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Impact of *Withania Somnifera* (Ashwagandha) on the Protein Composition of Specific Tissues in *Channa Gachua*

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ABSTRACT

An attempt has been made to ascertain the impact of the homeopathic medication *Withania somnifera* on the level of tissue protein and weight gain in *Channa gachua*. A 30-day feeding trial was conducted to investigate the impact of *Withania somnifera*, an herbal supplement, on the diet. The quantity of protein in the muscles, liver, and ovaries of the fish under treatment and the control group was measured. The amount of protein in the fish's liver and muscle that received ashwagandha treatment did not significantly increase. On the other hand, the ovary displayed a noticeably higher protein content per gram of tissue. The amount of tissue protein in the ovary after it is fed an experimental diet causes the ovary to mature prematurely.

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Introduction

Several freshwater fish species reach a certain level of maturity or "ripening," but they require the right social and environmental cues to finish maturing and spawning. The term "induced final maturation and ovulation" best describes forced reproduction at this point, since the induction cannot take place until a particular degree of maturity is attained. *Withania somnifera* is one such homeopathic remedy. The berries and leaves of *W. somnifera* are treated locally in Ayurveda medicine to cure ulcers, tumors, tubercular glands, and carbuncles. The herbal treatment ashwagandha, which has been used traditionally to treat a variety of symptoms and illnesses, is made from the roots of *W. somnifera*. The exotic Indian herb ashwagandha has amazing stress-relieving qualities that are on par with manmade medications used to treat anxiety and depression. Apart from its remarkable neuroprotective properties, ashwagandha could be a viable substitute therapy for several degenerative illnesses like Parkinson's and Alzheimer's. Strong antioxidants included in ashwagandha seek out and neutralize free radicals, which have been linked to aging and other age-related disease states. Recently Even more astoundingly, new research indicates that ashwagandha may also have anti-cancer properties. Because of its low intramuscular bone content, proteinaceous nature, ability to heal wounds, anti-inflammatory qualities, and affordability, *Channa* is widely consumed in Asia and has significant economic value. The impact of *W. somnifera* on the biochemical components of *Channa gachua*'s ovary is

investigated in this study. Additionally, the quantity of protein in muscle and liver tissue is measured.

Mature fish perform a technique called induced breeding to procreate in limited water when they are prompted by an external substance. Administering pituitary extract from a fish or a mammal is a popular technique for induced breeding in fish. Gonadotropins are the hormones that stimulate reproduction. It is also discovered that the placental hormone chorionic gonadotropin is equally efficacious [1]. Given that ashwagandha has been suggested to have aphrodisiac properties, the current study aims to explore some of the concepts associated with using this homeopathic medication to encourage breeding in the commercially significant fish, *C. gachua*. Since the herb ashwagandha has been suggested to have medicinal properties, the present investigation aims to explore some of the concepts associated with using this homeopathic medication to encourage breeding in the commercially significant fish, *C. gachua*. The purpose of this project is to offer some crucial baseline data regarding the usage of a natural product in the large-scale production of other species that are significant to the global economy.

Materials and Methods

The fish, which are called *C. gachua*, were procured from the Centre for Aquaculture Research and Extension (CARE), Aquafarm, St. Xavier's College, Palayamkottai. They were then housed in glass tanks that were filled with bore well water (DO: 6.6 mg/L, temperature: 26-28°C, salinity: 27-28%, pH: 7-7.3), with three fingerlings per tank for each treatment. Supplementary

feed was prepared by using the dried powder of *W. somnifera* (Table.1) [2]. Fish were split into two groups, one serving as a control and the other as an experimental group, in order to quantify the amounts of protein in the liver, muscle, and ovary. The experimental fish were sacrificed after being fed diets. After the fish were dissected, the liver, muscle, and ovaries were removed and processed to estimate the amount of protein [3].

Table 1: Percentage Composition of Ingredients of Experimental Diets

Diet	1 st day		10 th day		20 th day		30 th day		W.G
	Length	Weight	Length	Weight	Length	Weight	Length	Weight	
Control	5.9± 0.2	1.778± 0.29	7.0± 0.3	2.637± 0.33	7.6± 0.3	3.354± 0.07	8.4± 0.5	4.674± 0.40	2.896
Experiment	5.8± 0.3	1.993± 0.23	6.7± 0.2	2.661± 0.29	8.4± 0.3	5.001± 0.67	9.8± 0.7	7.075± 0.53	5.082

Result and Discussion

This study examines how *W. somnifera* affects the amount of protein in ovarian tissues and how long they take to grow. The growth pattern displayed by the experimental and control fishes is illustrated in Table 1. The results of the student’s t test revealed a significant difference between the growth rates of the experimental and control diets. The growth parameters of *C. gachua* showed increased values when medicinal plants were added to diets. For example, *C. gachua* given the control diet grew 2.896g of body weight, while those given the *W. somnifera* diet gained 5.082g (Table 2). The weight increase results were greater than the control diet values. The herbs enhanced the cellular use of lipids and fatty acids as well as protein accumulation, which helped *Pagrus major* fish grow well [4]. Higher protein synthesis and better food utilization were the causes of the growth gain in *L. rohita* on a diet supplemented with herbs [5].

