

Effect of Supplementing *Allium sativum* (Garlic) and *Azadirachta indica* (Neem) Leaves in Broiler Feeds on Their Blood Cholesterol, Triglycerides and Antibody Titre

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ABSTRACT

Effect of dried garlic powder and neem leaves on blood cholesterol, triglycerides and antibody titre (Newcastle and Infectious Bursal disease viruses) was investigated in 120 day-old broiler chicks. At the end of eight weeks feeding trial, both garlic and neem were found to significantly decrease blood cholesterol and triglycerides and to increase antibody titre compared with control birds.

Key Words: Garlic; Neem; Cholesterol; Triglycerides; Antibody titre; Broiler

INTRODUCTION

Pakistan is rich in plants of significant medicinal value. These plants have been reported to possess useful pharmacologically potent chemical substances for use in poultry (Akhtar *et al.*, 1984). Garlic (*Allium sativum* L.), in addition to its food value, have emerged as a potent hypocholesterolemic, antifungal and antibacterial agent (Ikram, 1972). Likewise, extract of dried leaves of Neem (*Azadirachta indica*) have been found very effective against Fowl pox and Newcastle disease viruses (Singh *et al.*, 1988). This paper describes the effect of these plants on blood cholesterol, triglycerides and antibody titre (against Newcastle and Infectious Bursal Diseases) in broiler chicks.

MATERIALS AND METHODS

One hundred and twenty day-old broiler chicks of mixed sexes were randomly divided into 15 experimental units of eight chicks each. These experimental units were randomly allotted to the five treatments, viz. A, B, C, D and E, in such a way that each treatment was applied on three experimental units. Treatment 'A' served as control while 5 and 10 gm neem/kg feed were added in the ration for birds under treatments 'B' and 'C', respectively. Similarly 10 gm and 20 gm garlic powder/kg of feed were mixed in the rations for birds under treatments 'D' and 'E', respectively. The broiler starter ration was fed *ad libitum* from day one to 28 and finisher ration from day 29 to 56 of age.

The chicks of all experimental treatments were kept under uniform managemental conditions and on

deep litter system in individual pens (3'x4'x1.75'). Birds were vaccinated against Newcastle Disease (ND) through intraocular route at day seven and subcutaneously at day 28 of age. Birds were also vaccinated against Infectious Bursal Disease on 10th, 20th and 30th day of age through intraocular route.

Blood cholesterol and triglycerides were determined by Liebermann-Burchard reaction method (Liebermann, 1985) at eight weeks of age and antibody titre against ND was measured by microtitration technique (MAFF, 1984) and that of IBD at four and eight weeks of age. The data thus collected were analyzed by analysis of variance technique using completely randomized design and compared by Duncan's Multiple Range (DMR) test (Snedecor & Cochran, 1991).

RESULTS AND DISCUSSION

Results have been presented in Table 1. The minimum blood cholesterol (123 mg/dl) level was recorded in chicks fed on neem @ 5 gm/kg feed, followed increasingly by those fed on garlic @ 20 gm/kg feed (131 mg/dl), garlic @ 10 gm/kg feed (138 mg/dl), neem @ 10 gm/kg feed (149 mg/dl) and normal/control feed (155 mg/dl). Statistical analysis revealed significantly ($P < 0.01$) lower level of blood cholesterol in birds fed rations containing Neem @ 5 gm/kg feed, garlic powder @ 10 or 20 gm/kg feed than the control. The difference among these treatments was, however, non-significant. The paired comparison also revealed a non-significant difference between birds fed ration without supplementation and those fed ration containing neem @ 10 gm/kg feed.

