

Effect of *Andrographis paniculata* Leaves extract on ovary of adult Ornamental fish – Black molly (*Mollienisia latipinna*)

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ABSTRACT

*In the present study an attempt was made to investigate the reproductive disturbance of the medicinal plant *Andrographis paniculata* leaves extract on ornamental fish black molly (*Mollienisia latipinna*). Since, immemorial time the *A. paniculata* commonly used for various ailments in humans. The experimental adult black molly fishes were treated with the leaves extract of *A. paniculata* 100mg / lit of water for a period of 24 days. At end of the experiment, the animals were sacrificed and dissected out the ovaries for histopathological observations. The histopathology of ovary reveals that there was no changes in the structure of oogonia, yolk, and tunica albugenea of control animals, but in 11 and 24 days treated animal's ovaries shown a remarkable changes in the structure of oogonia, the content of yolk substances, structure of oocyte wall, arrangement of columnar cells and tunica albugenea. Therefore, it concludes that the aqueous extract of leaves of *Andrographis paniculata* has considerable impact on the reproductive organ of black molly.*

Key words: *Andrographis paniculata*, Ovary, Black molly, Oogonia, Tunica albugenea.

INTRODUCTION

Black molly (*Mollienisia latipinna*) constitute one of the commercially most important ornamental fish [1]. There is a demand for black molly (*Mollienisia latipinna*) in national and international markets, due to its attractive colour and shape [2].

A. paniculata is a herbaceous plant in family of Acanthaceae, native to India and Srilanka. It is wildily cultivated in South Asia, where it is used as antibiotics and antidotes to treat infections, wounds and various ailments. Mostly the leaves and roots were used for medicinal purposes[3]/ *A.paniculata* leaf extract is known to posses a variety of pharmacological activities. The leaf extract had also been used as fertility control agent in some vertebrate animal models,[4],[5],[6],[7],[8] and it is also used as one of the most promising botanical pesticide. The leaf extract has also been reported to used as control of pest in aquaculture practices to the control of fish predator it is because of possessing low toxicity to the non – target aquatic life. Many synthetic pesticide used in aquatic practices are endocrine disrupting chemicals (EDCs) and it may act in very small amounts and in subtle ways, affecting behaviour and secondary

sexual characteristics as well as the gonads themselves and it leads to various changes in the biomarker,[9-14]. Therefore in the present investigation, an attempt was made to study the effect of the plant leaf extract of *A. paniculata* on the reproduction of black molly and the available literature were also scanty on the toxicity of the extract on black molly.

MATERIALS AND METHODS

Adult fresh water ornamental fish black molly (*Mollienisia latipinna*) were collected from the local market and acclimatized in to the laboratory conditions at $28\pm 1^{\circ}\text{C}$ for a week in a fish tank. The normal physico-chemical characteristics of the tap water were maintained. During acclimatization the fish were fed daily with pelleted commercial feed, 2, 3 times per day and the water was replenished daily.

A. paniculata leaf extract was dissolved 100 mg/lit of water. The fishes were grouped into three groups such as Group I, II and III. The group I fishes were maintained as control and group II were exposed to the extract for 11 days and group III fishes were exposed the extract for 24 days respectively to the above concentration of extract 100 mg/lit. At the end of the experiment period, the fishes were sacrificed and samples were collected for further analysis. The ovary separated from the experimental fish were used for histopathological analysis.

