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Full Length Research Article

IMPACT OF *SPIROGYRA VARIANS* ALGAE EXTRACT ON PROTEIN ALTERATIONS OF THE BROILER CHICKEN *GALLUS GALLUS*

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ABSTRACT

The present observation, the protein content were analyzed from different tissues (liver, Kidney and muscle) of control and experimental (Spirogyra varians algae powder mixed poultry feed) broiler chicken Gallus gallus. The protein values were noted in 5, 10 and 15 days of exposure period. The experiment (Spirogyra varians algae powder mixed poultry feed) broiler chicken Gallus gallus showed increasing trend in the liver, Kidney and muscle protein, when compared to control.

Key words: Catla catla, Freshwater fish, Bacteria.

INTRODUCTION

People mostly depend on water for agricultural and domestic purposes. But with rapid growing population and urbanization, different activities like unplanned building and encroachment, clearing of riparian vegetation along the river banks, disposal of waste materials in river and unwise mining of construction materials from the rivers are commonly observed in rivers. Human as well as natural phenomena are responsible for bringing disturbances in the river system (Gyawali, 2011). *Spirogyra* sp. is a genus of filamentous unbranched green algae that forms free floating mats in shallow waters. It widely occurs in stagnant waters, such as ponds and canals, in shaded littoral zones of lakes and in slow streams (Hainz *et al*., 2009 and Thiamdao *et al*., 2011). Which belong to class (Chlorophyta) and order Zygnematales, named for the helical or spiral arrangement of the chloroplasts that is diagnostic of the genus. Currently, *Spirogyra* is gaining interest and considered as an ingredient or supplement for cosmetics, antioxidants or in foods, as well as in pharmaceutical products (Punyoyai, 2008 and Lee, 2008). *Spirogyra* sp. is a genus of filamentous freshwater green algae in the division Chlorophyta, Order Zygnematales, Family Zygnemataceae. It is named after the helical or spiral arrangement of the chloroplasts. There are more than 400 species of *Spirogyra* in the world (Naik *et al*., 2012). *Spirogyra* sp. is consumed by people in the north and northeast of Thailand as a traditional food. It contains high amount of nutritional compositions including basic nutrients such as carbohydrates, fats, proteins, multivitamins, minerals and antioxidants (Peerapornpisal, 2008).

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Spirogyra sp. was screened against three bacteria: *Pseudomonas solanacearum*, *Escherichia coli* and *Clavibacter michiganense* and three plant pathogenic fungi: *Fusarium oxysporum, Curvularia* species and *Aspergillus niger*. Its antimicrobial property was found to be effective against the entire test organisms (Naik *et al*., 2012). Moreover, *Spirogyra* phytochemical components (alkaiods, steriods, flavonoids, tannins, terpanoids) exhibit antimicrobial activity against *Escherichia coli* and *Candida albicans* (Ratikanga *et al*., 2014). Protein rich feeds are one of the costliest feed ingredients in animal diets. The roughage based diets that are the primary ruminant feed in India are deficit in protein. Poor dietary supply of proteins results in low rates of reproduction and production, as well as increased susceptibility of livestock, including poultry, to metabolic disorders and infectious diseases. Animal nutritionists constantly seek cheaper, easily available, noncompetitive (with human food), unconventional agroforestal and industrial co-products for feeding to ruminants and poultry. The feed deficit in India is currently 11 percent for dry fodder, 28 percent for concentrate and 35 percent for green fodder (NIANP, 2005). Microalgae are an enormous biological resource, representing one of the most promising sources for new products and applications (Pulz and Gross, 2004). In the modern poultry farming there is a major demand to produce high quality poultry meat and egg at low price without rely on antibiotics and other medicinal use in poultry feed and water. Many synthetic drugs and growth promoters are being supplemented to the broilers to attain more weight gain in lesser time, but the use of such drugs have shown many disadvantages like higher rearing cost, adverse side effects on health of birds, prolonged withdrawal period and residual effects. Continuous feeding of

antibiotics to chickens results in accumulation of the antibiotic and muscle) of control and experimental (*Spirogyra varians*

Table 1. Feed ingredients and calculated composition of the control and experimental diets (gram)

Ingredients %	Control group (Gram)	Experimental group (Gram)
Yellow corn, soybean meal 44%, fats/oil, crude fibre, calcium, phosphorous, lysine, methionine, vitamin premix, mineral premix and salt	100	99
Spirogyra varians algae powder	-	1
Total	100	100

Table 2. Level of total protein content (mg/g) in broiler chicken exposed to 1% of algae *Spirogyra varians* powder mixed poultry feed

Experiment Days	Group	Liver	Kidney	Muscle
5 days	Control	3.04 ± 0.11	2.90 ± 0.13	4.87 ± 0.44
	Experiment	3.45 ± 0.10	3.01 ± 0.11	5.42 ± 0.13
10 days	Control	3.15 ± 0.11	2.96 ± 0.12	4.97 ± 0.55
	Experiment	3.50 ± 0.14	3.04 ± 0.07	5.55 ± 0.15
	Control	3.12 ± 0.05	3.01 ± 0.18	5.05 ± 0.49
15 days	Experiment	3.63 ± 0.14	3.11 ± 0.13	5.65 ± 0.23

