Summary

Bisphenol A (BPA) is used in the manufacture of plastic and its products. It is widely existing endocrine disrupting chemical (EDCs) especially in aquatic environment. BPA at environmentally relevant concentrations can alter vitellogenin level, modulate sexual differentiation, affect gonadal growth and cause reproductive failure in aquatic organisms in general and teleosts in particular. In the present study, biomarkers of endocrine disruption *i.e.* vitellogenein and brain aromatase exprression and expression of certain reproduction-related genes along hypothalamus–pituitary–gonadal (HPG)-axis were studied after BPA exposure in *Catla catla*. Two life stages of *Catla catla* (*i.e.* juvenile and pubertal females expected to spawn for first time in following season) were used as model. *Catla catla* (both juvenile and adult) were exposed to graded concentration of BPA (10, 100, 1000µg/l) for 14 days. Liver *vitellogenin* (*vtg*) and brain *aromatase* (*cyp19b*) expression in juvenile fish exposed to graded concentration of BPA is an inverted U-shaped curve while in pubertal female *vtg* mRNA increased in a concentration dependent manner. Neuronal genes disrupted at pituitary/hypothalamus level are the gonadotropin-releasing hormone (*gnrh*), the kiss/gpr54 system, which regulates gonadotropin release and *cyp19b* gene encoding brain aromatase. At the gonadal levels, BPA caused alteration in circulating plasma estradiol, testosterone level, altered normal gonad histology and modulate expression of *steroidogenic acute regulatory protein (star), ovarian atomatase (cyp19a), follicle stimulating hormone receptor (fshr), luteinizing hormone receptor (lhr)*. Effect of BPA on peripheral reproductive axis was also measured through the quantification of thyroid hormones in adult fish. BPA resulted in changed circulating plasma levels of thyroid hormones in exposed fish compared to controls. Results of the present study depicted that in female *Catla catla*, there is a severe endocrine disruption of the HPG-axis exposed to BPA at concentrations lower than those that induce *vitellogenin*. These results also indicate that BPA had an impact on the gene expression of members from kiss/gpr54 system and *gnrh* family in *Catla catla*, thereby probably disturbing the neuroendocrine homeostasis, further suggesting that kiss/gpr54 system can be used as sensitive biomarkers for estrogenic chemicals in the environmental monitoring. Moreover, BPA can affect the timing of the onset of puberty in fish at environmentally relevant concentrations (10µg/l) and disrupted organization of the kisspeptin signaling pathway may be the underlying mechanism by which a suite of

reproductive abnormalities are induced. These results also confirmed that BPA have biphasic, non-monotonic response that is characteristic to endocrine disrupting ohemicals