Table 2: Growth Performance of C Gachua

Ingredients	Semimoist Feed	Ashwagandha Diet
Soy Flour (%)	25	25
Tapioca Flour (%)	10	10
Wheat Flour (%)	10	10
Rice Flour (%)	20	20
Rice Bran (%)	10.7	10.5
Fish Oil (%)	2.3	2.3
Vitamin / Mineral Mix (%)	2	2
Anchovy (%)	10	10
Jawala (%)	10	10
Ashwagandha (%)	0	2

Protein Content

Table 3 shows the protein percentage (mg%) found in the control and treated fishes’ ovary, liver, and muscle. Fish used in the experiment and control groups had their liver and muscle protein contents measured. The experimental group and the control group do not differ significantly. In the present study, *W. somnifera* treatment for 30 days increased the protein in the ovary of *C. gachua*. The rise is most likely the result of oocytes absorbing vitellogenin, which is a precursor to yolk protein absorbed during maturation [6]. Reserve food components, such as glycogen, certain other carbohydrates, lipids, and proteins—collectively referred to as yolk or vitellin—package the egg cytoplasm during vitellogenesis [7]. Wallace reported a similar conclusion, stating that the liver synthesizes vitellogenin in response to estradiol, which is subsequently released into the bloodstream and delivered to the ovary [8]. Protein yolk precursors are absorbed into oocytes through micropinocytosis, according to ultrastructural data [9]. Three polypeptides were detected in the protein profile of the liver using SDS-Polyacrylamide gel electrophoresis at 15.8, 31.6, and 63 KDa region, while five polypeptides were detected in the ovary at 50.1, 79.4, 100, 125.3, and 158.4 KDa region. A comparison of this reveals an additional polypeptide region in the experimental fish’s ovary.

Table 3: Protein Content (mg %) Present in Ovary, Liver and Muscle of the Control and the Treated Fish, C Gachua

$$\text{Weight gain (g)} = \text{Final live weight (g)} - \text{Initial live weight (g)}$$

Tissue Analysed	Control	Experimental
Ovary	5.9	9.2
Liver	2.4	2.8
Muscle	3.6	3.8

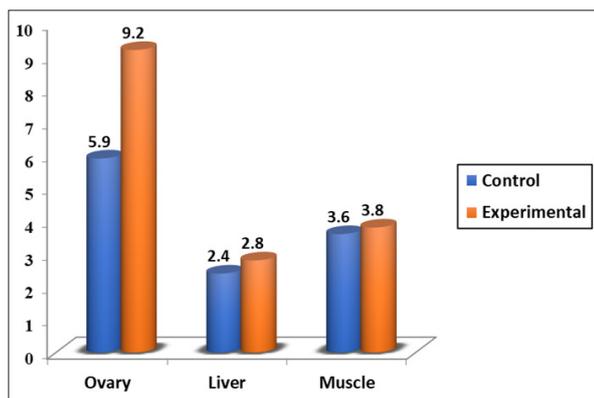


Figure 1: Protein Content (mg %) Present in Ovary, Liver and Muscle of the Control and the Treated Fish, C Gachua

$$\begin{aligned} \text{Hepatosomatic Index} &= \text{Liver Weight/Total body weight} \times 100 \\ &= 0.064 / 7.638 \times 100 \\ &= 0.837 \end{aligned}$$

$$\begin{aligned} \text{Gonadosomatic Index} &= \text{Gonad Weight/ Total body weight} \times 100 \\ &= 0.135 / 7.638 \times 100 \\ &= 1.767 \end{aligned}$$

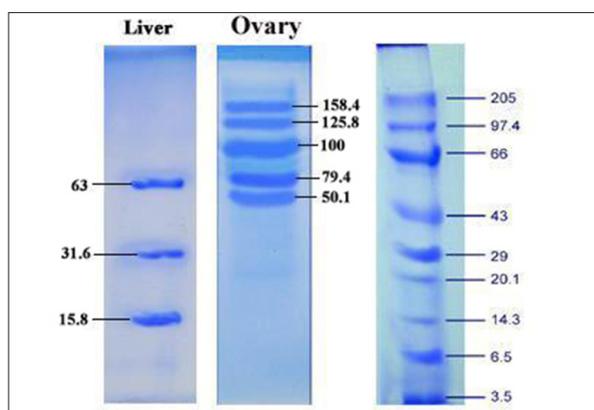


Figure 2: Protein Profile of Liver and Ovary of Withania Somnifera Treated Channa Gachua in SDS-PAGE

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