

Full Length Research Paper

Effects of *Phoenix dactylifera* on the prostate and seminal vesicle of Wistar rats

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Phoenix dactylifera, a member of the family *Arecaceae*, is a highly nutritious fruit that is rich in vitamins, simple sugars, flavonoids, saponins, tannins, carotenoids and steroids. The study is aimed at evaluating the possible effects of *P. dactylifera* on the prostate and seminal vesicle of Wistar rats so that it can be suggested for use in the treatment of infertility or as a natural male contraceptive. Twenty male Wistar rats were used for the study; they were divided into four groups of five rats each, group 1 served as the control and were given distilled water while groups 2 to 4 (experimental groups) received the extract at 250, 500 and 1000 mg/kg body weight orogastrically for 35 days. On the 36th day, all the rats were sacrificed using cervical dislocation method and the prostate gland and seminal vesicles were dissected, weighed and processed for light microscopic study. The results showed degeneration of prostate connective tissue and distorted glands in rats treated with the extract compared to that of the control. The seminal vesicles of rats treated with the extract showed no difference as compared to that of the control. In conclusion, the extract might affect sperm function by reducing sperm quality and viability as secretions from prostate helps in creating an alkaline pH that resist the acidity of the vaginal fluids. Therefore, *P. dactylifera* fruits might be used as a natural male contraceptive if the effects are found to be reversible in Human prostate.

Key words: Prostate, seminal vesicle, Wistar rats, *P. dactylifera*, sperm quality, semen.

INTRODUCTION

Phoenix dactylifera (Date palm), a member of the family *Arecaceae*, is a plant with highly nutritious fruit and is a staple food for the people of North Africa and Middle East, where hundreds of varieties are grown for domestic and commercial purposes (Forbes, 1971). Although its

place of origin is unknown because of long cultivation, the plant probably originate from lands around Iraq (Mesopotamia) and its cultivation spread to the Arabian Peninsula, North Africa, and the Middle Eastern Countries, possibly as early as 4000 BCE (Janick, 2005;

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Table 1. Body and organs weight of Rats treated with aqueous extract of *P. dactylifera*.

Parameter	Control	Groups 250 mg/kg	500 mg/kg	1000 mg/kg
Body weight (g)	77.20±2.69	60.00±4.52	82.00±2.98	71.80±7.23
Left Seminal vesicle (g)	0.094±0.016	0.136±0.025	0.118±0.017	0.140±0.014
Right Seminal vesicle(g)	0.088±0.017	0.112±0.019	0.096±0.016	0.144±0.028
Prostate gland (g)	0.278±0.013	0.288±0.055	0.228±0.028	0.316±0.058

All values expressed as Mean±SEM. Values with the same super script in the same row are significantly different at $P \leq 0.05$ using one-way analysis of variance (ANOVA). SEM = standard error of the mean.

Zohary et al., 2012). The date fruit is rich in simple sugars, vitamin C, flavonoids, saponins, tannins, steroids and carotenoids (Agboola and Adejumo, 2013; Sadiq et al., 2013). Dates have numerous therapeutics effects in both human and animals therefore, it is widely used for the treatment of various ailment and illnesses ranging from ulcer and gastric lesions (Gangwar et al., 2014), enhancing growth in chickens, sheep, fish and rats (Ali and Bashir, 1999) to the inhibition of the cancerous cell growth (Al-Juraisy et al., 2010).

The pollen grains of date palm were used to promote fertility in women while the male flowers were used to enhance fertility in ancient Egypt (Bajpayee, 1997). The prevalence of infertility is higher in developing/underdeveloped countries where limited resources are available for diagnosis and treatment, and a significant proportions of couples that experience fertility problems are affected by it social and psychological effects (CDC, 2014; Hamada et al., 2011) while 50% of infertility cases are as a result of male factor (Jarow et al., 2002). The aim of the study is to evaluate the possible effects of aqueous extract of *P. dactylifera* fruit on the prostate and seminal vesicle of Wistar rats so that it can be suggested for use in the treatment of infertility or as a natural male contraceptive.

