

# EFFECT OF HERBAL IMMUNE MODULATOR ON GROWTH RATE AND PROTEIN PROFILE OF DROMEDARY CAMEL CALVES DURING SUMMER STRESS

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## ABSTRACT

A clinical trial was conducted to study the effect of herbal immunomodulator during summer stress among 10 camel calves of 5-6 months age divided into two groups equally. The serum immunoglobulin and protein profile was done in both groups i.e., group I (immune modulator fed group) and group II (control group) on different days before the start of experiment (day 0) on day 4 (while feeding) and day 8, 15 and 21 after the completion of feeding. Both the groups were maintained under similar feeding practices. The body weight changes were recorded prior to and after the completion of experiment. The results indicated a significant change ( $P < 0.05$ ) in immunoglobulins, serum protein and globulin of group I in comparison with group II. The mean body weight changes were increased in group I whereas in group II the body weights were slightly decreased. Thus, supplementing herbal immune modulator Restobal augmented the growth rate, prevented the summer stress effect and maintained healthy immune system in camel calves of 5-6 months age.

**Key words:** Camel calves, growth rate, immune modulator, summer stress

The dromedary camels (*Camelus dromedarius*) of India survive under stressful climatic conditions during summer and winter. Immune modulation with immune modulators combats or restores immune capacity. Certain approaches to immune modulation viz., nutritional approach especially during the deficiencies and genetic approach for permanent change in genetic resistance to disease can restore immune function. Apart from these effective immune modulators will reduce the incidence and severity of disease episodes in populations of livestock that are immunologically impaired. Immune modulators are used in marine and poultry population and they play a vital role in the health of animals by up-regulating the immune system, to combat natural stresses in poultry feeds etc., (Bricknell and Gatesoupe, 2002). They can enhance growth, combat stress and reduce the incidence of clinical conditions thus enhancing the economic gains to farmers. The present study envisages the effect of herbal immune modulators on the growth rate and protein profile changes of camel calves during summer stress.

## Materials and Methods

A clinical trial was undertaken in 10 healthy camel calves of organised dromedary herd divided

randomly into two groups of five each. These were around 5-6 months of age group and of either sex. The group I camel calves were fed with an herbal immune modulator (Trade name: RESTOBAL\*) @ 25 ml per day orally for 7 days period. Group II camel calves were not fed with any immune modulator and served as control group. All the camel calves were maintained on normal feeding under semi-intensive system. Water was given *ad lib* for all the calves. The experiment was carried out during the hot summer period for a span of 21 days.

The blood samples were collected from both groups of calves at different intervals viz., day 0 (before start of trial) and on day 4 (while feeding) and on day 8, day 15 and day 21 (after feeding). The body weights of all the camel calves were taken before the start of experimental trial (day 0) and after the completion of the trial (day 21). The serum was separated from the blood and was stored at  $-20^{\circ}\text{C}$  until use. The serum samples were subjected for the estimation of the following parameters:

\* Ingredients and composition of Restobal: Ashwagandha: 600 mg, Tulsi: 600 mg; Amla: 480 mg; Chota gokhru: 160 mg; Mulethi: 160 mg; Satavari: 160 mg, Aam chhal: 60 mg Shudh Shilajit: 24 mg. Aqueous base q.s.: 10 ml. Manufactured by Dabur Ayurved Ltd

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- Serum immunoglobulins: Estimated by Modified Zinc Sulphate Turbidity test (BgVV/GTZ, 1994).
- Serum protein profile viz., total proteins, albumin, globulin and albumin to globulin ratio by using kits supplied by Merck Diagnostics Limited, Mumbai.

The efficacy of herbal immune modulator to combat stress was assessed based on the improvement in the immune status, serum protein profile and body weight. The mean, standard error of mean (SEM) and Paired t-test of scientific data were done using statistical package for systems software (SPSS 10.0).

