



Research Article  
International Journal of Pharmacy and  
Natural Medicines

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## Overall Effect of Supplementation of *M. oleifera* leaf extract on Hematological Parameters of Broiler Chicks

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Received: 26 October 2013, Accepted: 27 December 2013, Published Online: 15 June 2014

### Abstract

In the present study, the effect of aqueous extracts of *Moringa oleifera* and dried powder of leaf treatments on blood biochemical profile showed a moderate increase in total serum protein and total serum globulin indicating better humoral immune response. Higher Hb % in treatment groups indicated its hematinic properties. **Keywords:** Hematological parameters, Immunomodulatory effect, *Moringa oleifera*

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Manuscript ID: IJPNM2058



PAPER-QR CODE

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### 1. Introduction

Drumstick is a natural medicine for digestive disorder. The combination of fresh leaf extract, one teaspoon honey, and one glass of tender coconut water is an excellent herbal antidote for cholera, colitis, diarrhea, dysentery and jaundice. The drumstick flowers, leaves, seeds and roots are used for tumors. Roots are bitter, act as a tonic to the body and lungs, and are expectorant, diuretic and stimulant in paralytic afflictions, epilepsy and hysteria (Prasad and Ganguly, 2012). The *Moringa* tree has great use medicinally both as preventative and treatment. *Moringa oleifera* bark, sap, roots, leaves, seeds, oil, and flowers are used in traditional medicine in several countries. A folk remedy for stomach complaints, catarrh, cancer, gastric ulcers, skin diseases, lowering blood sugar, increasing bone density, nervous conditions, diabetes, fatigue, increase lactation, hay fever, impotence, edema, cramps, hemorrhoids, headaches, sore gums; to strengthen the eyes and the brain, liver, gall, digestive, respiratory and immune system,

and as a blood cleanser and blood builder. An infusion of leaves is used as an eye wash for treating conjunctivitis. Soup prepared with drumstick leaves is extremely beneficial for the natural prevention for tuberculosis, bronchitis, and asthma. The decoction of drumstick leaves are taken as soup; for better taste lime juice, pepper, and salt can be added to it as per the discretion of the patient. The present study was carried out to assess the effect of *M. oleifera* leaf supplementation in broiler chicks.

## 2. Materials and Method

The plant was procured locally and herbal preparations are made. Aqueous extract was made on boiling known amount of Moringa leaf in water and dried powder was made on shadow drying. Fifty (50 no.) day old Vencobb chicks were procured and maintained under standard farm conditions in Department of Microbiology, Faculty of Veterinary Science & Animal Husbandry, Ranchi. After providing 7 days of brooding periods, chicks were divided in 5 groups each having 10 chicks. The treatment given to the chicks under the 5 groups was as follows:

- Group 1: The chicks were treated with aqueous extract of *Moringa oleifera* leaves @ 250mg/kg b.wt. and were vaccinated accordingly as per the vaccination schedule.
- Group 2: The chicks were treated with leaf powder of *M. oleifera* @ 250mg/kg b.wt. and were vaccinated accordingly as per the vaccination schedule.
- Group 3: The chicks were treated with levamisole @ 10mg/kg b.wt. Orally and were vaccinated accordingly as per the vaccination schedule
- Group 4: The chicks of this group were not fed with any extract of *M. oleifera* and were vaccinated accordingly as per the vaccination schedule. This group served as positive control.
- Group 5: The chicks were neither be fed any extract of *M. oleifera* nor were vaccinated against Newcastle disease (ND) vaccine. This group served as negative control.

### Monitoring of hematological parameters

Hemoglobin concentration (g %) was measured by using Sahli's hemoglobinometer as per the method described by Schalm *et al.* (1975).

Total protein, albumen, globulin concentrations and albumen-globulin (A:G) ratio were performed according to modified Biuret and Doumas method (Doumas, 1971) with slight modifications.

### Monitoring of body weight

The body weight of all groups was recorded at weekly interval on day 0, 7, 14, 21, 28, 35 and 42.

### Statistical analysis:

All data were subjected to statistical analysis as per standard methods outlined by Snedecor and Cochran (1994).

