

Effect of Four Medicinal Plants (*Withania somnifera*, Liquorice, *Allium sativum* and *Berberis lycium*) Mixture Extraction the Hematological and Hypolipidemic Characteristics in Broiler Chicks

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Research Article

Abstract

The research study was undertaken to investigate the effect of different level of (*Withania somnifera*, Liquorice, *Allium sativum* and *Berberis Lycium*) extract in broiler chicks at NWFP Agricultural University Peshawar, Pakistan. Group A was kept as control, while B, C and D were treated with (*Withania somnifera*, Liquorice, *Allium sativum* and *Berberis lycium*) extract at the rate of (5 g+2.5 g+2 g+8 g), (10 g+5 g+3 g+9 g) and (15 g+7.5 g+4 g+10 g) g/L of water, respectively. Hb, PCV and TLC in group B was significantly ($P<0.05$) higher than other groups. Cholesterol, triglyceride, HDL and LDL was significantly ($P<0.05$) reduced in group B than other groups. It is concluded that (*Withania somnifera*, Liquorice, *Allium sativum* and *Berberis Lycium*) extract of (10 g+5 g+3 g+9 g) gm/L of water could effectively be utilized to control the lipid profile and hematology of broiler chicks.

Keywords: Hematological; Hypolipidemic; Poly herbs.

Abbreviations

Hb: Hemoglobin; TLC: Total Leukocyte Count; PCV: Packed Cell Volume; HDL: High Density Lipoprotein; LDL: Low Density Lipoprotein; ND: New Castle Disease; IB: Infectious Bronchitis; IBD: Infectious Bursal Disease

1. Introduction

Scientific interest in medicinal plants has developed rapidly due to increased efficiency of new plant-derived drugs, growing interest in natural products and rising concerns about the side effects of conventional medicine. Based on current research and financial investments into medical plants, it seems that they will continue to play important roles in human health. The medicinal plants find application in pharmaceutical, cosmetic, agricultural and food industry. The use of medicinal herbs for curing disease has been documented in history of all civilizations.

Allium sativum it is also known as Garlic, it is used by some people to treat the symptoms of acne and there is some evidence that it can assist in managing high cholesterol levels [1]. Garlic has an international reputation for lowering both blood pressure and blood cholesterol levels and generally improving the health of the cardio-vascular system. It has immunomodulatory activities. Epidemiological and animal studies have shown that garlic consumption reduces the incidence of cancer, e.g. in the stomach, colon, breast and cervix [2]. Risk factors for cardiovascular disease, including high cholesterol, high homocysteine, hypertension and inflammation,

increase the risk of dementia, including its most common form, Alzheimer's disease (AD) control by garlic. Epidemiological and animal studies have shown that garlic consumption reduces the incidence of cancer, e.g. in the stomach, colon, breast and cervix, better feed conversion efficiency [2,3].

Liquorice, one of the most biologically active herbs known, acts as an anti-inflammatory [4]. Immunological adjuvant effect of *Glycyrrhiza uralensis* saponins on the immune responses [5]. Liquorice contains a number of active ingredients. Glycyrrhizin possesses anti-inflammatory, antiulcer, expectorant, antimicrobial and anxiolytic like activities [4]. Based on these significant medicinal importance of mixture of plants (*Withania somnifera*, Liquorice, *Allium sativum* and *Berberis Lycium*) a research study was planned in broiler chicks

2. Materials and Methods

This research study was conducted to investigate the effect of different levels of plants extract (*Withania somnifera*, Liquorice, *Allium sativum* and *Berberis Lycium*) in broiler chicks at NWFP Agricultural University Peshawar poultry farm.

2.1 Preparation of mixture of plants

Mixture of medicinal plants *Withania somnifera*, Liquorice, *Allium sativum* and *Berberis lycium* were collected from the local market. The plant parts (fruit, leaves, and root) were cut into small pieces, air dried and powdered.

