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# A Comparative Study on Efficacy of Piperazine Citrate and Levamisole Against Natural Infected Ascariasis in Indigenous Chicken of Bangladesh

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**ABSTRACT**

Backyard poultry farming is an essential component of rural livelihoods in Bangladesh, particularly for women, as it provides both nutrition and income. Indigenous chickens raised under traditional management systems are highly susceptible to gastrointestinal parasitic infections, with *Ascaridia galli* being the most prevalent and pathogenic nematode. This study investigated the prevalence of *A. galli* and evaluated the efficacy of two commercial anthelmintics Piper® (piperazine citrate) and Neotrax® (levamisole) in indigenous chickens aged 2 to 12 months across several villages in Rowmari Thana, Kurigram district. The overall prevalence of ascariasis was 86%, with the highest infection rate (90%) observed in younger birds (2-4 months). Oral administration of Piper® (250 mg/kg) and Neotrax® (0.08 g/kg) resulted in significant improvements in body weight (10.42% and 30%, respectively) and complete elimination of parasite eggs by day 14, which was sustained through day 28. Hematological analyses showed increases in TEC, Hb, and PCV, along with reductions in ESR and TLC, indicating improved health status in treated birds. Postmortem examinations further confirmed the absence of intestinal lesions in treated groups, in contrast to the severe pathology observed in untreated controls. The study concludes that Piper® and Neotrax® are highly effective and safe for managing *A. galli* infections and offer a practical strategy for improving poultry health and productivity in rural backyard farming systems.

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## Introduction

Global poultry production continues to expand rapidly, driven by increasing demand for affordable animal protein. Broiler chickens are particularly important due to their fast growth, efficient feed utilization, and consumer preference for lean meat (Ariana et al., 2011). However, intensive production exposes birds to various stressors that can compromise health and productivity (Toghyani et al., 2010). Traditionally, antibiotics have been used as growth promoters to enhance feed efficiency and disease resistance, but their use has been restricted due to the risk of antimicrobial resistance and consumer health concerns (Ariana et al., 2011). Phytogenic feed additives, including herbs and plant extracts, have gained attention as natural alternatives to antibiotics. Green tea (*Camellia sinensis*) is rich in catechins, particularly epigallocatechin gallate (EGCG), known for its antimicrobial, antioxidant, and immunomodulatory properties (Abdul-Azeem, 2005; Guo et al., 2004). Previous studies have suggested that green tea may improve growth performance and carcass quality in broilers, though findings remain inconsistent (Sarker et al., 2010). This study aimed to evaluate the effects of green tea powder supplementation on growth performance, feed efficiency, carcass traits, and hematological profiles of broiler chickens, with the goal of determining its potential as a natural antibiotic substitute (Ariana et al., 2011).

## Materials and Methods

### Experimental Design and Management

The experiment was conducted at Aziz Poultry Farm, Magura Sadar, under the supervision of the Department of Pharmacology and Toxicology, Sylhet Agricultural University, Bangladesh. One hundred fifty-day-old Cobb-500 chicks were randomly allocated to three groups (n = 50 per group):

$T_0$: Control (basal diet only)

$T_1$: Antibiotic (basal diet + amoxicillin 30%, 1 g/kg feed)

$T_2$: Green tea (basal diet + 0.5% green tea powder, 5 g/kg feed)

Birds were reared for 35 days under identical management conditions with ad libitum feed and water. Standard commercial pre-starter, starter, and grower feeds (Nourish Feed Ltd.) were used.

### Data Collection

Live body weight was recorded weekly. Feed intake and feed conversion ratio (FCR) were calculated at 7-day intervals. At day 35, five birds per group were randomly selected for slaughter to measure dressing percentage.

### Hematological and Biochemical Analysis

Blood samples were collected from wing veins at day 35. Parameters analyzed included Total Erythrocyte Count (TEC), Hemoglobin (Hb), Packed Cell Volume (PCV), Serum Glutamate Oxaloacetate Transaminase (SGOT), and Serum Glutamate Pyruvate Transaminase (SGPT), using standard methods Lamberg and Rothstein (1977); Coffin (1995); Gupta and Charan (2007).