MATERIALS AND METHODS

Preparation of extract

The fruit was purchased from a local salesman in Samaru market Zaria. The extraction was done in the Department of Pharmacognosy, Ahmadu Bello University (ABU) Zaria, Kaduna State. The fruit was opened and the fleshy part was oven dried and grounded to powder. It was soaked in maceration apparatus with distilled water for 24 h, filtered and allowed to settle down, it was then decanted and oven dried at 50°C.

Experimental design

Twenty Wistar rats were purchased from the Animal House, Department of Human Anatomy, ABU Zaria and were kept and treated according to standard laboratory conditions. The Rats were randomized into four groups of five rats each and were kept under standard laboratory condition (12 h light/12 h dark cycle), fed with standard feed pellets (Grower's marsh, Vital Feed, Grand Cereal, Nigeria) and water *ad libitum*. The rats in group I (control) were

given distilled water while Group II-IV received the extract at (250, 500 and 1000mg/kg, respectively) oro-gastrically by intubation once daily for 35 days (Mehraban et al., 2014).

Histopathology

All Animals were sacrificed on the 36th day by cervical dislocation method and the prostate and seminal vesicles were dissected and weighed by using a chemical balance. They were fixed in Neutral Buffered Formalin (NBF), embedded in paraffin wax, at 5 µm and stained with heamatoxylin and eosin (H & E).

RESULTS AND DISCUSSION

Animals treated with the extract did not show any significant change in body/organ weight compared to that of the control (Table 1). This shows that the extract has no significant effect on metabolism. This is similar to a study conducted by Bahmanpour et al. (2006, 2013) indicating no significant change in the prostate and seminal vesicular weight following the administration of date palm gemules/pollen to Rats. There were no changes in the structure of the seminal vesicle of rats treated with *P. dactylifera* extract (Figures 2, 3 and 4) compared to that of the control (Figure 1) signifying that the extract has no negative effect on the seminal vesicles and will not affect their functions. The prostate glands of the rats treated with the extract showed destruction of connective tissues (Figure 6) and distorted glands (Figures 7 and 8) compared to that of the control (Figure 5). This is an indication that the extract could affect prostate function by reducing sperm quality/viability as secretions from the prostate constitute bulk of the semen, helps in the nourishment of sperm cells and create an alkaline pH that resist the acidity of the vaginal fluids (Guyton and Hall, 2006; Mann, 1974). Therefore, any impairment damage to the prostate will affect fertility by reducing sperm quality/viability.

Conclusion

Administration of aqueous extract of *P. dactylifera* fruit to male Wistar rats at 250, 500 and 1000 mg/kg for 35 days results in degeneration of prostate connective tissues and

