiferous tubules. Spermatozoa are released into the lumen through spermiation and are then moved to the epididymis via peristaltic action in the seminiferous tubules. In summary, spermatogenesis is a complex process involving cell division and maturation, supported by Sertoli cells, leading to the release and transport of spermatozoa. This study aimed to assess the effects of *Panasa Pakwa Phala* and *Panasa Beeja* on a spermatogenesis model in Wistar albino rats. The data from each experiment were discussed individually, followed by an effort to correlate the findings to understand the overall study comprehensively.

Sperm analysis:

Administration of Testosterone propionate (the standard) resulted in a significant reduction in body weight, a marked increase in sperm count, and a non-significant decrease in sluggish motility. Additionally, there was a non-significant rise in non-motile sperm and a slight decrease in sperm morphology, along with a non-significant increase in amorphous heads and hookless sperm. In the group of rats treated with *Panasa Pakwa Phala*, there was a significant increase in body weight, alongside a non-significant rise in sperm count and sluggish motility. There was also a non-significant decrease in non-motile sperm and a decline in average sperm morphology. Furthermore, there was a significant reduction in amorphous heads but a non-significant increase in hookless sperm. Rats administered by *Panasa Beeja* showed a substantial increase in body weight, with a non-significant rise in sperm count, a slight decrease in sluggish motility, and a non-significant increase in non-motile sperm. Notably, there was a very significant decrease in average sperm morphology, alongside a non-significant increase in amorphous heads and a very considerable rise in hookless sperm. This activity profile indicates that the *Vrshya* effect is more with the test drug *Panasa Pakwa Phala* than *Panasa Beeja*.

Organ Weight:

The administration of Testosterone propionate (standard) in the group showed a significant increase in testis weight and a very significant increase in the weight of the prostate and seminal vesicles. The parameters related to organ weight showed a non-significant increase in the testis and prostate, a very significant increase in the seminal vesicle, and a slight rise in spermatozoa in the group administered *Panasa Pakwa Phala*. The *Panasa Beeja* administered group showed a non-significant decrease in the weight of the testis, a non-significant increase in the weight of the prostate, and a significant increase in the weight of the seminal vesicle. This elevation might be attributed to the extended study duration, with the rats being treated with group-specific drug for 60 days.

Histopathological study:

Control group rats displayed standard testicular tissue structure, characterised by well-formed seminiferous tubules and moderate levels of spermatogenesis. The seminiferous tubules showed regular glandular activity, and the ventral prostate functioned with active glands. In the testosterone propionate-treated group, there was a slight rise in spermatozoa, but no signs of necrosis, inflammation, or vacuolation were found, and tissue architecture remained unchanged. There was a minor increase in secretion compared to the control group. In the histopathology examination of the test drug *Panasa Pakwa Phala*, increased spermatogenesis was noted in the tests, alongside sloughing of germ cells into the lumen, degeneration of tubules, and a reduction in germ cells. Compared to the control group, spermatozoa levels showed a slight increase. The prostate exhibited no histological alterations such as necrosis, inflammation, or vacuolation, but the secretion increased relative to the control group. The seminar showed no changes in secretion levels. In the test II group of rats treated with *Panasa Beeja*, the test is displayed exfoliation of germ cells into the lumen, degenerated tubules, and a loss of germ cells. The prostate showed an increase in secre-

tion, while the seminal vesicle did not demonstrate any increase in secretion.

