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Effect of Nishyinda leaves, ginger and turmeric extract (combination) on blood parameter and growth performance in broiler chicken

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Abstract

This study aimed to determine the effectiveness of Nishyinda (N) leaf, Ginger (Z), and Turmeric (T) extract (NTG extract) as a growth promoter in the broiler. A total of 20-day old broiler chicks were bought from Kazi Farms Limited, Bangladesh, and randomly split into two after seven days. The control (A) group was not supplemented with NTG extract in drinking water while NTG extract @ 1ml / litre in drinking water was supplemented to group B. Weekly measurements were reported for live body weight to gain up to 6 weeks and blood testing was performed at broiler's age of 21 and 42 days to assess hematological differences between control and treatment groups. The recorded FCR value was 1.93 and 1.88 respectively in control and treatment groups, which indicates that the NTG extract played a vital role. The mortality rate in Group A, recorded was 20%. Results showed that supplementing NTG extracts (Group B) in broilers resulted in a significant increase ($P < 0.05$) in mean live weights compared to control (A) group whereas, the hematological parameters (TEC, PCV, Hb, ESR) showed no significant ($p > 0.05$) difference as compared to control group.

Keywords: Nishyinda leaf, ginger, turmeric, broiler chicks, FCR, hematological parameter

Introduction

The pattern of sub-therapeutic use of antimicrobial growth promoters (AGP) as a preventive disease in livestock occurs in veterinary medicine [1]. The majority of antimicrobial growth promoters in the European Union (EU) were banned in 1999 with strict enforcement of the ban as of January 2006 [2]. These facts lead the world to find alternative growth promoters in poultry besides antibiotics. Nishyinda (*Vitex negundo*) is a hardy plant that mainly flourishes in the Indian subcontinent [3]. All parts of the plant, from root to fruit, possess a multitude of secondary phytochemical metabolites that impart to the plant an unprecedented variety of medicinal uses. The plant is a component of a range of commercially available herbal formulations and has also demonstrated potential as an effective bio-control agent similarly there are many herbal plants available in the Indian subcontinent that are somehow used in our daily lives. Ginger (*Zingiber officinale*) is a perennial plant with narrow, bright green, grassy leaves and purple-marked, yellowish-green flowers. Ginger is one of the top 20 herbal supplements on the market in the United States and today, pharmacopeias in many different countries list ginger extract for various digestive diseases [4]. Iranloye, 2002, noted a significant increase in RBC, PCV, WBC, and the total concentration of Hb in rats fed with garlic [5]. Treatment with garlic extract increases the activation of natural T-lymphocyte killer cells and enhances immune function [6], while Turmeric (*Curcuma longa*) is a tropical plant native to Southern and Southeastern tropical Asia and Curcumin is the main bioactive ingredient responsible for Curcuma biological operation. This has been shown that curcumin has many biological properties, exhibiting anti-inflammatory [7], antioxidant [8], and hypolipidaemic [9]. Turmeric has been widely used in diets for poultry. Turmeric is *Zingiberaceae*, a natural herb of the ginger family. A broad range of medicinal properties has been promoted for this herb. Turmeric was widely used in poultry feed in different amounts, dosages, and durations. The main objective of adding feed additives is to boost animal performance in poultry birds by increasing their growth rate, improving feed conversion efficiency, greater livability, and reduced mortality. These feed additives are called "Growth promoters" and are also referred to as feed additives other than nutrients [10].

Herbal growth promoters have shown therapeutic effects of feed contaminants such as aflatoxin against liver damage [11].

This research aimed to achieve the following aims:

1. To evaluate the growth performance of broiler supplemented with Nishyinda leaf, Ginger and Turmeric extract.
2. To investigate the effect of Nishyinda, Ginger and Turmeric extract on blood parameters of broiler.

Materials and Methods

Preparation of herbal extract

Mature and disease-free Nishyinda leaf, Ginger and Turmeric were collected from Bangladesh Agricultural University, Mymensingh, Bangladesh campus. The Nishyinda leaf was washed and dried in the sun for 2 days for the preparation of the water extract, Ginger and Turmeric (NTG). They pulverized the dried leaves with a blender. 10 g of each Nishyinda leaf, Ginger and Turmeric was added to 4000 ml of distilled water and boiled for an hour to make the final volume 3000 ml and 15 g iodide salt was added as a natural preservative, filtered and water extract was 1% and kept for future use in the refrigerator.

Collection and management of chickens

Broilers of 1 day old were collected from Kazi Farms Limited. The finally selected 20 chicks were allowed to acclimatize for 7 days in the experimental shed. The body weights (b.wt.) of assigned chickens were taken with a digital weighing machine and the results were recorded. During acclimatization the chickens were supplied with recommended feed and water. No antibiotics or vaccine was used in this experimental broiler. The rations consisted of broiler starter mash and broiler finisher mash, which were fed from 2-4 and 5-6 weeks of age, respectively.