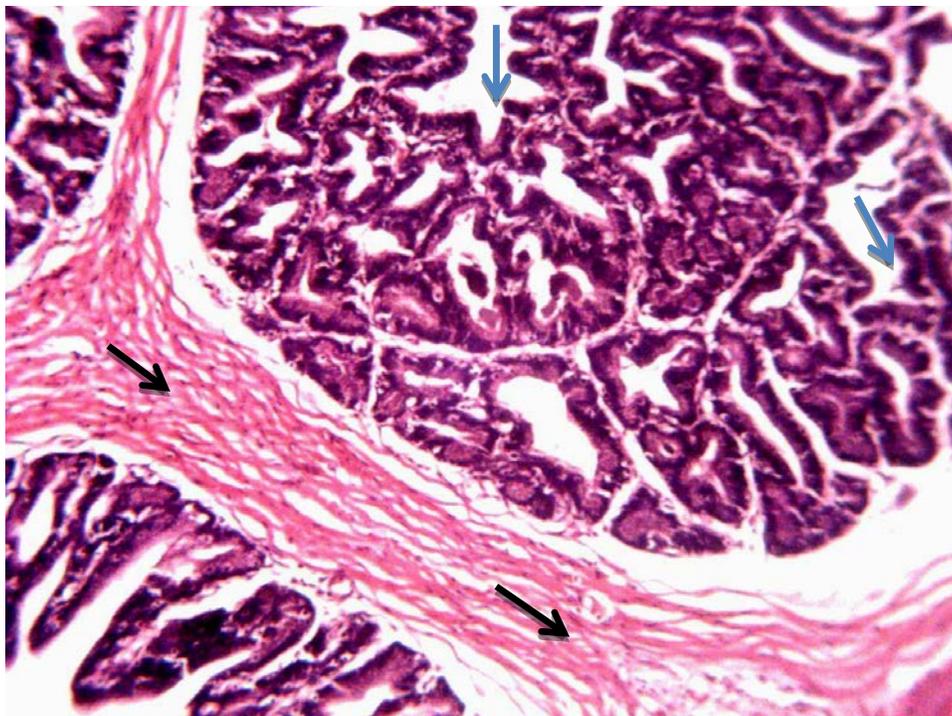


Figure 1. Photomicrograph of seminal vesicle of control rats illustrating the typical structure of the seminal vesicle showing the glands (light blue arrows) and smooth muscle (black arrows) H and E x100.

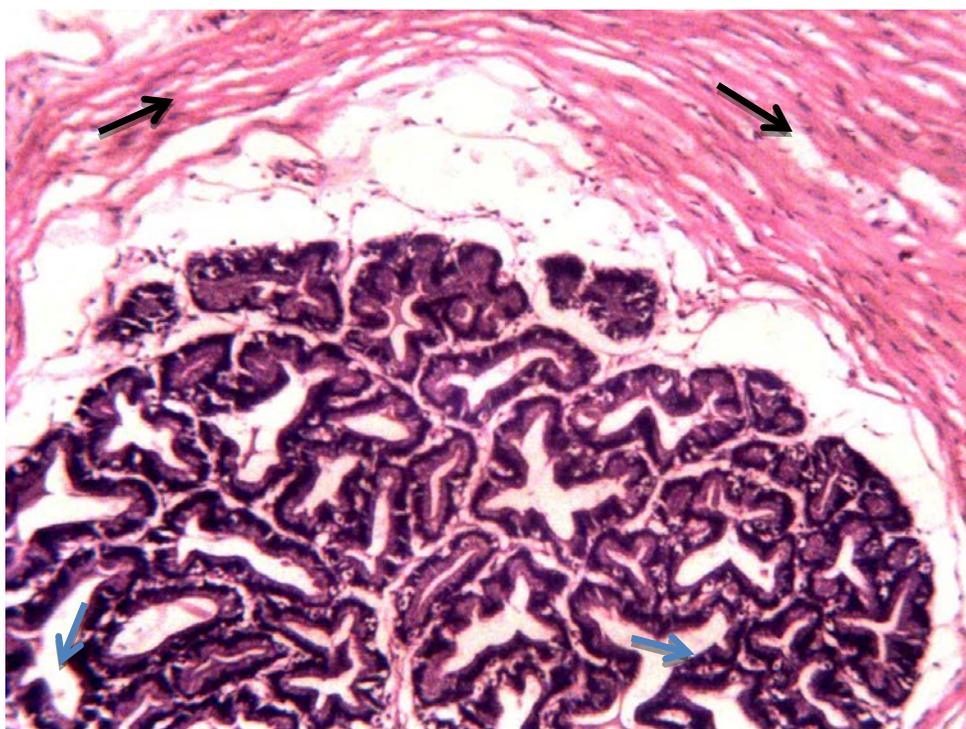


Figure 2. Photomicrograph of seminal vesicle of Rats treated with aqueous extract of *P. dactylifera*at 250 mg/kg showing the normal architecture with normal glands (light blue arrows) and smooth muscle layer (black arrows) H and E x100