Mean values ± SD four observations of control and experiment tissues

Use of antibiotics in farm animals resulted in a dramatic increase in the deaths and illness associated with antibiotic resistance (Newman, 2002). Since consumers are aware of the residual effects of antibiotics in poultry meat that is why they demand drug-free food products. This has led to the search of alternative natural growth enhancers such as plants and their extracts. The scientists are again concentrating on the use of, one time honored, ancient medicinal system to find beneficial herbs and plants, which can be safely used to increase the productivity of animals and poultry. One such plant is neem (*Azadirachta indica*) that has been shown to have important medicinal properties (Biswas *et al.,* 2002). Changes in dietary protein caused more impact on broiler performance compared with carbohydrates and lipids. Changes in macronutrients caused metabolic changes in broilers (Hada *et al*., 2013).

MATERIAL AND METHODS

For the present investigation, *Spirogyra varians* algae collected from Uppanar estuary, Cuddalore District, Tamil Nadu, India, were shade dried at room temperature for about 10 days. Then the dried *Spirogyra varians* algae materials were powdered in a mechanical grinder. 1 gram algae powder are added in the 99 grams of (Artificially formulated poultry feed) poultry feed. They are mixed thoroughly and it's used in the experimental broiler chicken *Gallus gallus*. The feed can be used in the control broilers without plant powder (Artificially formulated poultry feed). The tissues (Liver, kidney and muscles) of broiler chicken *Gallus gallus* (10mg) were homogenized in 80% methanol, centrifuged at 3500 rpm for 15 min. and the clear supernatant was used for the analysis of total proteins. Total protein concentration was estimated by the method of Lowry (Lowry *et al.,* 1951).

RESULTS

Preparation of *Spirogyra varians* algae mixed poultry feed: 1 gram of *Spirogyra varians* algae powder was added in the 99 grams of (Artificially formulated poultry feed) poultry feed. They are mixed thoroughly and it's used in the experimental broiler chicken *Gallus gallus*. The feed can be used in the control broilers without plant powder (Artificially formulated poultry feed) (Table 1). In the present study, the protein content were analyzed from different tissues (liver, Kidney (Table 2 and Fig. 1, 2 and 3). The protein values were noted in 5, 10 and 15 days of exposure period.

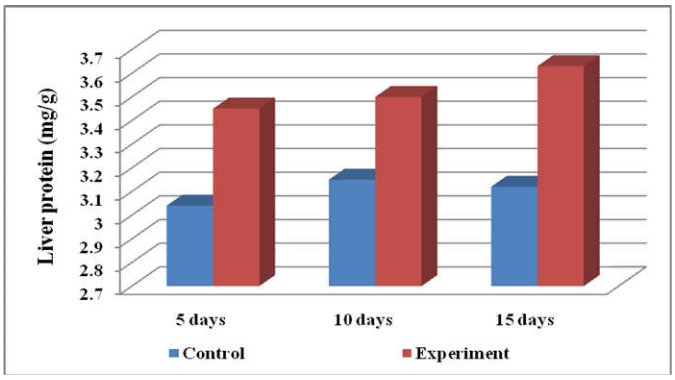

Fig. 1. Level of total liver protein content (mg/g) in broiler chicken exposed to 1% of algae *Spirogyra varians* mixed poultry feed

The protein values 3.04, 3.15 and 3.12 (mg/g) was recorded in the liver tissue of control broiler chicken *Gallus gallus* for a period from 5, 10 and 15 days. The protein content 3.4, 3.50 and 3.63 (mg/g) was observed in the tissue of experimental broiler chicken *Gallus gallus* for a period of 5, 10 and 15 days (Table 2 & Fig. 1). The kidney protein values were noted 2.90, 2.96 and 3.01 (mg/g) was recorded in the control broiler chicken *Gallus gallus* for a period from 5, 10 and 15 days. The kidney protein content 3.01, 3.04 and 3.11 (mg/g) was observed in the tissue of experimental broiler chicken *Gallus gallus* for a period of 5, 10 and 15 days (Table 2 & Fig. 2).

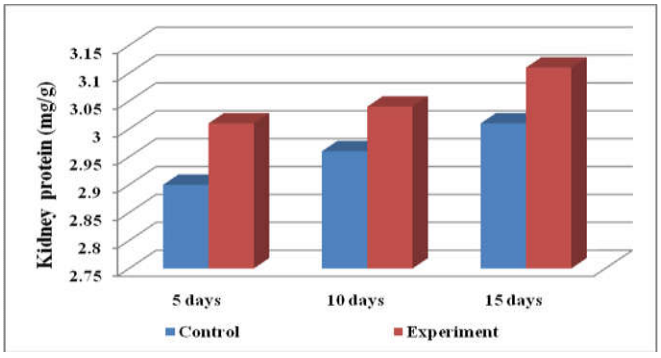

Fig. 2. Level of total kidney protein content (mg/g) in broiler chicken exposed to 1% of algae *Spirogyra varians* mixed poultry feed