2.2 Experimental design

The experiment was conducted in Completely Randomized Block Design (CRBD) with two factors that is (i) treatment with different level of plant materials (ii) vaccines. For this purpose two hundred forty (240) day old broiler chicks of approximately the same weight and appearance were purchased from the local market. These chicks were alienated into four treatment groups A, B, C and D, respectively. These groups were divided into two sub-groups for the different treatments. Each group carried three replicate (10 chicks/replicate). Treatment group designated as A was kept as control, while B, C and D were treated with an aqueous extract mixture of *Withania somnifera*, Liquorice, Garlic and *Berberis Lycium* at the rate of (5 g+2.5 g+2 g+8 g), (10 g+5 g+3 g+9 g), (15 g+7.5 g+4 g+10 g) per liter of tape water to each group, respectively. Chicks were reared in an open sided house in pens. Feeder, drinker, bulb and other necessary materials were provided to chicks in each pen to maintain sound management and environmental conditions. Experiment was lasted for 35 days.

2.3 Research study parameters

Data was recorded for hematological parameters including hemoglobin (Hb) concentration, packed cell volume (PCV), Total Leukocyte Counts (TLC) and lipid profile (cholesterol, triglyceride, LDL, HDL) determination using Elitech Kit technique as described by Werner.

3. Statistical Analysis

The data was statistically analyzed by the standard procedure of analysis of variance using two factorial completely randomized block design as described by Steel and Torrie [6]. The statistical package (SAS, 1997) was used to perform the above analysis on computer.

4. Results and Discussion

A research study was conducted to investigate the potentials of different levels of herbal plants (*W. somnifera*, *Liquorice*, *A. sativum* and *B. lycium*) extract given in fresh drinking water on the hematological and hypolipidemic parameters by using two factorial randomized completely block design. Findings of the research work are discussed as under.

4.1 Hematology

Mean heamatolgy (Hb, PCV, and TLC) values are discussed as under.

4.2 Hemoglobin

Significant ($P < 0.05$) differences were observed in the mean Hb levels among the treatments and non-significant between the vaccinated and non-vaccinated and also among the interaction of vaccinated and non-vaccinated groups. However, group B showed higher Hb level (8.43 g/dl). The findings of the present study are opposed to the findings of, who observed that significant increase in Hb level, while herbal plant (Neem) was feeding to the laying Hens [7].

4.3 PCV

There was no significant ($P > 0.05$) difference observed on the mean PCV levels among the treatments and non-significant ($P > 0.05$) difference between the vaccinated and non-vaccinated and also among the interaction of vaccinated and non-vaccinated groups. However, group A showed higher PCV level (26.16%). The results of the current study are conflict to observations of, who reported the significant increase in PCV level, while the herbal plant (Neem) was feeding to the laying Hens [7].

4.4 TLC

There was significant ($P < 0.05$) difference observed in the mean TLC levels among the treatments and non-significant ($P > 0.05$) difference between the vaccinated and non-vaccinated and also among the interaction of vaccinated and non-vaccinated groups. Group B showed higher TLC (26233.33 cu/mm) level. The findings of the present research study are supported with the findings of Esonu et al. [7] who had reported significant increase in TLC level during feeding of herbal plant (Neem) to the laying hens (Table 1).

Table 1: Mean Hb, PCV and TLC in broiler chicks fed different levels (*W. somnifera*, Liquorice, *A. sativum* and *B. lycium*) in broiler chicks.

Group	Mean	Mean	Mean
	Hb	PCV	TLC
A	6.33 ^{bc}	26.16	21000.00 ^b
B	8.43 ^a	25.66	26233.33 ^a
C	6.70 ^b	25.00	21766.67 ^b
D	6.03 ^c	24.83	21283.33 ^b
Vaccination			
Vac	6.85	25.75	23016.67
Non-vac	6.90	25.08	22125.00
Interaction			
A × Vac	6.30	28.00	21666.67
A × Non-Vac	6.36	24.33	20333.33
B × Vac	8.53	25.33	25666.67
B × Non-Vac	8.33	26.00	26800.00
C × Vac	6.43	25.00	23000.00
C × Non-Vac	6.96	25.00	20533.33
D × Vac	6.13	24.66	21733.33
D × Non-Vac	5.93	25.00	20833.33

abc: Means within the same row having different superscripts are significantly different ($P < 0.05$)

4.5 Lipid profile

Mean lipid profile (total cholesterol, triglyceride, LDL (low density lipoprotein) and HDL (higher density lipoprotein)) values are presented in Table 2.

