Effect of Supplementation of Phyllanthus Niruri Extracts on Immune Status in Commercial Broilers

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Abstract

The present work was carried out to study the influence of supplementation of P. niruri in crude and standardized extract forms on the immune potential in commercial broiler chicken. The results revealed that the supplementation of P. niruri crude and std. extracts at 1% and 0.1% levels improved the humoral immunity by increasing antibody titres against specific antigen Ranikhet Lasota in broilers. Further research is needed to confirm the positive influence of P. niruri on immune potential and to optimize inclusion levels and period of inclusion in broiler diets and to determine their possible physiological interfering effects and cost effectiveness. The Hepatostimulatory effect of Phyllanthus and the resultant increase in protein synthesis is once again proved.

INTRODUCTION

In modern poultry production immunomodulation could become an important tool in reducing morbidity and mortality and agents that activate host immune responsiveness can provide supportive therapy to conventional chemotherapy. Nowadays emphasis is being given on the search for herbal formulations, which are helpful in immunomodulation. Several authors (Haribabu and Panda, 1993 and Jaime Borell et al. 2000) had reported that poly herbal formulations containing Phyllanthus niruri (Phyllanthus Linn.) could increase the humoral immune function of hosts. But reports on the supplementation of Phyllanthus niruri extracts alone and the possible immune reaction are scarce. The aim of the present study was to explore the effects of supplementation of Phyllanthus niruri extracts on immune status in commercial broiler chicken.

MATERIALS AND METHODS

Fiftyfour, day old, straightrun broiler chicks belonging to a single hatch of cobb strain from local commercial hatchery were utilized for this study. The chicks were weighed, wing banded, randomly allotted to 3 treatment groups consisting of three replicates of six chicks each. One group served as control (T1 - only basal diet) and other two groups served as treated groups. Out of two treated groups one group was fed with 1% P.niruri crude extract powder supplemented diet (T2) and the other group was fed with 0.1% P. niruri standardized extract powder supplemented diet (T3), from day one. The birds were reared in broiler cages in a gable roofed, open sided house under standard and uniform management conditions throughout the experimental period of six weeks. The broiler starter and finisher mashes were fed ad libitum to the birds. Ranikhet - LaSota strain was used to produce antibodies against Ranikhet disease virus. All the birds were also immunized against Sheep Red Blood Cells (SRBC). Primary immunization was done on 7th day and the secondary immunization was done on 28th day. The humoral immunity was assessed by estimating the HI titre values against specific antigen Ranikhet LaSota by microdilution technique on 7th, 14th, 21st, 28th, 35th and 42nd days (Giamborne, 1982) and HA titre values against non specific antigen SRBC (Van der Zijpp, 1983) on 14th, 21st, 28th, 35th and 42nd days. The serum total protein and albumin were estimated as per modified Biuret and Dumas method (Varley, 1980) and serum globulin and albumin:globulin ratio were calculated. Total and differential white blood cell counts to assess the cell mediated immunity were determined (Campbell, 1995). The experimental results were statistically analyzed (Snedecor and Cochran, 1994) and critically discussed.

RESULTS AND DISCUSSION

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The HI titre values against Ranikhet LaSota antigen on 7, 14, 21, 28, 35 and 42 days of experimental period revealed that were no significant differences among the groups on days 7, 14, 21, 28 and 35 in HI titre values except on day 42, where the group supplemented with P. niruri crude extract recorded highest titre value followed by the group supplemented with standardized extract (p¡0.01). More than this throughout the study period the HI titre values were found to be relatively more in the treated groups than the control group. The HA titre values against SRBC on 14, 21, 28, 35 and 42 days of experimental period revealed that significant difference was observed among the group only on day 35 (p¡0.05) where P. niruri crude extract supplemented group recorded highest followed by P. niruri std. extract supplemented group.

The result of the present study is in accordance with the finding of Haribabu and Panda (1993) who proved that different levels of dietary Livol, a formulation containing Phyllanthus, modulated good immune response to Newcastle disease virus up to 20 weeks of age in layers. They found that high percentage of birds evinced protective titres and high level of immune response to RD vaccinations. Jaime Borell et al. (2000) predicted that the use of immuplus, an another formulation containing Phyllathus, in poultry optimized the vaccinal response by enhancing antibody titre against specific antigen Gumboro through stimulation of humoral immune function of hosts.