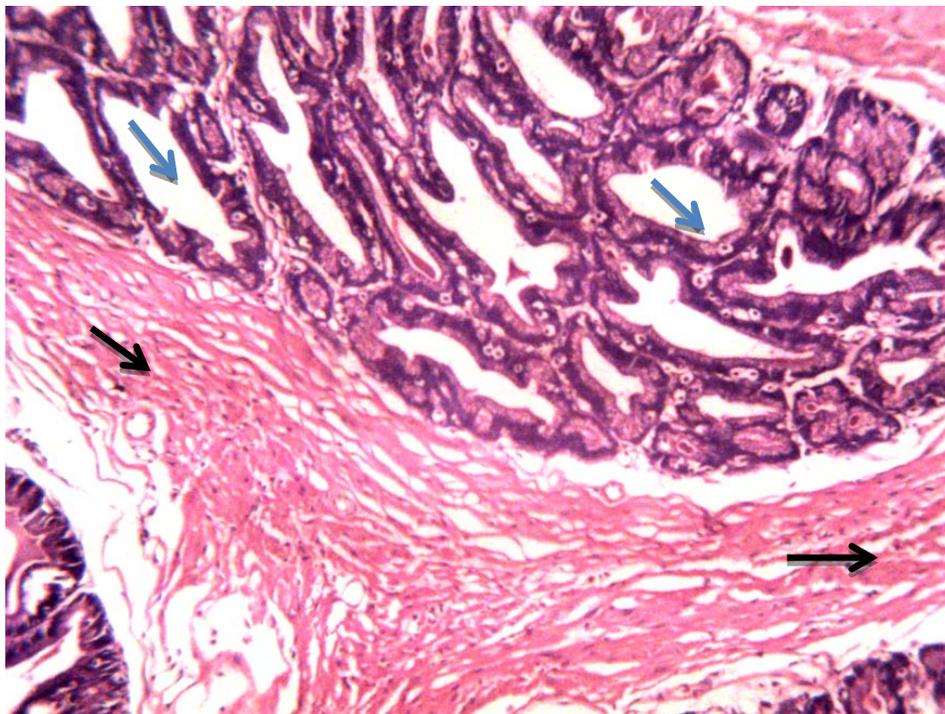


Figure 3. Photomicrograph of seminal vesicle of Rats treated with aqueous extract of *P. dactylifera* at 500 mg/kg showing normal glands (light blue arrows) and smooth muscles (black arrows) H and E x100.