RESULTS AND DISCUSSION

Both the group (Group – II and III) of black molly (*Mollienisia latipinna*) exposed to the extract 100 mg/lit of *A. paniculata*, not at all induced fertilization during the experimental period except control. The histopathology of ovary of 11 and 24 days treated fishes well revealed the extract of *A.paniculata* treatment has affected the development of ovary in the concentration 100 mg/lit of extract (Fig-1). The administration of extract resulted disappearing and degradation of yolk substance, and disintegrated oocyte wall. Ovaries of extract treated fish for 11 and 24 days revealed that the underdeveloped post ovulatory follicle and suppressed maturation of younger follicle (Fig-2 to 4). It would be due to the hormonal inhibitory effect of the extract. Similarly, Ankly *et al.* [15], reported that the *A.paniculata* leaf extract possess anti-implantation and anti-spermetogenic activities and the leaf extract affect the post – coital activity of reproduction[15],[16]. The follicular atresia is initially indicated by breaks or gaps that appear in the vitalline envelope subsequently due to the toxicity, and follicle were also less visible[17]. There were changes in the size and development of ovaries with increased atretic follicle, ruptured follicle and undeveloped oocyte. Similarly, Jegedae *et al* [18], who reported that when female black molly was fed with varying dietary supplementation levels of *A. paniculata* leaf extract shown as a reproductive inhibitor and it attributable to poor development of ovarian tissues[19]. The nucleolus and yolk material begin to reduce ultimately, follicular cells in various stages of degeneration surrounds a loose mass of oocyte residue [17]. Follicular atresia occurred in experimented fishes even at a low level toxicity,[20],[21].The ovaries of treated block molly fish exhibited immature, and more atretic, follicle, [22]. The suppressed reproduction activity, reduced oocyte sizes and restarted maturation by *A. paniculata* leaf extract,[23-25].

Morphological changes in the gonad of black molly ovaries contain oocyte [26], and atretic oocyte. Normally the oocyte nucleolus was large in size and located at centre of the nucleoplasma. The extract treated fish has small size nucleolus (or) absent of nucleolus development. Yolk vesicle were seen on cytoplasm a at the cortical alveolus phase and the extract treated fishes has minimum amount of yolk substance (or) absence of yolk substance (Fig

– 3 & 4). Histopathology has received increasing interest in changes of oocyte size in extract treated fish.



Fig : 1 Shows the difference in the growth of ovary after treated with the plant extract 11 and 24 Days.

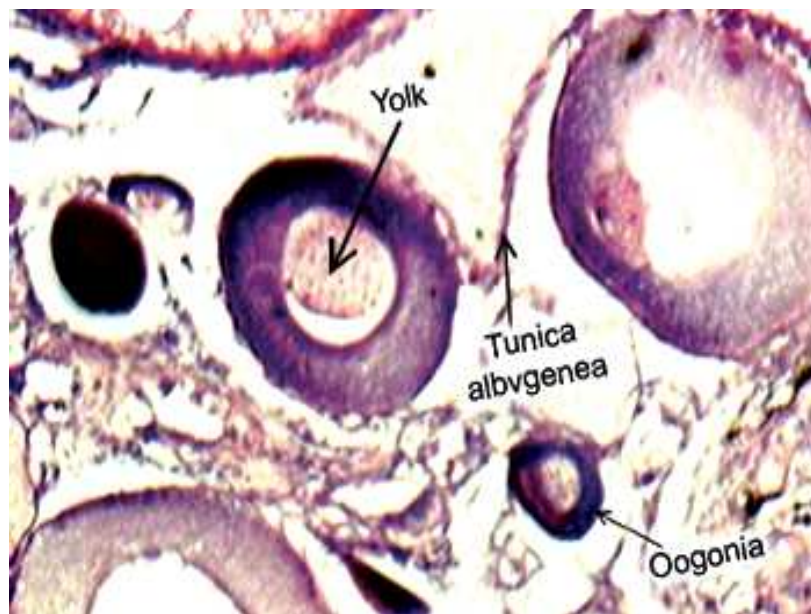


Fig : 2 Normal Structure of ovary (20 X).

The morphological changes of the oocyte of black molly by vitellogenic maturation and the gradually increased size of oocyte [27]. Both, the treated fishes' oocyte size was gradually decreased. In control, the size of the oocyte are evenly distributed, but due to the treatment with the extract, the oocyte was condensed [28],[29]. The vitelline membrane appear commonly at the yolk substance, but the present result showed, that the disappearance of vitelline membrane in the extract treated fishes [30]. The treated black molly resulted by gonadal maturation difference with leaf extract, and its acts as inhibitor and changed the morphological characteristics of gonads and this might be due to the granulation of the cytoplasm, and

appearance of increase in number of vacuoles and irregularity in the shape of the oocyte [31],[32] .