The experimental units were kept on a floor litter system in separate pens each measuring 3 x 4 square feet. The pens were thoroughly cleaned, whitewashed, and disinfected before putting the experimental chick into these. All the birds were provided the same management conditions like floor space, temperature, relative humidity, ventilation, and light. The chicks were brooded at 35 °C during the first week and thereafter; the temperature was reduced by 30 °C every week until the temperature reached the room temperature i.e., 25±1 °C. A weighed amount of the ration was offered to the birds twice a day and the leftover feed was collected to calculate feed consumption of the birds.

Experimental design

The experiment was conducted according to the completely randomized design and data were collected on initial body

weight, weekly body weight gain, and weekly feed consumption. The data collected were used to measure weekly growth rate, feed utilization efficiency, and mortality percentage. After 7 days of acclimatization all 20 broiler chicks were randomly divided into 2 equal groups (A and B) to determine the effectiveness of NTG extract as a growth promoter on the broiler. Mean live weight gain by broiler group on 7th, 14th, 21st, 28th, 35th, and 42nd days was recorded. Blood samples were collected from controlled and treated chicken veins at the 21st and 42nd to study the effect of NTG extract on parameters such as (a) Total Erythrocyte count (TEC) (b) Hemoglobin estimate (Hb) (c) Packed Cell Volume (PCV) (d) Erythrocyte sedimentation rate (ESR) and (e) Total erythrocyte count (TEC) using well-known methods as described in Lamberg and Rothstein (1977) [12].

Postmortem examination for side effects

There was no mortality in the experimental broilers during the experimental period, however at the end of the experiment (after 42 days) postmortem examination were carried out but there was no significant change in any organs.

Statistical analysis

The data were analyzed statistically between control and treated groups of chicken by Student 't' test.

Results and Discussion

Effect of NTG leaves extracts supplementation on growth in broilers

The mean live body weight (g) recorded after six weeks of the experimental period was 1600±58.02 and 1700±63.04 respectively (Table 1 and Fig 1). Results showed that supplementing NTG extracts (Group B) in broilers resulted in a significant increase ($P<0.05$) in mean live weights compared to the control (A) group. Test also showed that in the treatment group, FCR is also less (1.88) than in the control group (1.93). Similar findings obtained from Qamar *et.al.* (2015) stating that the introduction of consumer herbal products to broilers substantially improved weight gains for birds [11]. Also S. Khatun and Al. (2013) concluded that the mean live weight of broiler was significantly increased when tulsi (*Ocimum sanctum*) and neem (*Azadirachta indica*) leaves were used as a broiler growth promoter [10]. The birds' improvement in weight gain may be due to inhibition of pathogenic bacteria such as *S. aureus*, *E. coli*, and *aflatoxin* which are harmful to microbes [13]. In our study, commercial feed supplementation with NTG extract showed a significant ($p<0.05$) impact on feed consumption of reared birds, which is also on par with previous research [11, 5].

Table 1: Initial and final live weight, weight gain, feed consumption and feed conversion ratio of broilers fed different levels of NTG extract from 1 to 6 weeks of age

Variables	Control	Treatment
	A (n=10) mean±SD	B (n=10) mean±SD
Initial live weight (g) of day old chicks	45±1.80	45±1.10
Initial live weight (g) on 7 th day	142±7.30	141±7.30
Final live weight (g) on 42 nd day	1600±58.02	1700±63.04 *
Weight gain (g)	1478±45.90	1559±36.90 *
Feed consumption (g)	3100	3200*
Feed conversion ratio (FCR) (g feed consumed/g weight gain)	1.93	1.88

*Mean values within the same row were significantly different ($P<0.05$) between groups

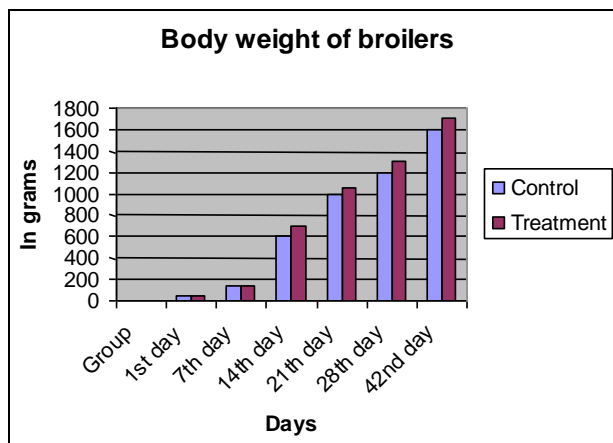


Fig 1: Weekly body weight gain trend

Effect of NTG leaves extracts supplementation on Carcass

Statistical analyzes of the data showed that the introduction of NTG extract in broiler drinking water had a major impact on the intake of feed relative to the control group. However, no difference was observed between the percentages of dressing, relative gizzard weights, and relative spleen weight of two feeding groups' birds (Table 2). Our finding corroborates with the result of Mahmood *et al.* (2009) as a non-significant effect on percentage values for broiler dressing was observed due to the inclusion of garlic and kalongi in broiler diets [13]. They also noted no difference ($P>0.05$) in dressing percentage or relative gizzard and spleen weights between the Polyherbal supplemented and control group [14].