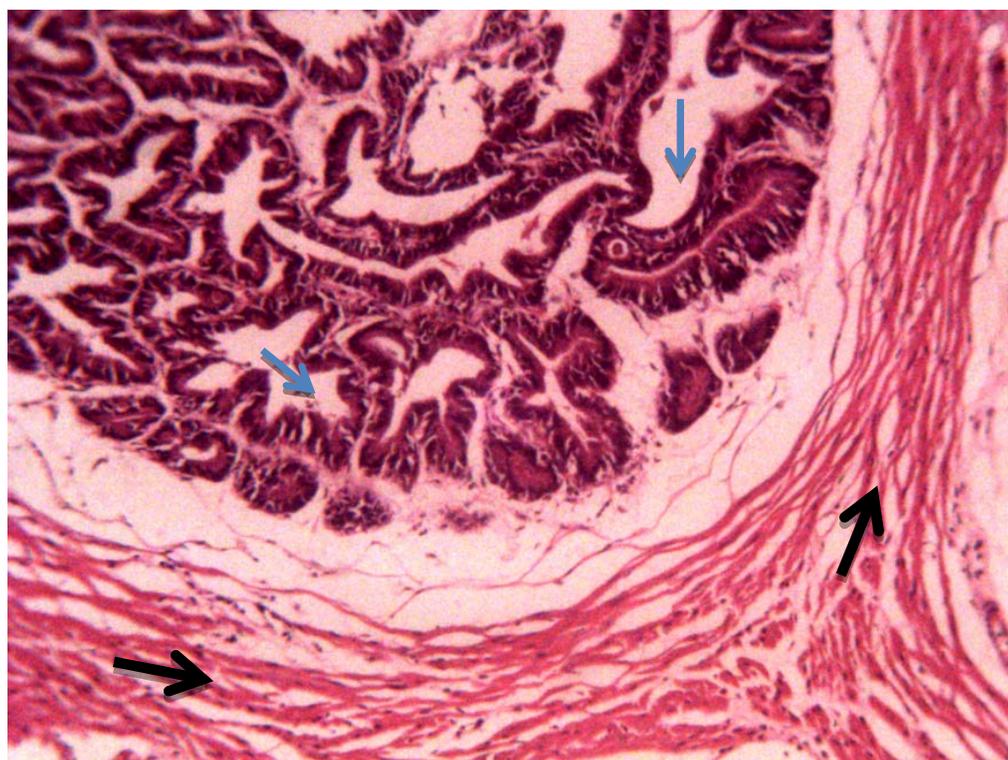


Figure 4. Photomicrograph of seminal vesicle of Rats treated with aqueous extract of *P. dactylifera* at 1000mg/kg showing normal glands (light blue arrows) and smooth muscles (black arrows) H and E x100

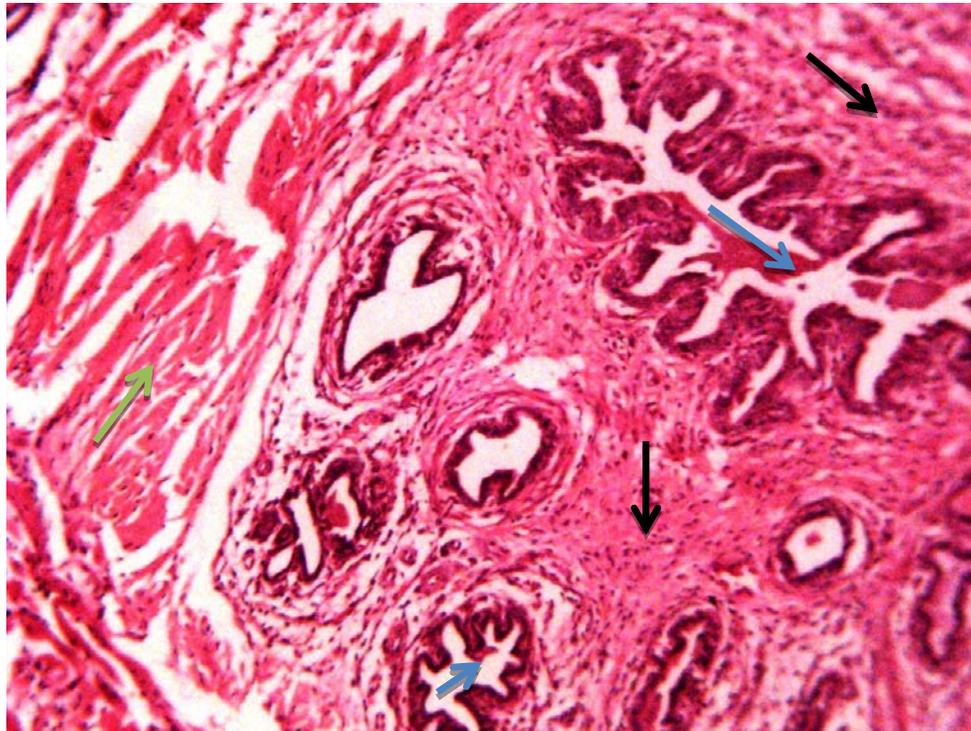


Figure 5. Photomicrograph of Prostate gland of control Rats illustrating the typical structure with normal glands (light blue arrows), connective tissues (black arrows) and smooth muscles (green arrow) H and E x100.