## Results and Discussion

The serum Immunoglobulins (Ig) content and protein profile in camel calves of 5-6 months of age of both the groups were presented in table 1. The Ig levels in group I varied from 15.41 to 18.59 mg/ml on day 0 and in group II the variation was 15.28 to 18.83 mg/ml. After completion of feeding the variation range were 16.03 to 18.83 mg/ml and 16.34 to 18.63 mg/ml in groups I and II, respectively. By day 21 the Ig content showed a variation of 16.23 to 19.68 mg/ml in group I and 16.43 to 18.86 mg/ml in group II, respectively. The mean Ig concentration on day 0 revealed  $17.058 \pm 0.661$  and  $17.232 \pm 0.676$  mg/ml in the groups I and II, respectively, which later increased slightly in both the groups but the mean increase in group I was slightly higher than in group II. A significant variation was noticed in the immunoglobulins concentration of group I on different days during and after feeding till 21st day but between groups on different days there was no significant variation. The control group didn't show any significant variation in Ig content on different days.

The total protein in group I varied from 5.39 to 6.43 g/dl on day 0 and in group II the variation was 4.93 to 6.08 g/dl. Immediately after completion of feeding the variations were 5.40 to 6.33 g/dl and 5.27 to 5.89 g/dl in groups I and II, respectively. By day 21 the protein content showed a variation of 5.73 to 6.74 g/dl in group I and 5.25 to 5.89 in group II, respectively. The mean total protein content showed  $5.942 \pm 0.172$  and  $5.630 \pm 0.189$  g/dl in immune modulator fed as well as control group before start of trial which showed later an increase in protein content to  $6.184 \pm 0.166$  g/dl in group I by day 21, whereas, group II revealed a slight decrease in total protein to  $5.528 \pm 0.119$  g/dl by day 21. Between days there was a significant variation in the total protein content after feeding immune modulator while in the control group there was no significant variation. In between groups the total protein showed significant change on day 21.

The albumin levels varied from 2.81 to 3.56 g/dl and 2.77 to 3.66 g/dl in groups I and II on day 0. On day 8 i.e., immediately after completion of feeding the variation was 2.96 to 3.22 g/dl and 2.86 to 3.06 g/dl in groups I and II, respectively. By day 21 the albumin content showed a variation of 3.09 to 3.26 g/dl in group I and 2.76 to 3.15 g/dl in group II, respectively. The mean albumin levels showed  $3.260 \pm 0.167$  and  $3.076 \pm 0.158$  g/dl in immune modulator fed as well as control group before the start of the trial, which showed a slight decrease later by day 21 in both the groups. No significant variation in the albumin content was noticed in both groups on different days as well as between groups.

The globulin content in group I varied from 2.36 to 3.05 g/dl on day 0 and in group II the variation was 1.96 to 2.98 g/dl. On day 8, the variation was 2.32 to 3.22 g/dl and 2.25 to 2.83 g/dl in groups I and II, respectively. By day 21 the globulin content showed a variation of 2.64 to 3.59 g/dl in group I and 2.1 to 2.91 g/dl in group II, respectively. The mean globulin content on day 0 showed  $2.682 \pm 0.128$  and  $2.554 \pm 0.179$  g/dl in immune modulator fed as well as control group which later showed an increase in globulin content by day 21 to  $3.024 \pm 0.162$  g/dl in group I, whereas, group II revealed a slight decrease in total globulin levels to  $2.510 \pm 0.159$  g/dl by day 21. After feeding immune modulator significant changes in the globulin levels were noticed whereas the control group didn't show any significant changes in globulin levels. Apart from this, on day 21 the globulin changes were significant in between both the groups.

The A: G content varied from 1.00 to 1.50 and 0.99 to 1.51 in groups I and II on day 0. On day 8 i.e., immediately after completion of feeding the variation was 0.96 to 1.33 and 1.08 to 1.32 in groups I and II, respectively. By day 21 the A:G showed a variation of 0.87 to 1.17 in group I and 0.94 to 1.50 in group II, respectively. The mean A: G content showed  $1.231 \pm 0.102$  and  $1.236 \pm 0.123$  in immune modulator fed as well as control group before the start of the trial which showed later a decrease in A:G by day 21 to  $1.056 \pm 0.052$  and  $1.226 \pm 0.097$  in groups I and II, but the decrease in A:G levels were more pronounced in group I than group II. The A: G ratio did not show any significant changes in group I while in group II significant change in A: G ratio was observed on day 8 and day 15.