4.6 Mean cholesterol and triglyceride

There was significant ($P < 0.05$) difference observed in the mean serum total cholesterol and triglyceride

values were recorded among the treatments. Non-significant difference ($P > 0.05$) between the vaccinated and non-vaccinated subgroups and also among the interaction of vaccinated and non-vaccinated groups. However, the group B was observed with the lowest numerical values. The findings of present study are fully supported with the findings of Visavadiys and Narasinhacharya, who investigated the hypocholesteremic and antioxidant effect of *Withania somnifera* in male albino rats and found significantly ($P < 0.05$) lower total cholesterol level. The results of present study are in agreement with those of Hemalatha et al. [8] who reported that administration of aqueous extract of *Withania somnifera* significantly lowered the serum cholesterol, serum LPO, and hepatic LPO level. The present findings are also supported Niazi et al. [9] who reported that extract of medicinal plants significantly lowered ($P > 0.05$) total triglyceride level of broiler chicks.

4.7 Mean HDL (higher density lipoprotein)

Significantly high ($P < 0.05$) HDL value was observed in group B than control group and non-significant difference ($P > 0.05$) between the vaccinated and non-vaccinated. Similarly no significant ($P > 0.05$) difference was found among the interaction of vaccinated and non-vaccinated groups. Results of present study are in agreement with Jaynt, who reported that *Withania somnifera* prevented the rise in LPO (lipid peroxidation) in rabbit and mice.

4.8 Mean LDL (low density lipoprotein)

Mean serum low-density lipoprotein value was found significant ($P < 0.05$) among the treatments and non-significant between the vaccinated and non-vaccinated. Similarly no significant ($P > 0.05$) difference was found among the interaction of vaccinated and non-vaccinated groups. However, numerically there was lower serum low-density lipoprotein value in treatment B (77.83 mg%) than the control. The findings of present study also support the finding of Niazi et al. [9] who investigated that extract of herbal plant had significantly ($P < 0.05$) lowered LDL level in broiler chicks.

5. Conclusion

It is concluded from the findings of present research work that group B receiving (*W. somnifera*, Liquorice, *A. sativum* and *B. lycium*) extract are potential source to improve full blood count and control the lipid profile in poultry production.

Table 2: Mean cholesterol, triglyceride, HDL and LDL in broiler chicks fed different levels of (*W. somnifera*, Liquorice, *A. sativum* and *B. lycium*).

Group	Mean	Mean	Mean	Mean
	Cholesterol	Triglyceride	HDL	LDL
A	197.66 ^a	138.61 ^a	52.91 ^b	86.61 ^a
B	127.58 ^c	75.61 ^c	86.51 ^a	77.83 ^b
C	168.23 ^b	110.66 ^b	57.51 ^b	84.70 ^a
D	162.28 ^b	113.06 ^b	55.75 ^b	84.90 ^a
Vaccination				
Vac	166.70	106.44 ^b	64.38	83.16
Non-vac	161.18	112.54 ^{ba}	61.96	83.85
Interaction				
A × Vac	201.66	136.40	53.63	88.30
A × Non-Vac	193.66	140.83	52.20	84.93
B × Vac	129.40	77.16	87.96	74.33
B × Non-Vac	125.76	74.06	85.06	81.33
C × Vac	169.83	104.50	60.10	84.86
C × Non-Vac	166.63	116.83	54.93	84.53
D × Vac	165.90	107.70	55.83	85.16
D × Non-Vac	158.66	118.43	55.66	84.63

abc: Means within the same row having different superscripts are significantly different (P<0.05)

6. Recommendations

It is recommended that group B receiving (*W. somnifera*, Liquorice, *A. sativum* and *B. lycium*) extract of drinking water had significantly lower lipid profile and improve full blood count.

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