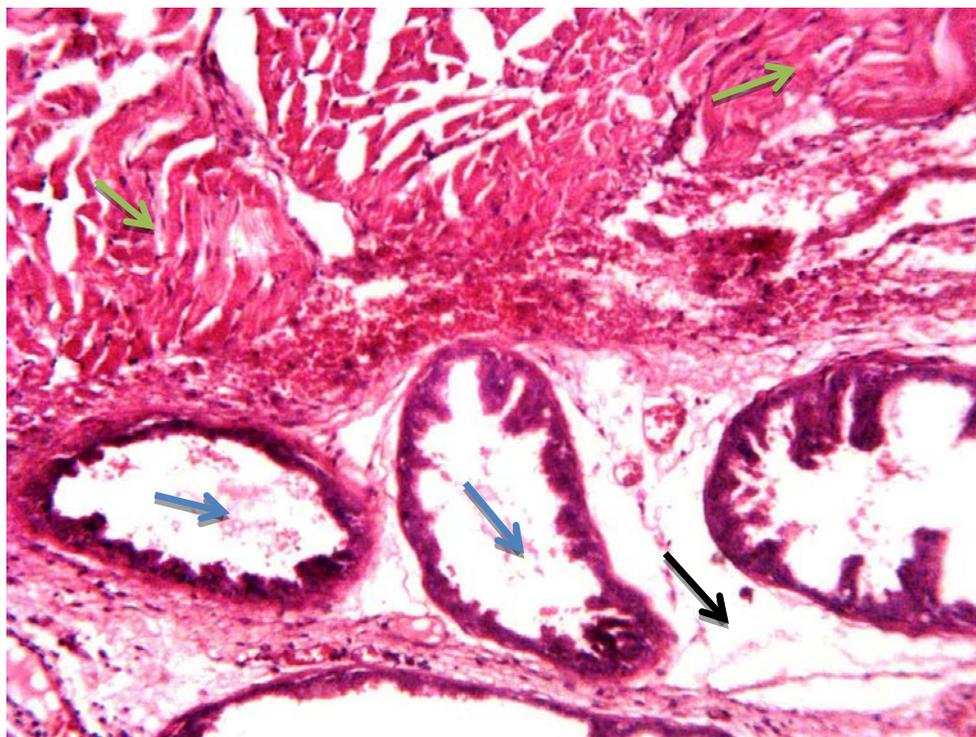


Figure 6. Photomicrograph of prostate gland of rats treated with aqueous extract of *P. dactylifera* at 250 mg/kg showing normal smooth muscles (green arrows), degenerated connective tissues (black arrow) and distorted glands (light blue arrows) H and E x100.