### Statistical Analysis

Data were analyzed using one-way ANOVA (Minitab v20), and mean differences were determined using Tukey's test. Significance was set at $P < 0.001$.

## Results and Discussion

### Growth Performance

Broilers supplemented with green tea ($T_2$) exhibited significantly higher ($P < 0.001$) body weight gain (2004.88 g) compared to antibiotic (1964.86 g) and control groups (1914.75 g).

**Table 1.** Comparison of live body weight among the group

| Group | Mean Live Weight gain (g) | | | | |
|---|---|---|---|---|---|
| | **Day 7** | **Day 14** | **Day 21** | **Day 28** | **Day 35** |
| $T_0$ (N=50) | 167.55b | 463.27c | 899.46c | 1462.18c | 1914.75c |
| $T_1$ (N=50) | 179.27a | 475.78b | 921.44b | 1487.49b | 1964.86b |
| $T_2$ (N=50) | 182.07a | 485.05a | 940.63a | 1518.56a | 2004.88a |
| SEM | 1.34 | 1.77 | 3.25 | 4.44 | 6.69 |
| Level of Significance | *** | *** | *** | *** | *** |

T= Control group, T= Antibiotic supplemented group, T= Green Tea supplemented group, N= Number of birds, SEM= Standard Error of Mean

***Values in rows with different superscripts differ significantly (p<0.001)

### Carcass Traits

The highest dressing weight (1443.51 g) and dressing percentage (72%) were recorded in the green tea group. Offal weights (heart, liver, spleen) were also significantly higher ($P < 0.001$) in $T_2$, while gizzard weight was slightly lower.

The intestinal length was longest in $T_2$ (160.48 cm) compared with $T_0$ (145.30 cm).

70% 71% 72%

T0 T1 T2

### Feed Intake

All the feed intake values are presented in Table 2. Feed was supplied in different groups $T_0$, $T_1$ and $T_2$ separately. Every 7 days interval total consumed feed amount of each group are calculated from total feed stock. Feed intake was slightly lower in the green tea group (2987 g) compared to the control (3086 g).

**Table 2.** Comparison of feed intake among the group

| Group | Average feed intake (g/bird) | | | | |
|---|---|---|---|---|---|
| | **Day 7** | **Day 14** | **Day 21** | **Day 28** | **Day 35** |
| $T_0$ (N=50) | 150 | 535 | 1180 | 2150 | 3086 |
| $T_1$ (N=50) | 156 | 540 | 1165 | 2125 | 3026 |
| $T_2$ (N=50) | 160 | 555 | 1152 | 2100 | 2987 |

**Feed Conversion Ratio (FCR)**

All the FCR values are presented in Table 3. FCR improved significantly in the green tea group (1.49) compared with antibiotic (1.54) and control (1.61). Use of dietary green tea improves feed conversion ratio.

**Table 3.** Effects of treatments on FCR 7 days interval

| Group | Feed Conversion Ratio (FCR) | | | | |
|---|---|---|---|---|---|
| | Day 7 | Day 14 | Day 21 | Day 28 | Day 35 |
| $T_0$ (N=50) | 0.90 | 1.15 | 1.31 | 1.47 | 1.61 |
| $T_1$ (N=50) | 0.87 | 1.13 | 1.26 | 1.43 | 1.54 |
| $T_2$ (N=50) | 0.80 | 1.14 | 1.22 | 1.38 | 1.49 |

**Hematological and Biochemical Parameters**

All the hematological values are presented in Table 4. The green tea-supplemented group showed significant increases ($P<0.001$) in Hb (13.75 g/dl), PCV (41.70%), and TEC ($4.85\times10^6$/mm³) compared to the control. SGOT and SGPT levels were also elevated within physiological ranges, suggesting enhanced liver function. The mean values of hemoglobin increased significantly ($p<0.001$) in all the treated groups and the highest was recorded in group $T_2$ (13.752g/dl) and lowest in control group $T_0$ (9.806g/dl). The mean value of PCV (Packed Cell Volume) also increased significantly ($p < 0.001$) in all the treated groups. The highest value was recorded in group $T_2$ (41.707%) and lowest in control group $T_0$ (36.463%). The mean values of TEC (Total Erythrocyte Count) in all treated groups were increased significantly ($p < 0.001$) than control group. The highest TEC value was recorded in group $T_2$ (4.850 million/mm$^3$) and lowest in group $T_0$ (3.113 million/mm$^3$).

