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Effect of papaya seed extract on contractile response of cauda epididymal tubules

R.J. Verma, N.J. Chinoy

Department of Zoology, University School of Sciences, Gujarat University, Ahmedabad 380009, India

Keywords: contractility; epididymis; *Carica papaya*; epinephrine

Abstract **Aim:** To evaluate the administration of *Carica papaya* seed extract on the contractility of cauda epididymal tubules in male rats. **Methods:** Adult male albino rats were administered intramuscularly papaya seed extract at a dose of 0.5 mg/kg/day for 7 days. Animals were killed, cauda epididymal tubules of 5 cm length were isolated and the contractile response to different concentrations of adrenalin (1-500 μg/25mL) was examined. In another group of animals, the contractile response was assayed 3 months after withdrawal of the treatment. **Results:** Papaya seed extract brought about a significant decrease in the contractile response of epididymal tubules as compared with the control. After three months of papaya withdrawal, a nearly normal pattern of contraction was regained. **Conclusion:** Papaya seed treatment reversibly reduces the contractile response of cauda epididymal tubules. *(Asian J Androl 2002 Mar; 4: 77-78)*

1 Introduction

Administration of ripe pawpaw seed (*Carica papaya*) extract in male rats caused a dose-dependent effect on the testis and epididymis [1]. Pathak et al. [2] indicated that the oral administration of the benzene chromatographic fraction of chloroform extract of papaya seeds induced a total suppression of cauda epididymal sperm count and motility in rats. A crude aqueous extract of papaya seed orally or intramuscularly caused a significant reduction in cauda epididymal sperm count, motility and fertility in rats [3]. Also, the intramuscular administration of an aqueous extract of *Carica papaya* seed caused a selective androgen deprivation resulting in infertility with complete reversibility after withdrawal of treatment [4].

In addition to sperm maturation and storage, epididymal tubules are also responsible for sperm transport at the time of ejaculation. Cauda epididymis has higher density of adrenergic fibers and exhibits rhythmic contractions under hormonal stimulation rather than spontaneous [5]. Though papaya seed extract significantly reduces the fertility rate, its effect on the contractile response of cauda epididymal tubules remained unknown. The aim of the present investigation was to evaluate the effect of aqueous extract of papaya seed treatment on the contractile response of cauda epididymal tubules.

2 Materials and methods

2.1 Extract preparation

Shade-dried seeds of ripe *Carica papaya* variety honey dew were obtained from the Village Development Unit, Dehradun, India. The extract was prepared accord

Correspondence to: Dr. Ramtej J. Verma, Department of Zoology, University School of Sciences, Gujarat University, Ahmedabad 380009, India.
Tel: +91-79-630 2362
E-mail: zooldeptgu@satyam.net.in
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ing to the WHO protocol CG-06 (World Health Organization 1983, restricted publication). Air-dried papaya seeds were ground into powder with a mortar. An aqueous suspension of 5 g of the powder in 100 mL of distilled water was prepared and soxhleted for 1 h. After cooling, the content was filtered successively through ordinary and then through Whatman filter paper number 1. The residue was then resuspended in the same amount of distilled water and soxhleted three or four times for complete extraction of water-soluble contents. The filtrates were collected, pooled and evaporated in a water-bath to dryness. The residue was dissolved in 0.9% saline for use. The residue was completely soluble in water and the pale yellow solution obtained was stable at room temperature.

2.2 Animal and treatment

Colony bred adult male rats of Charles Foster strain, 180-200 g body weight (obtained from Cadila Health Care, Ahmedabad, India), were provided with animal food and tap water ad-libitum and maintained under laboratory condition. The animals were divided at random into three groups of 10 animals each. The Group 1 (Treated) and Group 2 (Withdrawal) animals were intramuscularly administered the extract (0.5 mg/kg/day) for 7 days, Group 3 (Control) were injected 0.9% saline. The animals of Group 1 were killed the next day after the last dose of papaya treatment and those of Group 3, three months after withdrawal of the treatment. The epididymal tubules were immediately obtained and their contractility assessed.

