

Chronic Oral Administration of Ethanol Extract of *Carica papaya* Seeds Does not Affect the Histology of the Cauda Epididymis of Adult Male Wistar Rats

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Abstract: The role of the epididymis in male reproduction has been studied and it is well established that the spermatozoa are produced by the germinal epithelia of seminiferous tubules and are transported to the epididymis for onward transport, maturation and storage. The antifertility property of *Carica papaya* seed extracts have also been well documented in experimental animals. This study examines the effect of chronic oral administration of ethanol extract of *C. papaya* on the histology of adult male wistar rats. 15 apparently healthy adult male wistar rats were obtained from the animal house of the Department of Human Anatomy, Ahmadu Bello University Zaria and divided into 3 groups (I, II, III) of 5 each. 100 and 250 mg/kg/day of the extract was orally administered to groups II and III, respectively while group I which served as control received distilled water. The daily administration was carried out for a period of 90 days after which the animals were humanely sacrificed, the epididymis obtained and processed for light microscopy. Microscopic examination of the epididymis showed normal histology in both the control and experimental groups. This study concludes that the oral administration of the extract which has great potential in male fertility control does not affect the histology of the epididymis of adult male wistar rats.

Key words: *Carica papaya seed*, cauda epididymis, chronic oral administration, histology

INTRODUCTION

The epididymis is a highly convoluted tubule that links the rete testis and the ductus deferens. It serves the primary functions of transport, maturation and storage of spermatozoa released from the germinal epithelia of the seminiferous tubules (Flickinger *et al.*, 1978; Adebayo and Olurode, 2010). The acquisition of fertilizing capacity by the spermatozoa in the epididymis is an active process in that they have to be subjected to the epididymal environment which is essentially controlled by the epididymal epithelium and by extension dependent on the presence of testicular androgens (Franca and Cardoso, 1998; Johnson *et al.*, 2000). The quest for the development of a male contraceptive particularly from natural sources has led to the discovery of the antifertility efficacy of the seed of some species of *Carica papaya*. The locally available and widely distributed *C. papaya* seed have shown great promise in male contraception in animal models (Lohiya *et al.*, 1994; Udoh and Kehinde, 1999; Pathak *et al.*, 2000; Lohiya *et al.*, 2001; Sharma *et al.*, 2001; Verma and Chinoy, 2001; Lohiya *et al.*,

2002; Lohiya *et al.*, 2006). However, the information on the effect of these extracts on the cauda epididymis which performs the important task of conferring maturity to spermatozoa is scanty and this forms the stimulus for the present study.

Preparation of extract: Ripe *C. papaya* fruits of Homestead variety were commercially obtained from a local market in Zaria and authenticated at the Department of Biological Sciences, Ahmadu Bello University, Zaria with voucher No. 0911. The seeds were removed, shade dried and coarsely powdered (Lohiya *et al.*, 2006). The powdered material was Soxhleted with ethanol in the Department of Pharmacognosy and Drug Development of Ahmadu Bello University, Zaria. The Soxhleted material was concentrated under reduced pressure and the oily residue used in the investigation.

Experimental animals: 18 apparently healthy, sexually mature male Wistar rats weighing between 180 and 200 g were used in the present study. The animals were obtained and housed in polypropylene cages in the animal

house of the Department of Human Anatomy, Ahmadu Bello University, Zaria-Nigeria. They were fed rat pellet diet and layers mesh, exposed to a 12 h light: 12 h dark cycle and water was provided *ad libitum*. Animals were treated humanely, Veterinary care and supervision were provided throughout the period of study.

Experimental design: The 18 male wistar rats were obtained from the animal house of the Department of Human Anatomy, Ahmadu Bello University Zaria-Nigeria in January 2010 and randomly divided into 3 group to 6 rats each. The rats in group I which served as control where orally administered distilled water while groups II and III were orally administered 100 and 250 mg/kg/day of the ethanol extract of *C. papaya*, respectively.

Daily oral administration was sustained for a period of 90 days after which the wistar rats were humanely sacrificed under chloroform anesthesia in an enclosed chamber. The thoracic cavities of the wistar rats were cut open under anesthesia to expose the beating heart. The inferior vena cave was severed to drain out blood and using IV delivery set and needle, normal saline was perfused for 3 min through the heart to rinse the vasculature before Bouin's fluid was also perfused through the heart for general body fixation. The cauda epididymis was separated from the testis and other parts of the epididymis for further fixation in Bouin's fluid for 24 h. Routine paraffin processed, H and E stained tissues were then prepared for light microscopy.