## 3. Results and Discussion

In the present study, total serum protein, total albumin and globulin were estimated at the end of the experiment from the blood collected on 42<sup>nd</sup> day (Table 1). The treatment groups showed significant difference among themselves in their total serum protein value only at (P 0.05). However, the mean value of total serum protein was observed to be highest in levamisole treated chicks. A moderately higher level in serum protein was observed in chicks fed with the *M. oleifera* extract as compared to the control chicks.

Protein level in the body is directly related to the liver function and consumption of protein (Leeson and Summer, 2001). Avian blood contains globular protein, albumin and globulin. Albumin out of all varieties of protein exerts maximum osmotic pressure (80% of the total osmotic pressure of plasma) and globular protein plays role in the synthesis of immunoglobulin.

Total serum protein concentration is an indicator of hydration (Ley *et al.*, 1983). Cheville (1967) observed a decline in total serum protein in infectious bursal disease (IBD) infected chicks. This might be attributed to inflammatory exudation of serum albumin into the bursa of fabricius. However Ley *et al.* (1983) reported change in total serum protein level after IBD infection.

The result in the present study collaborated with those of Karnataka *et al.* (1993), Chakraborty and Chatterjee (1998) and Kumari *et al.* (2011a, 2011b, 2012a, 2012b). In the present study, the per-os treatment of chicks with *M. oleifera* preparations showed significant effect on Hb% of broiler chicks. The obtained result may be suggestive of the fact that *M. oleifera* leaves aqueous extract and leaves powder have hematinic properties. The present finding is supported by the work of Hedau *et al.* (2008) who studied the effect of *M. oleifera* leaf and *Butea frondosa* flower supplementation on cockerels and found significantly increased haemoglobin percentage in treatment group.

Observations recorded on blood biochemical profiles at different spaces of time during whole period of experiment could probably explain some more mechanisms involved.

#### Total serum Albumin

In the present study, the serum albumin level of leaves powder treated group was observed to be highest. Similarly, *M. oleifera* powder and levamisole treated groups had a higher serum albumin level than the control.

Ganguly and Prasad (2010) and Bhardwaj et al. (2011, 2012) noticed no significant effect of their herbal as well levamisole treatment on total serum albumin level of the broiler chicks.

However, our findings contradict with those of Vyas et al. (1987) who observed a lower level of serum albumin in levamisole fed chicks and needs further confirmation.

#### Serum globulin

In our study, no significant effect of levamisole and *M. oleifera* treatment was observed on the serum globulin level of broiler chicks. However, highest level of serum globulin was observed in levamisole fed chicks. *M. oleifera* leaves aqueous extract and leaves powder treated groups also had a higher level of serum globulin than the vaccinated and non-vaccinated control groups. The non- vaccinated control group had lowest serum globulin level.

Our finding simulates with the finding of Bhardwaj et al. (2011, 2012) who observed increased serum globulin level in levamisole treated chicks and decreased level in unvaccinated control birds. The improved serum globulin level in our test groups is further supported by our earlier findings of immunopotentiating effect of treatments as evident from the enhancement of HI antibody titer against ND virus vaccine. Globulin concentration therefore, is taken to be direct correlate of humoral immune competence of a subject. This also explains lowered antibody response to various antigens in malnourished individuals.

#### Albumin-globulin ratio

Highest A:G ratio was observed in the unvaccinated control group whereas the treated groups had a lower A:G ratio than the vaccinated control. High A:G ratio in the unvaccinated control group may be attributed to low serum globulin level of this group.

#### Effect of *M. oleifera* on average body weight of chicks

In the present study, treatments with *M. oleifera* leaf extract showed significant effect on the average body weight of the chicks. On day 42 i.e at the end of the experiment group T<sub>1</sub> and group T<sub>2</sub> fed with *M. oleifera* showed a significantly higher average body weight than the control groups T<sub>4</sub> and T<sub>5</sub>. The average body weight of levamisole and herbal preparation fed groups T<sub>3</sub>, T<sub>2</sub> and T<sub>1</sub> respectively were higher than that of the control groups but the difference among them was non-significant (Table 2).