2.3 Epididymal contraction assessment

Cauda epididymal tubule of 5 cm length was isolated and used for recording of their contractile pattern in a double organ bath of 25 mL capacity maintained at 34 ¡À 3 ¡æand pH 7.4 [6]. After 30 minutes of stabilization in Krebs Ringer bicarbonate (KRB) buffer, the spontaneous contractility, if any, was recorded for 2-5 minutes and thereafter, the response to 1-500 μg/25 mL concentrations of adrenalin tartrate (1:1000 w/v adrenalin, Harson Laboratories, Baroda, India) was recorded for 1 min each. A rest period of 1 min was given after wash with fresh KRB buffer between two recordings. A minimum of 10 recordings were obtained for each concentration of adrenalin and the mean amplitude (in mm) to each concentration was then calculated.

2.4 Data processing

Data were expressed in mean ¡ÀS.E.M., if applicable. Statistical analysis was performed using the Student's *t*-test and $P<0.05$ was considered significant.

3 Results and discussion

As can be seen from the Table 1, treatment with the aqueous papaya seed extract caused a significant reduction in the contractile response to adrenalin. Withdrawal of treatment for three months brought about a significant recovery (compared with the Treated) in the contractile response at the range of 5-80 μg/25mL adrenalin concentrations. The mechanism responsible for the reduced contractile response by papaya is not clear. However, the latter may contribute to the reduced fertility in male rats in previous studies [2,3,4] as the reduced epididymal contractility would retard the sperm transport in the cauda epididymis.

Table 1. Effect of papaya seed extract on contractile response of cauda epididymal tubules. Mean ¡ÀSEM. $^{b}P < 0.05$, $^{c}P < 0.01$, *vs* control; $^{e}P < 0.02$, $^{f}P < 0.01$, *vs* the treated.

Adrenalin concentration (mg/25 mL)	Contractile response (mm)		
	Control (n=10)	Treated (n=10)	Withdrawal (n=10)
1	3.77 ¡À0.16	1.60 ¡À0.13^{c}	1.95 ¡À0.11
5	7.53 ¡À0.44	3.77 ¡À0.17^{c}	5.13 ¡À0.23
10	8.30 ¡À0.45	4.03 ¡À0.23^{c}	6.87 ¡À0.25^{f}
20	9.10 ¡À0.53	4.67 ¡À0.33^{c}	7.27 ¡À0.20^{f}
30	9.23 ¡À0.52	5.17 ¡À0.33^{c}	7.13 ¡À0.35^{f}
40	9.53 ¡À0.53	5.43 ¡À0.37^{c}	7.73 ¡À0.35^{f}
50	9.70 ¡À0.53	5.67 ¡À0.41^{c}	7.37 ¡À0.30^{f}
60	9.73 ¡À0.53	5.67 ¡À0.41^{c}	7.67 ¡À0.60^{e}
70	9.57 ¡À0.49	5.63 ¡À0.42^{c}	7.40 ¡À0.35^{f}
80	9.40 ¡À0.48	5.57 ¡À0.44^{c}	7.17 ¡À0.37^{e}
90	9.57 ¡À0.43	5.77 ¡À0.50^{c}	7.10 ¡À0.40
100	9.57 ¡À0.43	5.77 ¡À0.50^{c}	6.57 ¡À0.42
200	9.73 ¡À0.43	5.93 ¡À0.48^{c}	6.80 ¡À0.35
300	9.17 ¡À0.40	5.80 ¡À0.46^{c}	6.10 ¡À0.38
400	8.00 ¡À0.52	5.60 ¡À0.46^{c}	4.60 ¡À0.50
500	7.13 ¡À0.56	5.27 ¡À0.44^{b}	4.17 ¡À0.47

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