

Induction of ovulation and spawning in the catfish, *Clarias batrachus* (L.) by prostaglandin F_{2a}

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Summary. Administration of low doses of prostaglandin F_{2a} (PGF_{2a}), i.e. 10 and 100 ng/g b.wt, was ineffective in inducing ovulation and spawning in mature catfish. However, doses of 200 ng/g b.wt of PGF_{2a} elicited partial response, and 500 ng/g b.wt of PGF_{2a} induced profuse ovulation and spawning similar to that induced by administration of human chorionic gonadotropin (HCG).

Prostaglandins are known to stimulate the smooth muscles of the reproductive tracts of mammals³⁻⁷ and birds⁸. It is reported that prostaglandins play a role in the process of ovulation in mammals⁹⁻¹² and it is suggested that prostaglandins might induce ovulation and spawning in fishes^{13,14}. In this investigation, an attempt has been made to study the effect of prostaglandin (PGF_{2a}) in the induction of ovulation and spawning in the catfish *Clarias batrachus*.

Mature catfish, *Clarias batrachus* were collected around the Mangalore area early during the spawning period (May-June) and were brought to Dharwad in fish containers. These fish were initially acclimatized in large cement cisterns for 1 week. The fish selected for experimentation were acclimatized for 3-4 days in glass aquaria. The experiment was conducted in June, 1981. The fish were divided into 6 groups and treated as shown in the table.

The prostaglandin and the chorionic gonadotropin were administered i.p. and injected specimens were maintained individually in aquaria. Each aquarium was examined for eggs 11-12 h after injection. Every injected fish was stripped and the ripe eggs were collected and then number calculated per 100 g b.wt. Saline-injected fish were used as controls. It is known that HCG induces ovulation and spawning in *C. batrachus*^{15,16}. A group of 6 fish was treated with HCG so that the ovulation/spawning response could be compared in HCG treated and PGF_{2a} treated fish.

The results of this experiment are given in the table. Administration of low doses of PGF_{2a}, 10 ng/g b.wt and 100 ng/g b.wt, did not induce ovulation and spawning in all fish, whereas PGF_{2a} at 200 ng/g b.wt elicited a partial response in 5 out of 6 treated fish with 2848.83 ± 598.39 eggs/100 g b.wt. 500 ng/g b.wt of PGF_{2a}, however, induced profuse ovulation and spawning with 9219.46 ± 1686.39 eggs/100 g b.wt in all 6 fish. The results are similar to those of the HCG trial, in which the number of ovulated eggs is 7463.27 ± 725.00 /100 g b.wt and is not significantly different. Saline-treated fish did not show any response. These

observations show that administration of high doses of PGF_{2a} induces ovulation in *Clarias batrachus*, while low doses are ineffective. There are a few reports on the efficacy of prostaglandins in the induction of ovulation and spawning in fishes. To the best of our knowledge, this is first report on a catfish to show that ovulation and spawning is induced by PGF_{2a}.

Earlier reports have shown that administration of PGF_{2a} can induce ovulation in HCG-treated goldfish¹³. However, Stacey and Peter¹⁴ were able to induce female spawning behavior in goldfish with a lower dose, 10 ng of PGF_{2a} when injected intraventricularly. In our study, however, the best response was observed with 500 ng/g b.wt when injected i.p. From the results of mammalian studies, 2 hypotheses have been advanced to explain the role of PGs in ovulation. PGs may act directly to induce ovulation by stimulating the release of an ovulatory surge of gonadotropins^{17,18}, or PGs might act directly on the ovary^{12,19-22}. In this experiment, HCG also induced ovulation and spawning not significantly different from that of fish treated with 500 ng of PGF_{2a}. Therefore, it seems that the action of PGF_{2a} may be direct on the ovary. However, further experimentation is needed to elucidate the exact mechanism of actions of prostaglandins in the induction of ovulation and spawning in *Clarias batrachus*.

| Group | Treatment and dosage | No. of fish injected | No. of fish spawned | No. of eggs/100 g b.wt |
|-----------|--|----------------------|---------------------|------------------------|
| Group I | Saline control (0.2 ml of 0.6% saline) | 6 | Nil | Nil |
| Group II | HCG* (4 IU/g b.wt) | 6 | 6 | 7463.27 ± 725.00 |
| Group III | PGF _{2a} ** (10 ng/g b.wt) | 6 | Nil | Nil |
| Group IV | PGF _{2a} (100 ng/g b.wt) | 6 | Nil | Nil |
| Group V | PGF _{2a} (200 ng/g b.wt) | 6 | 5 | 2848.83 ± 598.39 |
| Group VI | PGF _{2a} (500 ng/g b.wt) | 6 | 6 | 9219.46 ± 1686.39 |

*Chorionic gonadotrophin (Gonadotrophon, L.H. Paines and Byrne Ltd, England). **PGF_{2a} (Equimate) ICI Ltd, England. p-Values between the groups: II and V, $p < 0.001$; II and VI, not significant; V and VI, $p < 0.01$.

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