**Table1. Effect of treatments on following blood biochemical profiles of the chicks at the end of the experiment**

Treatment groups	Hb%	Total serum protein (g/dl)	Total serum albumin (g/dl)	Total serum globulin (g/dl)	A:G ratio
T <sub>1</sub>	10.6±0.146 <sup>c</sup>	3.980±0.024 <sup>ab</sup>	1.900±0.073 <sup>abc</sup>	2.080±0.078	0.927±0.074
T <sub>2</sub>	10.4±0.231 <sup>bc</sup>	4.020±0.055 <sup>ab</sup>	1.993±0.008 <sup>c</sup>	2.027±0.054	0.987±0.026
T <sub>3</sub>	10.2±0.381 <sup>abc</sup>	4.2±0.139 <sup>b</sup>	1.980±0.007 <sup>bc</sup>	2.220±0.142	0.910±0.059
T <sub>4</sub>	9.8±0.193 <sup>ab</sup>	3.88±0.065 <sup>a</sup>	1.840±0.012 <sup>a</sup>	2.010±0.062	0.920±0.032
T <sub>5</sub>	9.6±0.073 <sup>a</sup>	3.8±0.126 <sup>a</sup>	1.890±0.008 <sup>ab</sup>	1.913±0.122	1.006±0.057
CD	0.610	0.270	0.098	NS	NS

NS: Non-significant, P 0.05

**Table 2. Effect of treatments on average body weight of the chicks at different ages**

	T1	T2	T3	T4	T5
Day 1	50±0.394	50±0.394	50±0.394	50±1.154	50±1.220
Day7	170±2.150	170±2.150	169±1.483	170±0.0730	175±1.333
Day14	375±1.491	375±2.781	375±1.491	370±2.275	370±2.275
Day21	605±1.520 <sup>c</sup>	600±1.164 <sup>c</sup>	600±1.125 <sup>c</sup>	590±2.704 <sup>b</sup>	580±2.066 <sup>a</sup>
Day28	1000±2.427 <sup>d</sup>	989±0.258 <sup>c</sup>	990±2.129 <sup>c</sup>	960±3.347 <sup>b</sup>	950±2.280 <sup>a</sup>
Day35	1210±2.769 <sup>c</sup>	1199±0.298 <sup>bc</sup>	1199±2.667 <sup>b</sup>	1150.3±13.008 <sup>a</sup>	1140±2.375 <sup>a</sup>
Day42	2010±12.586 <sup>c</sup>	2010±1.838 <sup>c</sup>	2005±1.667 <sup>c</sup>	1990±2.981 <sup>b</sup>	1960±2.860 <sup>a</sup>

Values in a row bearing different superscripts differ significantly

The group of chicks fed with *M. oleifera* showed a markedly lower feed conversion ratio than the control groups as well as levamisole treated group throughout the period of observation (Table 2), which might be suggestive of the fact that some of the metabolic byproducts of the herbal preparation may have growth promoting properties. Ayurvedic scriptures mention that *M. oleifera* has tonic properties and is one of the constituent of Herbal medicine,

a well known tonic preparation of Ayurveda (Prasad and Ganguly, 2012), which supports the findings in the present study.

Hedau et al. (2008) studies the effect of *M. oleifera* leaves and *Butea frondosa* flower supplementation on cockerels. The result showed higher body weight gain and hematinic effect in treatment group. Studies on herbal feed supplements indicate that these Ayurvedic herbs have a significant influence on body weight (Ganguly and Prasad, 2010; Prasad, 2012; Kumari, 2011a; 2011b; 2012a; 2012b).

Broilers are very much prone to various forms of stresses of both external and internal origin. External stressors include extreme change in temperature, inadequate water supply, poor feed, improper ventilation, overcrowding etc. Broilers under stress may show poor appetite, cessation or reduction in reproductive activities and poor growth. To counteract the stress caused due to various origin, various chemical mediators such as epinephrine, glucocorticoids etc are released from adrenal gland (Swenson, 1977). Adaptogen are those agents which possess the ability to increase the non specific immune response to individual agents against a variety of stressors. They are known to significantly reverse the depleted adrenal cortisol and elevated plasma cortisol level, in stressed animals (Dhanukar et al., 1988).

#### 4. Conclusion

The average body weight was higher in *M. oleifera* treated groups, suggestive of beneficial effect of *M. oleifera* on body weight. No mortality was recorded in tested groups. So, *M.oleifera* was recommended as a feed supplement for broiler chicks.

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