



**Cairo University  
Faculty of Veterinary Medicine**



## **Impact of Phenol on Fish Health and Fecundity**

A thesis submitted by

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### **ABSTRACT**

This study was designed to monitor the effect of phenol on *Oreochromis niloticus* fish fecundity and health. Water and fish of both sexes were collected from area of Tebin (Helwan, branch of River Nile) as naturally polluted group and investigated for phenol residue. In fish liver phenol was found 1.4 ppm, and in water was 0.02 ppm. Females *O. niloticus* from Tebin area showed significant decrease in growth measurement, gonado-somatic index (GSI) and K condition as well as relative and absolute fecundity. Moreover, total protein (T.P), albumin, globulin and glucose showed significant increase while alanine aminotransferase (ALT) and aspartate aminotransferase (AST) dropped significantly. Males from Tebin area also showed significant decrease in relative fecundity, sperm density and sperm live % as well as AST,  $17\beta$  estradiol (E2) and globulin. Oppositely, albumin, ALT and glucose significantly increased. LC50 of phenol was calculated at laboratory using a total number of 60 fish both sexes. An experiment of Phenol exposure to (1/10 LC50) was held out for different periods (21, 28, 35 and 45 days) on 160 *O. niloticus* females and males with 40 fish of both sexes left without exposure as control. Females showed significant decrease in total body length and body weight (B.W) at 21 and 28 days. Whereas, hepatic weight (WH), GSI, relative and absolute fecundity showed significant decrease in all experimental periods. Condition factor (K) and AST showed

significant decrease at 28, 35 and 45 days. Glucose showed significant increase all over experimental period.  $17\beta$  Estradiol (E2) significant increased at 21 and 28 days while significant decreased at 35 days. Whereas, males showed significant increase throughout the experimental periods in ALT, albumin and glucose, whereas, AST and globulin showed significant decrease.  $17\beta$  Estradiol (E2) showed significant increase at 21, 28 and 45 days while at 35 days it decreased significantly. Testosterone (T) showed significant increase at 35 and 45 days post exposure. Histopathological examination of male liver from Tebin showed features of hepatocytes coagulative necrosis associated with infiltration of fibrous exudate, but hepatic parenchyma of females from Tebin showed features of fatty infiltration associated with inter-cellular fibrous exudate infiltration. Histopathological examination of experimented fish liver showed gradual increasing of melano-macrophage cells infiltration around hepato-pancreatic structure from mild to severe aggregation at 21 days to 45 days of exposure, with marked vacuolation and massive necrosis of hepatocytes. Ovary of females from Tebin showed variable stages of follicles maturation, whereas ovary of experimented showed calcification stroma with vacuolated and atretic follicles. Testicular tubules showing features of degeneration associated with scant number of sperms and marked increase of inter-tubular fibrous connective tissue. Vitellogenin fractionation revealed appearance of two bands in protein marker at 440 and 654 K Da respectively. In females first band appeared only after 28 days while second appeared in all experimented and naturally polluted groups, thus was referred to be female specific. Among males, first band appeared after 21, 28 and 35 days while second band appeared after 45 days. It is concluded that phenol is an endocrine disruptor chemical with an environmental estrogenic effect. So it is recommended to protect aquaculture water sources from being polluted with industrial effluents and sustainable development through building purifying stations near industrial factories to remove the different chemicals and pollutants in their effluents.