The mean serum total protein, albumin, globulin and albumin:globulin ratio estimated on 2nd, 4th and 6th weeks are given in table . No significant difference was noticed among groups in 2 weeks but significant (p¡0.01) differences were noticed in serum total protein, albumin and globulin in 4th and 6th weeks and albumin:globulin ratio in 4th week. P. niruri std. extract supplemented group performed better than the P. niruri crude extract supplemented group, though both the groups have shown increased serum total protein, albumin and globulin than the untreated group. The probable reason may be due to the hepatostimulatory effect of P. niruri extracts followed by increased liver protein synthesis.No significant differences were observed in the total WBC and differential cell counts throughout the study period among different treatment groups. This shows that P. niruri extracts do not have any direct effect on cell mediated immunity.

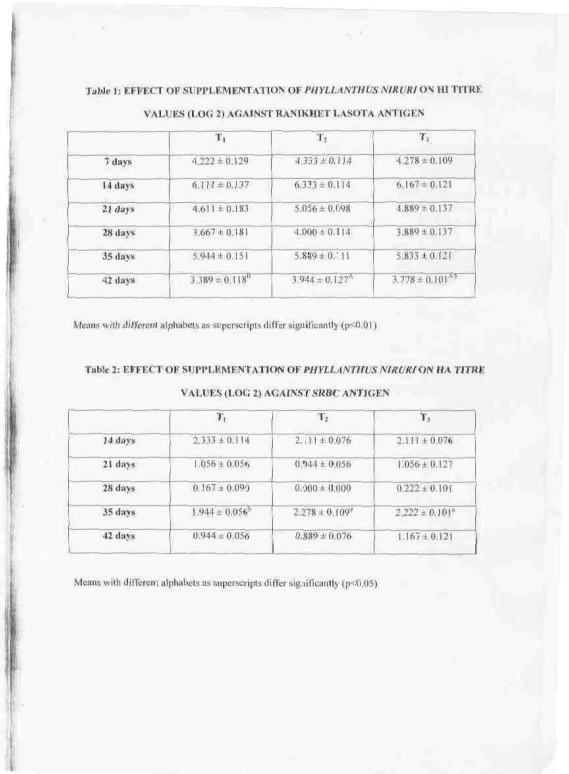

Table 1: EFFECT OF SUPPLEMENTATION OF *PHYLLANTHUS NIRURI* ON HI TITRE VALUES (LOG 2) AGAINST RANIKHET LASOTA ANTIGEN

	T_1	T_2	T_3
7 days	4.222 ± 0.129	4.333 ± 0.114	4.278 ± 0.109
14 days	6.111 ± 0.137	6.333 ± 0.114	6.167 ± 0.121
21 days	4.611 ± 0.183	5.056 ± 0.098	4.889 ± 0.137
28 days	3.667 ± 0.181	4.000 ± 0.114	3.889 ± 0.137
35 days	5.944 ± 0.151	5.889 ± 0.111	5.833 ± 0.121
42 days	3.389 ± 0.118^{B}	3.944 ± 0.127^{A}	3.778 ± 0.101^{AB}

Means with different alphabets as superscripts differ significantly ($p<0.01$)

Table 2: EFFECT OF SUPPLEMENTATION OF *PHYLLANTHUS NIRURI* ON HA TITRE VALUES (LOG 2) AGAINST SRBC ANTIGEN

	T_1	T_2	T_3
14 days	2.333 ± 0.114	2.111 ± 0.076	2.111 ± 0.076
21 days	1.056 ± 0.056	0.944 ± 0.056	1.056 ± 0.127
28 days	0.167 ± 0.093	0.000 ± 0.000	0.222 ± 0.101
35 days	1.944 ± 0.056^{B}	2.278 ± 0.109^{A}	2.222 ± 0.101^{A}
42 days	0.944 ± 0.056	0.889 ± 0.076	1.167 ± 0.121

Means with different alphabets as superscripts differ significantly ($p<0.05$)