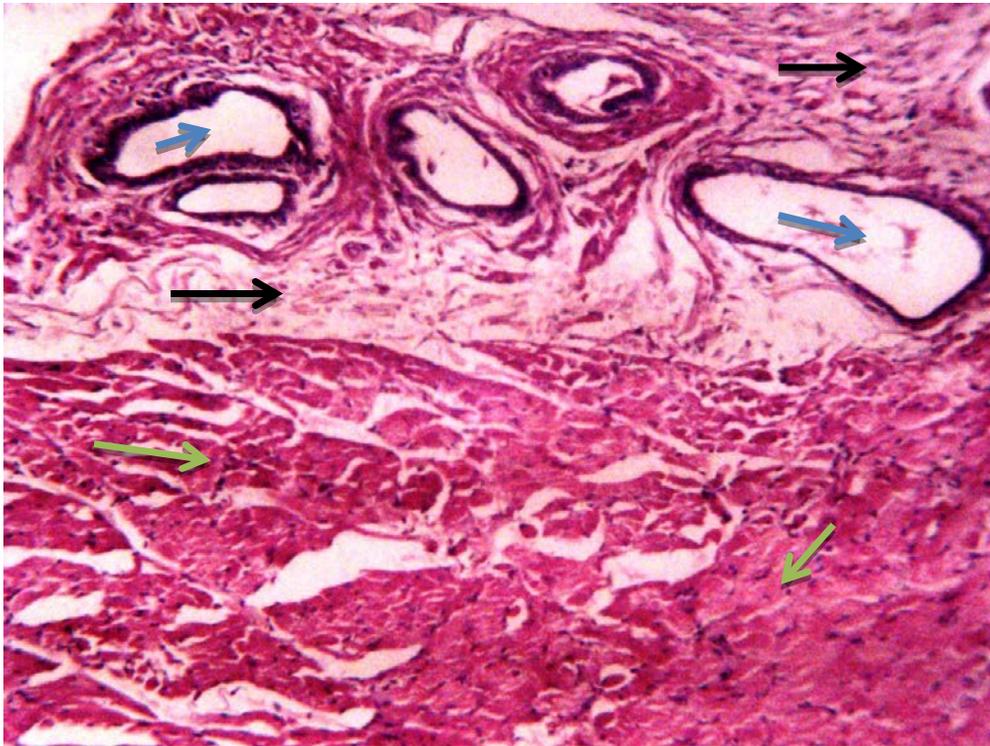


Figure 7. Photomicrograph of Prostate gland of rats treated with aqueous extract of *P. dactylifera* at 500 mg/kg showing normal smooth muscles (green arrows), normal connective tissues (black arrows) and degenerated glands (light blue arrows) H and E x100.

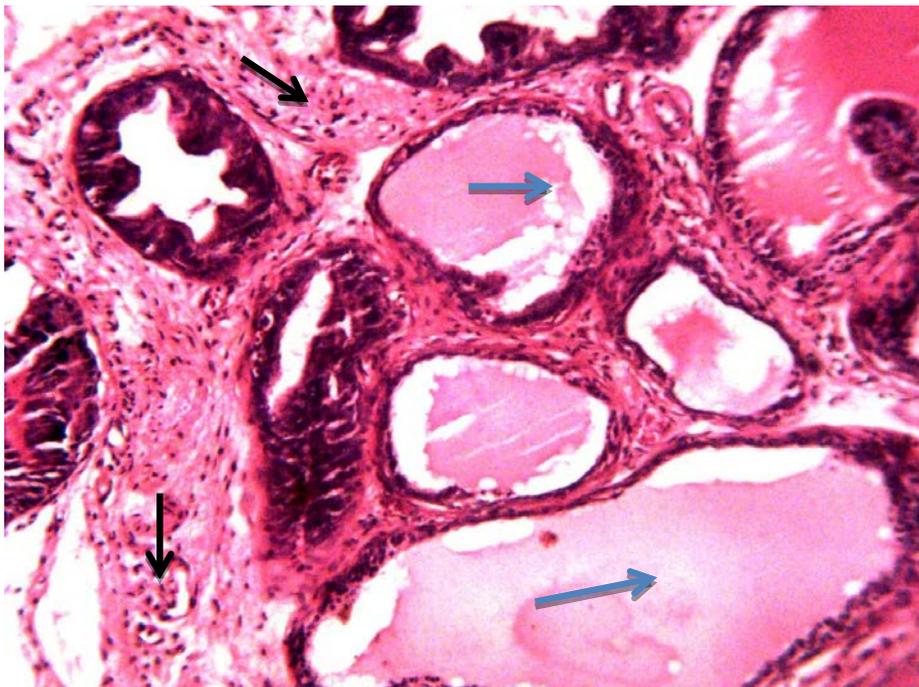


Figure 8. Photomicrograph of prostate gland of rats treated with aqueous extract of *P. dactylifera* at 1000 mg/kg showing normal connective tissues (black arrow) and distorted glands (light blue arrows) H and E x100.

distortion of glands, this might affect prostate function leading to poor sperm quality/viability. Therefore, *P. dactylifera* fruits might be used as a natural male contraceptive if the effects are found to be reversible in Human prostate.

Conflict of Interests

The authors have not declared any conflict of interests.

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