**Table 4.** Haemato-biochemical parameters in broilers after being treatments

| Items | Treatment (Mean) | | | SEM | Level of Significance |
|---|---|---|---|---|---|
| | $T_0$ (N=50) | $T_1$ (N=50) | $T_2$ (N=50) | | |
| Hemoglobin Content (g/dl) | $09.806^C$ | $11.820^b$ | $13.752^a$ | 0.315 | *** |
| PCV (%) | $36.463^C$ | $38.866^b$ | $41.707^a$ | 0.437 | *** |
| TEC (million/$^3$mm blood) | $03.113^b$ | $03.687^b$ | $04.850^a$ | 0.172 | *** |
| SGOT (U/L) | $342.80^a$ | $332.56^b$ | $287.96^C$ | 4.440 | *** |
| SGPT (U/L) | $06.757^a$ | $05.743^b$ | $04.77^c$ | 0.186 | *** |

T= Control group, T= Antibiotic supplemented group, T= Green Tea supplemented group, N= Number of birds, SEM= Standard Error of Mean

***Values in rows with different superscripts differ significantly ($p<0.001$)

The inclusion of 0.5% green tea powder improved body weight gain and feed efficiency in broilers, consistent with findings by Sarker et al., (2010) and Biswas et al., (2000). Green tea catechins may enhance digestive enzyme activity, modulate gut microflora, and reduce oxidative stress, leading to improved nutrient utilization (Abdul-Azeem, 2005; Guo et al., 2004). There was a tendency of Green Tea Powder (GTP) to suppressed feed intake (Biswas et al., 2001) without change of the body weight gain. Sarker et al. (2010) showed feed intake highly decreased by increasing the percentage of green tea powder on diet. Feed intake is more decreased in 1.0% green tea powder than 0.5%. Same observation showed by (Yang et al., 2003) that feed intake decreased more in 1.0% green tea powder than 0.5% green tea powder supplied with normal diet and feed intake more decreased in 0.5% green tea powder supplement diet than control. Reduced feed

intake with improved FCR indicates better metabolic efficiency. This has been also observed in other feeding experiments using layers (Biswas et al., 2000; Toghyani et al., 2010). Several experiment (Biswas et al., 2001; Sarker et al., 2010; Yang et al., 2003) showed that increased percentage (0.5%) of green tea powder improved feed efficiency or Feed Conversion Ratio (FCR) than control. Similar result observed in current experiment that dietary 0.5% GTP improved FCR in broiler. The positive effects on hematological indices suggest that green tea promotes hematopoiesis and overall physiological health. Increased Hb, PCV, and TEC values support improved oxygen transport and metabolic activity, aligning with earlier reports (Yang et al., 2003). The increased level of total erythrocyte count, hemoglobin content and packed cell volume might be due to the effects on haemopoietic organs. Enhanced SGOT and SGPT values within normal limits indicate improved liver metabolism without toxicity. Dietary supplementation of green tea also affects offal's weight significantly and increase the intestinal length observed significantly in green tea treatment group (Abdul-Azeem, 2005; Guo et al., 2004). These results confirm that green tea powder can serve as a safe and effective alternative to antibiotic growth promoters, improving productivity and health performance in broilers (Abdul-Azeem, 2005; Guo et al., 2004).

## Conclusion

Dietary supplementation of 0.5% green tea powder significantly improved growth performance, feed efficiency, dressing yield, and hematological parameters in broiler chickens. Green tea may serve as a natural and sustainable alternative to antibiotic growth promoters in poultry production.

## Conflict of interest

The authors declare that there is no conflict of interests.

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