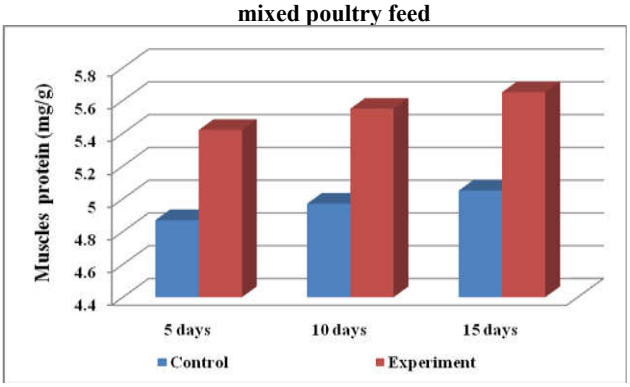

Fig. 3. Level of total muscle protein content (mg/g) in broiler chicken exposed to 1% algae of *Spirogyra varians* mixed poultry feed

The muscles protein values 4.87, 4.97 and 5.05 (mg/g) were recorded in the tissue of control broiler chicken *Gallus gallus* for a period from 5, 10 and 15 days. The muscles protein content was recorded 5.42, 5.55 and 5.65 (mg/g) in the tissue of experimental broiler chicken *Gallus gallus* for a period of 5, 10 and 15 days (Table 3 and Fig. 3). In this study, the experiment broiler chicken *Gallus gallus* showed increasing trend in the liver, Kidney and muscle protein, when compared to control.

DISCUSSION

The positive effects of herbs on body weight and general performance may be due to the presence of a mixture of essential fatty acids including linolenic and linoleic acids presented in some herbs, especially the black seeds which are essential for growth (Murray *et al*., (1991). Toghyani *et al.* (2010) reported that the low dosage (5 g/Kg) of Thyme have significant effect on broiler body weight and their feed conversion ratio. Najafi and Torki, (2010) reported that the group which fed by thyme-included diet had significantly better body weight and feed conversion ratio, But Tekeli *et al.* (2006) and Demir *et al.,* (2008) reported opposite results; they found that thyme has no influence on broilers performance.

The improvement in feed conversion ratio with feeding herbal extract could be associated with improving the digestibility of dietary protein in the small intestine (El-Gendy *et al.,* 1996). The action of herbal extracts as antioxidants, anti bacterial, anti fungal and anti protozoa also add to the positive improvement in birds' performance (Leung and Foster, 1996). Elbushra *et al.* (2012) reported that live body weight at 6 weeks old, body weight gain, feed conversion ratio and protein efficiency ratio were significantly improved for chicks fed diets supplemented with fenugreek at rate of 0.5% or 1.5% as compared to control diet. Supplementation of fenugreek had significant effect for broiler chicks in live body weight, body weight gain, feed conversion ratio, protein efficiency ratio, feed consumption and efficiency of energy utilization. These obtained results go in agreement with Banjo, (2012). Teteh *et al.* (2013) and Makanjuola *et al.* (2014) in broiler chickens supplemented with *Moringa* extract. Different concentrations of *Moringa* aqueous leaf extract induce increased in body weight gain and improved in feed conversion rate in Cobb broilers (Portugaliza and Fernandez, 2012). Elevation in weight gain and improved in feed conversion rate may be attributed to presence of high amounts of vitamins, minerals and amino acids in *Moringa* leaf (Nkukwana *et al*., 2014). *Moringa* leaf extracts was induced significant increase in body weight gain improved in feed conversion rate. *Moringa* leaf extract act growth promoter (Hossam Allam *et al*., 2016). In this investigation, protein content of liver, Kidney and muscle can be increased in the tissues of experiment broiler chicken *Gallus gallus* when compared to control. Chronakis *et al.* (2001) reported that proteins isolated from *Spirulina* are quite intricate biomaterials, likely to be protein and/or protein pigment (phycocyanin) complexes rather than individual protein molecules. Neem leaves contain biological active components that affect the feed utilization. These biological active components may also change the hematological and serum biochemical substances of animals (Kausik *et al*., 2008 and Akpan *et al.,* 2008). Elevations in total protein our study may be due to *Moringa* are rich in both essential and sulfur containing amino acids (Moyo *et al.,* 2011) and due to *Moringa oleifera* contain large amount of protein (Onu and Otuma, 2008). *Moringa* leaf extract act growth promoter, antioxidant and have benefits effect in immunity, heamatological and biochemical parameters (Hossam Allam *et al*., 2016).

Conclusion

Thus, the present baseline information of the biochemical composition (Protein) observation of the control and experimental (*Spirogyra varians* algae powder mixed poultry feed) broiler chicken. The algae mixed poultry feed were showed potential for boosting biochemical composition in the experimental broiler chicken compared to control group. So the most available algae were converted in the poultry feed to increase poultry food production and economic benefits in the poultry farmers. Accordingly, it is recommended that the algae mixed feed on the broiler chicken and cattle's.

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