

IN VITRO EFFECTS OF ENDOCRINE DISRUPTING CHEMICALS ON THE GONADAL STEROIDOGENESIS IN AN INDIAN MAJOR CARP, *LABEO ROHITA* (HAM.)

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Introduction:

Environmental chemicals of natural and synthetic origin can interact with the endocrine system and alter development and reproduction in wildlife [1] and humans [2]. A wide range of chemicals were shown to have an affinity for estrogen receptors from various species. These contaminants also appear to influence the endocrine system by altering enzymes that enable hormone synthesis and hormone metabolism. The effects of these endocrine disrupting chemicals have been extensively reported in fish; they include inhibition of gonad growth, reduction in the number and quality of germ cells, feminisation and masculinisation [3]. In the present investigation, an attempt has been made to study the in vitro effects of bisphenol-A (BPA) and butylhydroxy anisole (BHA) on the gonadal steroidogenesis in an Indian major carp, *Labeo rohita*.

Methods:

Oocytes and testicular fragments were collected during three stages of the gonadal development. Incubations were performed with 3 ml of culture medium containing steroid precursor progesterone for about 24 h at 18°C. BPA and BHA at a concentration of 5 µM were added to the incubation medium. Steroids synthesised in the incubation medium were extracted with dichloromethane. Steroids were analysed and quantified by High Performance Liquid Chromatography.

Results and Discussion:

BPA and BHA show remarkable inhibitory effect on ovarian and testicular steroidogenesis during all three stages of the gonadal development. This inhibition of steroid production by BPA and BHA is of both physiological and toxicological significance. BPA was found to be more estrogenic when compared to BHA. The decreased E2 synthesis by the oocytes confirms that BPA and BHA have the potential to inhibit ovarian aromatase, the enzyme that converts T to E2. The stimulation of 17,20β-P synthesis by BPA in mature oocytes confirms that BPA enhances the activity of 20β-HSD (Fig. 1). BPA and BHA showed inhibitory effect on androgen production by different stages of testicular fragments. BPA significantly decreased T and 11-KT production. The effect of BPA and BHA was not significant on E2 production. Decreased T synthesis

observed in the present investigation confirms that BPA and BHA have remarkable effect on 17β-HSD activity (Fig. 2). Taken together, these results indicate that the decreased steroid hormone biosynthesis observed in *Labeo rohita*, following exposure to BPA and BHA, may lead to reduction in reproductive capacity of the fish.

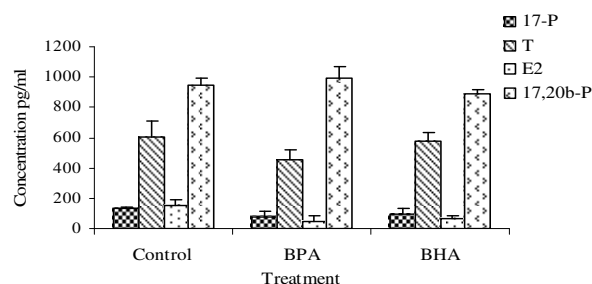


Fig. 1. Effect of BPA and BHA on in vitro steroid production by matured oocytes.

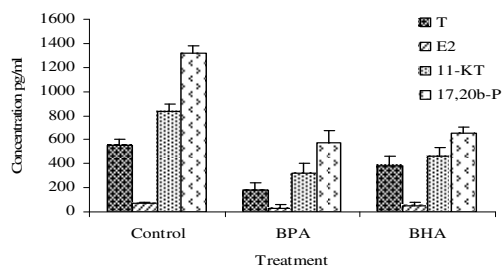


Fig. 2. Effect of BPA and BHA on in vitro steroid production by spawning testicular fragments.

References:

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