RESULTS

Result of the light microscopy of the cross sections of cauda epididymis obtained from the control group as shown in (Plate 1) reveals a regular and circular duct with a pseudostratified columnar epithelium that exhibits stereocilia. The epithelium is surrounded by a basement papaya extract respectively also sho membrane which contains a discontinuous layer of basal cells in its inner surface. The lumen of the tubule contains a collection of late spermatids and the extratubular space contains connective tissue and blood vessels. Light microscopic examination of cross sections obtained from groups II and III that received 100 and 250 mg/kg of *C. wed* similar histological profile as shown in Plate. 2 and 3, respectively. However, the lumen of the tubule in these experimental groups reveals highly depleted late spermatids.

DISCUSSION AND CONCLUSION

The normal histological features observed in cross sections of the cauda epididymis of both the control and experimental groups is an indication that the ethanol extract of *C. papaya* seed is not apparently harmful to the epithelium which is important in the synthesis of proteins and sialic acid of the epididymal fluid (Hinton and

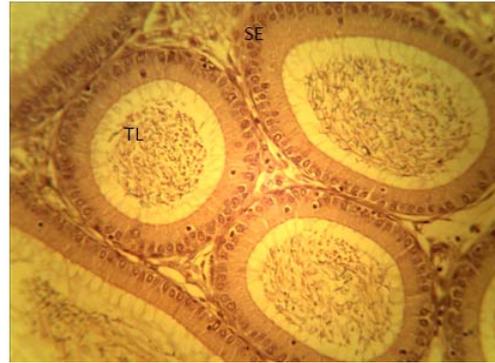


Plate 1: Transverse section of the cauda epididymis of wistar rats from the control group showing a normal pseudostratified epithelium (SE) and dense collection of sperm cells in the tubular lumen (TL). H & E, X25

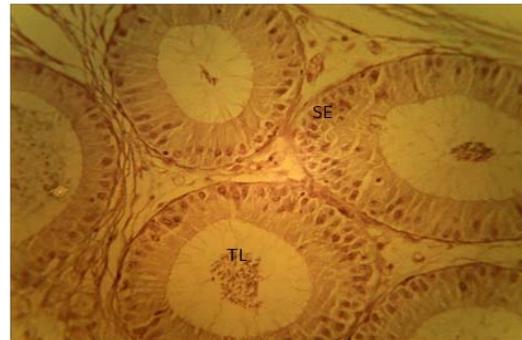


Plate 2: Transverse section of the cauda epididymis of wistar rats after 90 days oral administration of 100 mg/kg *C. papaya* seed extract showing a normal pseudostratified epithelium (SE) and a sparse collection of sperm cells in the tubular lumen (TL). H & E, X250

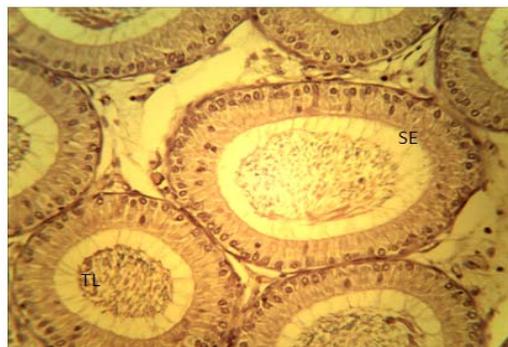


Plate 3: Transverse section of the cauda epididymis of wistar rats after 90 days oral administration of 250 mg/kg *C. papaya* seed extract showing a normal pseudostratified epithelium (SE) and a scanty collection of sperm cells in the tubular lumen (TL). H & E, X250

Palladino, 1995; Turner *et al.*, 1995). It is well known that the secretion of various proteins by the principal cells of the epididymis into the epididymal lumen influences sperm maturation (Verma and Chinoy, 2001; Almeida

et al., 2006). However, scanty collection of late spermatids in the lumen of the cauda epididymis of the experimental group particularly the group that received 250 mg/kg of the extract results from the arrest of spermatogenesis at the germinal epithelium which is consistent with the findings of other investigators (Lohiya *et al.*, 1994; Udoh and Kehinde, 1999; Pathak *et al.*, 2000; Sharma *et al.*, 2001; Verma and Chinoy, 2001; Lohiya *et al.*, 2006).

CONCLUSION

In conclusion, the result obtained from this study of the effect of chronic oral administration of ethanol extract of *C. papaya* seed indicates no influence of the extract on the histological features of cauda epididymis of adult wistar rats and will serve as a basis for further research into the male contraceptive efficacy and safety of *C. papaya* seeds.

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