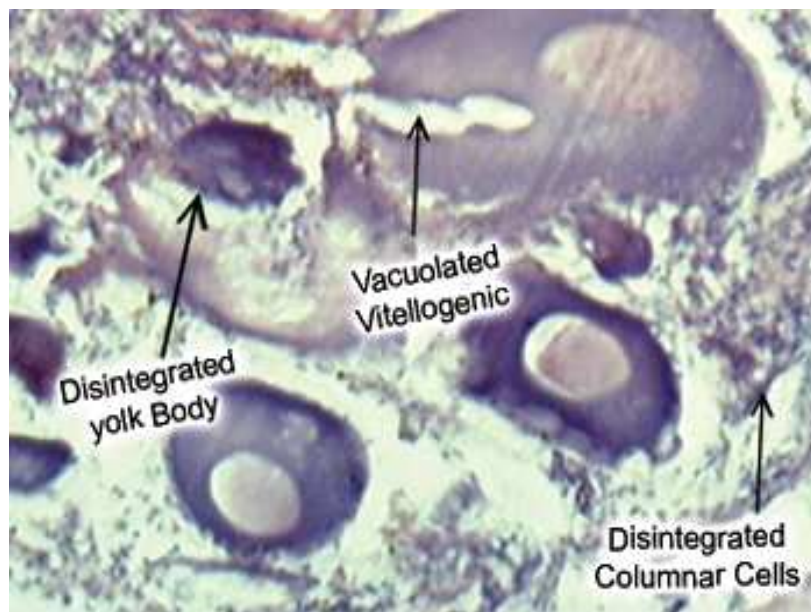


Fig : 3 Change in the structure of oocyte of ovary after 11 days of treatment with the extract.

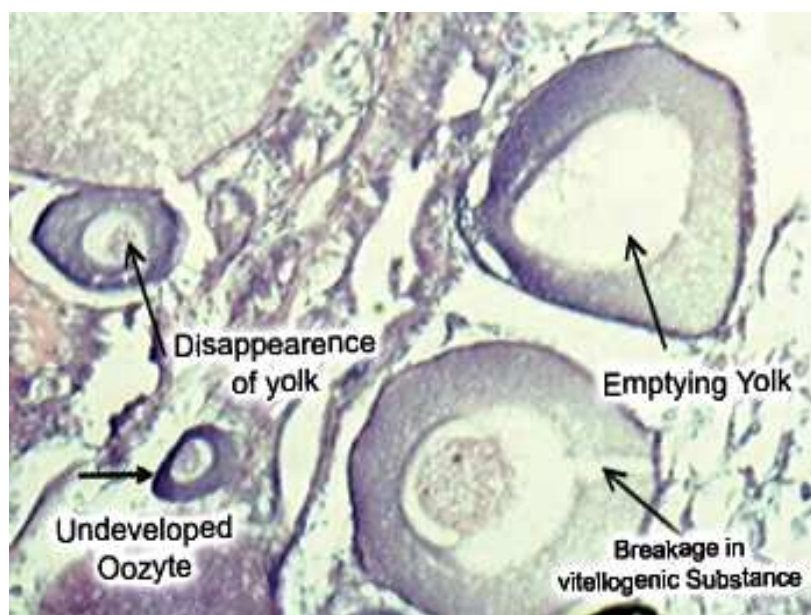


Fig : 4Changes in the structure of oocyte of ovary after 24 days treatment with the extract

The present results shown a damage on tissues of ovaries was minimal while animal exposed to a minimum period of (11 days) to the extract of *A.paniculata*. But, exposure to a period of 24 days resulted a disintegration of many more ovary cells, rendering the ovaries devoid of oocyte and undeveloped ovary.

CONCLUSION

Commonly the leaves and roots of *A. paniculata* were used for medicinal purposes. The usage of leaf extract control of pest in aquaculture practices to the control of fish predator may directly or indirectly affect the reproduction of fishes..

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