Table I. Average values of various blood parameters as influenced by garlic and neem supplementation in broiler feeds

Parameters	Age (weeks)	Treatments				
		A (Control)	B Neem @ 5 gm/kg	C Neem @ 10 gm/kg	D Garlic @ 10 gm/kg	E Garlic @ 20 gm/kg
Blood cholesterol (mg/dl)	8	155.3 ^a	123.7 ^c	149.0 ^{ab}	138.7 ^{bc}	131.7 ^c
Blood triglycerides (mg/dl)	8	92.0 ^a	72.33 ^b	75.33 ^b	89.67 ^a	90.0 ^a
Geometric mean	4	9.8	26.0	207.9	12.1	13.0
HI titre for ND	8	388.08	630.3	1024.0	512.0	776.0
Geometric mean	4	39.4	104.0	128.0	78.8	97.0
IHI titre for IBD	8	315.2	776.0	1260.7	388.0	630.3

^{a,b,c} Values within a classification in the same row with different letters differ significantly ($P < 0.05$); HI = Haemagglutination Inhibition; IHI = Indirect Haemagglutination Inhibition; ND = Newcastle disease; IBD = Infectious bursal disease

The minimum blood triglyceride (72.33 mg/dl) level was found in chicks fed ration containing neem @ 5 gm/kg feed, followed increasingly by those fed ration containing neem @ 10 gm/kg feed (75.33 mg/dl), garlic @ 10 gm/kg feed (89.67 mg/dl), garlic @ 10 gm/kg feed (90 mg/dl) and normal/control ration (92 mg/dl). The chicks fed on rations containing neem @ 5 or 10 gm/kg feed had significantly ($P < 0.05$) less value of blood triglycerides compared with control. Non-significant differences were, however, observed among birds fed on ration without supplementation or containing garlic @ 10 or 20 gm/kg feed.

The chicks under treatment of garlic had 10.73 to 15.23% less blood cholesterol and 2.17 to 2.54% less blood triglycerides level than control. Similarly, the chicks under neem treatment had 4.08 to 20.39% less blood cholesterol and 18.12 to 21.38% less blood triglycerides level.

Reduction in cholesterol and triglycerides with garlic or neem has also been reported previously (Jain, 1977; Qureshi *et al.*, 1983; Horton *et al.*, 1991; Dixit *et al.*, 1992; Konjufca *et al.*, 1995; Pesti, 1997). The lower levels of triglycerides may be due to the inhibition of fatty acids synthesis. Organic tellurium compounds are found in high concentration in garlic buds, which may contribute to lower the blood cholesterol levels by inhibiting squalene epoxidase, the penultimate enzyme in the synthetic pathway of cholesterol (Qureshi *et al.*, 1983).

The highest antibody titre against ND at four weeks of age was found in chicks fed ration containing neem @ 10 gm/kg feed with GMT value of 207.9,

followed by those fed rations containing neem @ 5 gm (26.0), garlic @ 20 gm, (13.0), garlic @ 10 gm (12.1) and unsupplemented control (9.8). At eight weeks of age, the highest titre was in chicks fed ration containing neem @ 10 gm (1024.0), followed by garlic @ 20 gm (776.0), neem @ 5 gm (630.3), garlic @ 10 gm (512.0) and lowest in un-supplemented control (388.0). The highest GMT value at four weeks of age against IBD was found in chicks fed ration containing neem @ 10 gm/kg feed (128.0), followed by neem @ 5 gm (104.0), garlic @ 20 gm (97.0), garlic @ 10 gm (78.8) and control (39.4). Similarly the highest GMT value at eight weeks of age was recorded in birds fed ration containing neem @ 10 gm/kg (1260.7), followed by neem @ 5 gm (776.0), garlic @ 20 gm (630.3), garlic @ 10 gm (388.0) and lowest level was recorded in control (group A) which was 315.20. Both the herbs (garlic and neem) improved the antibody titre.

The antibody titre of neem treated broilers was 2-21 times more for ND and 2-4 times more for IBD than non treated control. The antibody titre of garlic treated broilers was also 1.3 times more for ND and 2-2.5 times more than control for IBD.

The results of the present study are also supported by the findings of certain other investigations (El-Habbak *et al.*, 1989) where an increased level of antibody titre with garlic in Japanese quails was observed. Singh *et al.* (1988) also reported increased antibody titre with the use of neem. Neem leaves possess antiviral properties against Newcastle Disease virus and may increase the titre level.

CONCLUSION

Garlic and neem may be used to reduce the blood cholesterol and triglycerides and increase antibody titre of the birds against ND and IBD viruses. However, in this respect the neem has more potential compared with the garlic.

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