

Chronic embryonic exposure to ethanol induced apoptosis and impairments of behavioral activities in the zebrafish larvae

ABSTRACT

Decades of research have pinpointed the pathological consequences of ethanol and we focused to understand the developmental neurotoxicity effects of ethanol on the zebrafish nervous system. The zebrafish embryos were exposed to different concentrations of ethanol (0.25%, 0.5%, 0.75%, 1.5% and 2.00%), in a semi static condition from 5 hours post fertilization (hpf), with daily renewal of the medium until hatching. We have measured the behavior of individual larva; spontaneous locomotor behavior, tail coiling at 24 hpf and locomotor behavior, swimming activity at 6 days post fertilization. We also measured anxiety related behavior in the group of 5 larvae at 6 dpf. Besides that, we also evaluate apoptosis in the zebrafish embryo at 24 hpf. We found that, chronic embryonic exposure to ethanol significantly decreased the number of spontaneous tail coiling as the ethanol concentration increased. The swimming activity in the individual zebrafish zebrafish larva at 6 dpf was significantly increase increased at 0.75%. Analysis of the anxiety related behavior has shown that exposure to ethanol and stimulation with aversive stimulus have significantly decreased in the percentage of outward preference in the larvae. The exposure to ethanol has induced significant decrease in the percentage of edge and down preference of the larvae in the presence of aversive stimulus as compared to control. The exposure to ethanol significantly decreased the percentage of right preference while the swimming speed of the larvae was not affected. The number of apoptotic cells was significantly increased in 1.5% ethanol as compared to the control at 24 hpf. This finding showed that chronic embryonic exposure to ethanol induced behavioral alterations in the zebrafish larvae and also increased apoptosis in the embryo. Further study is needed to understand the mechanism that underlie the behavioral alterations and the induction of apoptosis.

Keyword: Ethanol; Developmental neurotoxicity; Anxiety