Table 2: Dressing percentages, relative giblet weight (heart, gizzard, liver and spleen) and pancreas of broilers administered 1ml/L drinking water of NTG extract and control

Variables	Control	Treatment
	A Mean±S.E	B Mean±S.E
Dressing percentage	62.01±1.02	63.39±1.14
Relative heart weight	0.45±0.39	0.46±0.02
Relative gizzard weight	1.49±0.076	1.51±0.070
Relative liver weight	2.60±0.047	2.61±0.09
Relative spleen weight	0.12±0.005	0.12±0.006
Relative pancreas weight	0.28±0.018	0.29±0.019

Effects of NTG leaves extracts on hematological parameters of broiler

Observation of hematological parameters (RBC, Hb, PCV, ESR) on the 21st and 42nd day was taken but no substantial difference ($P>0.05$) between control and treatment groups was observed in the groups (Table 3 & Figure 2). Molla and his team in 2013 also observed no difference in hematological parameters between control and treated group when Nishyinda, black pepper, and cinnamon extract were used as a growth promoter in broiler chickens [14]. Our outcome is different from the research of Iranloye (2002), which states that Garlic feeding significantly increased red cell count, hemoglobin concentration, and PCV compared to control for 30 days ($P<0.05$). A large rise in total white blood counts, neutrophils, monocytes, and lymphocytes was also seen in the garlic fed rat. No major improvements in the counts of basophils and eosinophils were detected [5].

Table 3: Effects of NTG extract on hematological parameters (RBC, Hb, PCV, ESR) of broiler

Day	Treatment	Mean ± SEM	Significant status	
21 st day	RBC Million/mm ³	NTG extract	197.32±5.54	NS
		Control	191.35±4.37	
	Hb g/L	NTG extract	6.47±0.07	
		Control	6.00±0.14	
	PCV %	NTG extract	19.00±0.60	NS
		Control	16.33±0.88	
ESR	NTG extract	8.66±0.88	NS	
	Control	10.67±0.86		
42 nd day	RBC Million/mm ³	NTG extract	297.67±12.12	NS
		Control	248.70±13.87	
	Hb g/L	NTG extract	7.64±0.2	
		Control	6.92±0.27	
	PCV %	NTG extract	20.71±0.34	NS
		Control	17±0.61	
	ESR	NTG extract	4.00±1.01	
		Control	7.00±0.60	

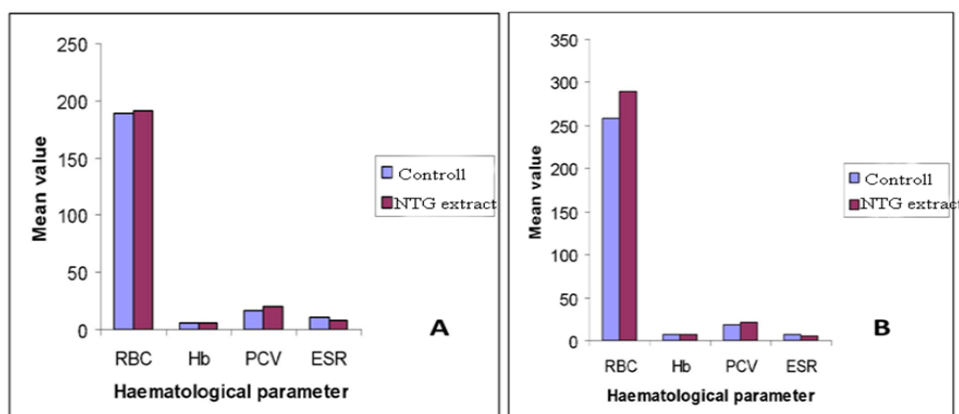


Fig 2: Haematological parameter (RBC, Hb, PCV and ESR) at 21st Day (A) and at 42nd Day (B) in control and treatment group

Conclusion

This research work shows that continuous NTG extract treatment provided a substantial ($p < 0.05$) increase in live body weight and had no substantial ($p < 0.05$) effects on blood parameters as there are no side effects of herbal medication and the study duration is only six weeks, while RBC's physiological life span is 120 days. It is concluded that supplementation of NTG extract @ 1 ml / L in drinking water from the broiler treatment group caused a significant increase in live body weight and positive effects on hematological parameters compared to that of the broiler control group. Further large-scale trials are needed to make the findings more accurate and effective in order to determine the different levels of antibodies in treated group broilers by exposing certain organisms in experimental broilers before experimental bird culling.

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