Probable mode of action:

The impact of any substance depends on its *Rasa*, *Guna*, *Veerya*, *Vipaka*, and *Prabhava*. Its effectiveness is also influenced by various factors, including potency, the specific organ it targets, timing of administration, delivery method, and intended outcome. Substances that share qualities with *Shukra* can enhance the *Shukra dhatu*. *Panasa* contains *Madhura rasa*, along with *Guru*, *Snigdha Guna*, *Madhura Vipaka*, and *Sheeta Veerya*. *Madhura Rasa* calms *Vata* and nourishes the *Shukra dhatu*. The *Snigdha Guna* offers *Vatahara* and *Vrshya* benefits, essential for *Shukra* formation. *Sheeta veerya* is vital for alleviating *Pittaja Shukra dushti*, helping to relieve burning sensations in the phallus during discharge. Plants are rich in various molecules with significant therapeutic effects. Jackfruit contains phytoconstituents such as alkaloids, carbohydrates, flavonoids, terpenoids, resin, and quinones, with the seeds exceptionally high in alkaloids, carbohydrates, and flavonoids. Jackfruit extract has antioxidant properties vital for sperm proliferation, differentiation, and function. Alkaloids are known for their antioxidant and anti-inflammatory properties, while carbohydrates enhance sperm motility. Flavonoids exhibit antioxidant, anti-apoptotic, and anti-inflammatory effects, improving both spermatogenesis and sperm quality. Terpenoids serve as natural antioxidants, and research indicates they may also boost sperm count. Quinones enhance sperm quality through their antioxidative properties. The likely mechanism behind these effects relates to the antioxidant nature of the present phytochemicals, which are crucial for sperm health. [8]

When examining nutritional content, carbohydrates are a vital energy source necessary for the metabolic processes involved in spermatogenesis. The fruit's higher carbohydrate content than the seeds may provide better energy support. Additionally, fibre promotes digestive health, regulates hormones, aids in detoxification, and supports weight management. By addressing these aspects, fibre creates a favourable environment for optimal spermatogenesis. While the seeds provide essential nutrients, especially proteins vital for sperm development, the fruit's more excellent carbohydrate, fibre, and overall energy content suggests it may offer more comprehensive support for health and reproductive functions, including spermatogenesis.

CONCLUSION

Panasa (*Artocarpus heterophyllus* Lam.) is a tall, evergreen tree in the Moraceae family, referenced in ancient texts like the Puranas, Brihatrayees, and Nighantus. The drug *Panasa* features *Madhura Kashaya Rasa*, *Sheeta veerya*, *Snigdha* and *Guru Guna*, and *Madhura Vipaka*. It is known for its properties, such as *Brmhana*, *Mamsavrddhikara*, *Balya*, *Sukrala*, and *Vrana Ropana*. Notably, all Acharyas recognise the *Vrshya* action of *Panasa Pakwa Phala* and *Beeja*. Experimental studies on rats have shown significant effects of *Panasa Pakwa Phala* and *Panasa Beeja* on spermatogenesis. The group fed with *Panasa Pakwa Phala* demonstrated a more pronounced spermatogenic effect than the group receiving *Panasa Beeja*, mainly showing a moderate increase in sperm count and motility.

Statistical analysis indicated that rats given *Panasa Pakwa Phala* experienced a significant increase in body weight, a non-significant rise in sperm count and sluggish motility, and a slight decrease in non-motile sperm and normal sperm morphology. There was a significant reduction in amorphous heads and a slight increase in hookless sperm. In contrast, rats receiving *Panasa Beeja* also showed a substantial increase in body weight but with a non-significant rise in sperm count, a slight decrease in sluggish motility, and a significant decline in average sperm morphology. Additionally, there was a non-significant rise in amorphous heads and a very substantial increase in hookless sperm. This activity profile suggests that the *Vrshya* effect is more pronounced with *Panasa Pakwa Phala* than *Panasa Beeja*.