Fig. 1: Effect of supplementation of Phyllanthus niruri

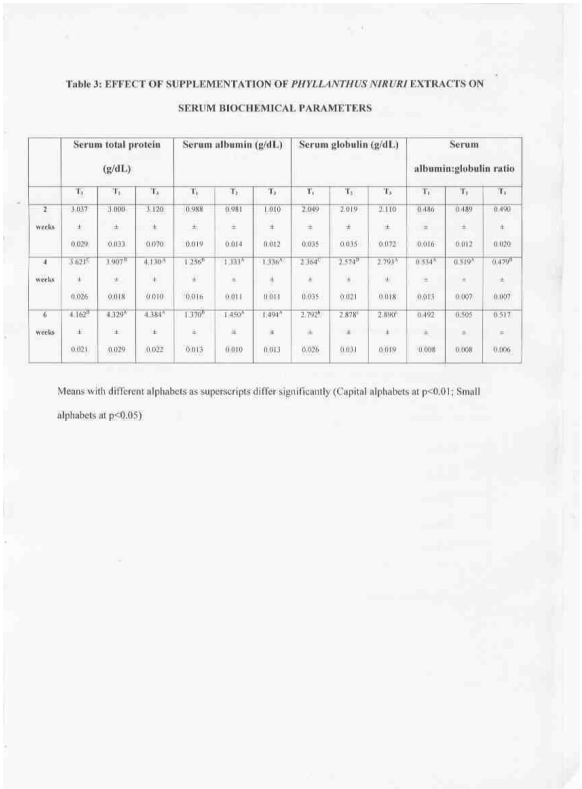

Table 3: EFFECT OF SUPPLEMENTATION OF *PHYLLANTHUS NIRURI* EXTRACTS ON SERUM BIOCHEMICAL PARAMETERS

	Serum total protein (g/dL)			Serum albumin (g/dL)			Serum globulin (g/dL)			Serum albumin:globulin ratio		
	T_1	T_2	T_3	T_1	T_2	T_3	T_1	T_2	T_3	T_1	T_2	T_3
2 weeks	3.037 ± 0.029	3.000 ± 0.033	3.120 ± 0.070	0.988 ± 0.019	0.981 ± 0.014	1.010 ± 0.012	2.049 ± 0.035	2.019 ± 0.035	2.110 ± 0.072	0.486 ± 0.016	0.489 ± 0.012	0.490 ± 0.020
4 weeks	3.621^{c} ± 0.026	3.907^{B} ± 0.018	4.130^{A} ± 0.010	1.236^{B} ± 0.016	1.331^{A} ± 0.011	1.336^{A} ± 0.013	2.364^{C} ± 0.035	2.574^{B} ± 0.021	2.793^{A} ± 0.018	0.534^{A} ± 0.013	0.519^{A} ± 0.007	0.479^{B} ± 0.007
6 weeks	4.162^{C} ± 0.021	4.329^{B} ± 0.029	4.384^{A} ± 0.022	1.370^{B} ± 0.013	1.456^{A} ± 0.010	1.494^{A} ± 0.013	2.792^{A} ± 0.026	2.878^{A} ± 0.031	2.890^{A} ± 0.019	0.492 ± 0.008	0.505 ± 0.008	0.517 ± 0.006

Means with different alphabets as superscripts differ significantly (Capital alphabets at p<0.01; Small alphabets at p<0.05)

Fig. 2: Effect of supplementation of Phyllanthus niruri extracts on serum biochemical parameters.