Regarding organ weights, the group treated with *Panasa Pakwa Phala* showed a non-significant increase in testis and prostate weights, a significant rise

in seminal vesicle weight, and a slight increase in spermatozoa. Histopathological examination of the *Panasa Pakwa Phala* group indicated enhanced spermatogenesis in the tests, with some germ cells sloughing into the lumen, degenerated tubules, and depletion of germ cells. Compared to the control group, there was a slight rise in spermatozoa. The prostate displayed no histological changes, such as necrosis or inflammation, but increased secretion was observed. The seminal vehicle showed no changes in secretion. The *Panasa Beeja* group exhibited similar histopathological changes in the testis, including germ cell exfoliation and tubule degeneration, while the prostate and seminal vesicle exhibited similar secretion patterns. In summary, the thorough evaluation of sperm count, motility, morphology, and histopathological changes supports the conclusion that *Panasa Pakwa Phala* is more effective than *Panasa Beeja* in promoting spermatogenesis. The enhanced *Vrshya* effect and improved spermatogenic parameters in the *Panasa Pakwa Phala* group highlights its superior efficacy in modulating spermatogenesis.

The unique combination of *Madhura rasa*, *Sheeta veerya*, *Snigdha*, and *Guru Guna* in *Panasa*, especially in its ripe fruit, enhances its *Vrshya* action, promoting effective spermatogenesis and overall reproductive health. *Madhura rasa* helps balance *Vata Dosha* and nourishes the *Shukra Dhatu*. *Snigdha Guna* provides *Vatahara* and *Vrshya* benefits, crucial for *Shukra* formation. The *Sheeta veerya* is essential for mitigating *Pittaja Shukra dushti*, relieving burning sensations in the phallus during discharge. *Vrshya* karma increases the qualities of *Shukra*, further supporting spermatogenesis. *Shukra* shares characteristics with *Panasa*, which indicates that both may facilitate *Vrshya karma*. *Madhura Rasa* is more abundant in the fruit than in the seed, making the *Phala* richer and thus enhancing spermatogenesis more significantly in mature fruit (*Pakwa Phala*). The study concludes that the *Vrshya* effect related to spermatogenesis is considerably more significant with *Panasa Pakwa Phala* than with *Panasa Beeja*.

REFERENCES

1. Acharya Y T, editor, Commentary Ayurveda Deepika of Chakrapaanidatta on Charaka Samhita of Agnivesha, Chikitsasthana; Samyoga Sharamuliya Vajikarana Pada: Chapter 2.1, Verse 20. Varanasi: Choukamba Surbharati Prakashani, 2020; P.39.
2. Bapalal VG. Nighantu Adarsha. Vol 2, Varanasi: Chaukambha Bharathi Academy, 2009; P. 476.
3. Anonymous. The Wealth of India, Vol 1-A, New Delhi: National Institute of Science Communication, Council of Scientific and Industrial Research, 2001; P. 447-53.
4. Lucas D S. Dravyaguna Vijnana-Study of Dravya Materia Medica: Volume 2; Varanasi: Chaukambha Orientalia, 2017; P. 662-63.
5. Ranasinghe Sasini, Manduwanthi Tharaka, Marapana R.A.U.J. Nutritional and health benefits of Jackfruit (Artocarpus heterophyllus Lam.): A Review. International Journal of Food Science. January 2019; 12. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6339770/.
6. Angadi Ravindra, A Textbook of Bhaishajya Kalpana Vijnana, Varanasi: Chaukhamba Surbharati Prakashan, Ed. 2021; P. 64.
7. Prof. Dr. Ranade S.B, Prof. Dr. Deshpande R.R, Research methodology and medical statistics, Manakarnika publications, Ed. 2006; P. 234.
8. De Lamirande E, Jiang H, Zini A, Kodama H, Gagnon C. Reactive oxygen species and sperm physiology. Rev Reprod. 1997; 2(1):48-54. https://doi.org/10.1530/ror.0.0020048.

Source of Support: Nil
Conflict of Interest: None Declared

How to cite this URL: Greeshma K.V et al: Experimental Evaluation of the Comparative Effects of Panasa (Artocarpus heterophyllus Lam.) Pakwa Phala and Beeja Majja on Spermatogenesis in Wistar Albino Rats.. International Ayurvedic Medical Journal {online} 2024 {cited November 2024} Available from: http://www.iamj.in/posts/images/upload/8_18.pdf