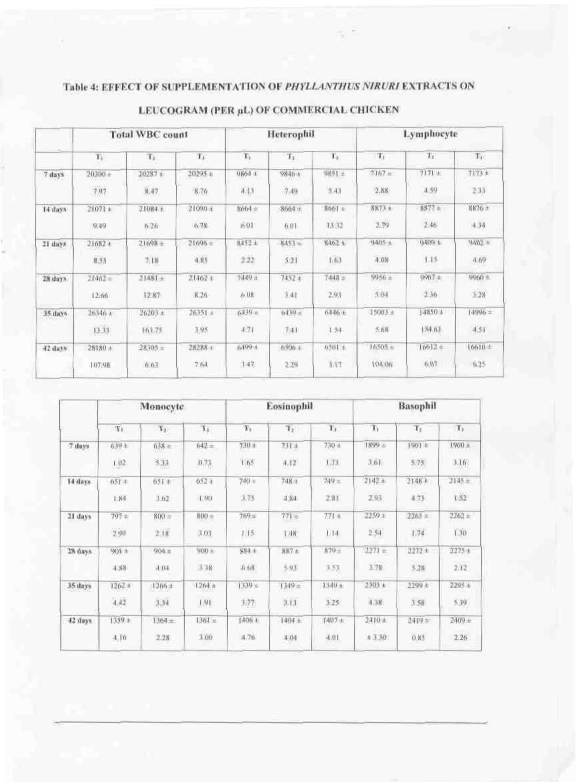

Table 4: EFFECT OF SUPPLEMENTATION OF *PHYLLANTHUS NIRURI* EXTRACTS ON LEUCOGRAM (PER µL) OF COMMERCIAL CHICKEN

	Total WBC count			Heterophil			Lymphocyte		
	T_1	T_2	T_3	T_1	T_2	T_3	T_1	T_2	T_3
7 days	20380 ± 7.97	20287 ± 8.47	20295 ± 8.76	0864 ± 4.13	9840 ± 7.49	9851 ± 5.43	7167 ± 2.88	7171 ± 4.59	7173 ± 2.33
14 days	21071 ± 9.49	21084 ± 6.26	21090 ± 6.78	8664 ± 6.91	8664 ± 6.01	8661 ± 13.32	8873 ± 2.79	8877 ± 2.46	8876 ± 4.34
21 days	21682 ± 8.53	21698 ± 7.18	21696 ± 4.85	8452 ± 2.22	8453 ± 5.21	8462 ± 1.63	9405 ± 4.08	9400 ± 1.15	9402 ± 4.69
28 days	21462 ± 12.66	21481 ± 12.87	21462 ± 8.26	7449 ± 6.08	7432 ± 3.41	7448 ± 2.93	9956 ± 5.04	9967 ± 2.56	9960 ± 3.28
35 days	26346 ± 13.33	26203 ± 163.75	26351 ± 3.95	6430 ± 4.71	6439 ± 7.41	6446 ± 1.54	15003 ± 5.68	14850 ± 154.63	14996 ± 4.51
42 days	28180 ± 107.98	28305 ± 6.63	28288 ± 7.64	6499 ± 1.47	6506 ± 2.29	6501 ± 3.17	16505 ± 104.06	16612 ± 6.67	16610 ± 6.25

	Monocyte			Eosinophil			Basophil		
	T_1	T_2	T_3	T_1	T_2	T_3	T_1	T_2	T_3
7 days	639 ± 1.02	638 ± 5.33	642 ± 0.73	730 ± 1.65	731 ± 4.12	730 ± 1.73	1899 ± 3.61	1901 ± 5.75	1900 ± 3.16
14 days	651 ± 1.84	651 ± 3.62	652 ± 1.90	749 ± 3.75	748 ± 4.84	749 ± 2.81	2142 ± 2.93	2140 ± 4.73	2145 ± 1.52
21 days	797 ± 2.99	800 ± 2.18	800 ± 3.03	769 ± 1.15	771 ± 1.48	771 ± 1.14	2259 ± 2.54	2265 ± 1.74	2262 ± 1.30
28 days	903 ± 4.88	906 ± 4.04	900 ± 3.38	884 ± 6.68	887 ± 5.93	879 ± 3.53	2271 ± 3.78	2272 ± 5.28	2275 ± 2.12
35 days	1262 ± 4.42	1266 ± 3.34	1264 ± 1.91	1339 ± 3.77	1349 ± 3.13	1349 ± 3.25	2303 ± 4.38	2299 ± 3.58	2295 ± 5.39
42 days	1359 ± 4.16	1364 ± 2.28	1361 ± 3.00	1406 ± 4.76	1404 ± 4.04	1407 ± 4.01	2410 ± 4.330	2419 ± 0.85	2409 ± 2.26

Fig. 3: Effect of supplementation of Phyllanthus niruri extracts on leucogram of commercial chicken.

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