The mean body weight changes on day 0 revealed  $138.4 \pm 10.4$  and  $137.8 \pm 12.7$  Kg in groups I and II, respectively, which later increased slightly in group

**Table 1.** Mean Ig and Protein profile in different groups of camel calves (Mean±SEM).

S.No.	Parameter	Group	Days				
			Day 0	Day 4	Day 8	Day 15	Day 21
1.	Immunoglobulin conc. (mg/ml)	I	17.058±0.661 <sup>a</sup>	17.496±0.619 <sup>a,b</sup>	17.514±0.605 <sup>a,c</sup>	17.764±0.627 <sup>a,d</sup>	18.058±0.703 <sup>a,b,c,d</sup>
		II	17.232±0.676	17.414±0.518	17.452±0.463	17.584±0.505	17.652±0.504
2.	Total Protein (g/dl)	I	5.942±0.172	5.772±0.196 <sup>b</sup>	5.804±0.179 <sup>c</sup>	5.960±0.191 <sup>c,d</sup>	6.184±0.166 <sup>b,c,d*</sup>
		II	5.630±0.189	5.554±0.124	5.600±0.135	5.612±0.046	5.528±0.119 <sup>*</sup>
3.	Albumin (g/dl)	I	3.260±0.167	3.046±0.073	3.078±0.044	3.112±0.040	3.160±0.027
		II	3.076±0.158	3.018±0.071	3.026±0.051	3.094±0.070	3.018±0.069
4.	Globulin (g/dl)	I	2.682±0.128	2.726±0.152 <sup>b</sup>	2.694±0.160 <sup>c</sup>	2.848±0.186	3.024±0.162 <sup>b,c*</sup>
		II	2.554±0.179	2.536±0.086	2.574±0.106	2.518±0.071	2.510±0.159 <sup>*</sup>
5.	A: G ratio	I	1.231±0.102	1.130±0.063	1.157±0.063	1.111±0.071	1.056±0.052
		II	1.236±0.123	1.195±0.045	1.182±0.047 <sup>c</sup>	1.235±0.062 <sup>c</sup>	1.226±0.097

NOTE: Similar letter superscripts between days indicate significant at 5% level

\* superscript \*indicates significant between groups on day 21

I. By day 21, the mean increase in body weight was 139.6±11.1 Kg. In group II on day 21 the mean body weight change was 136.8±12.1 Kg which was slightly lower than that of day 0. No significant changes in the body weights were noticed in camel calves between groups on different days.

The mean Ig concentration in group I increased significantly after feeding immune modulator whereas in group II the mean increase was slight and non-significant suggesting that supplementing herbal immune modulators may have beneficial effect on the immune system. Earlier reports were available on the immunoglobulin profile in adult camels (Mehrotra and Gupta, 1989, Al-ani *et al*, 1992; Khadjeh, 2001, Roy and Sharma, 1991; Kataria and Kataria, 2004). The mean total protein profiles and globulin contents were increased significantly in group I suggesting healthy benefits and better immune function. In control group the changes were towards decreasing trend indicating the stressful changes of hot climate. The significant variation in the A:G ratio of group II may be due to stress experienced by hot climate. Earlier workers reported on the serum total protein profile in camels. Roy and Sharma (1991) reported that Ig levels in adult female camels above 3 years of age with suckling calves up to one month of age was 26.62± 2.91 mg/ml (Mean± SE). Kataria and Kataria (2004) observed a mean Ig content of 2.43 and 2.86 g/dl in dromedary camels in moderate and hot climates, respectively. They observed that the immunoglobulin levels were lower during hot ambient temperature and the protein profile did not show any changes. Plasma proteins provide not only the essential blocks for the formation of new individual, but also is an

important and critical aspect of immunity in the shape of immunoglobulins (Lone *et al*, 2003). The significant changes in the Ig, protein and globulin levels after feeding immune modulator might be due to the effect of immune system combating heat stress.

In group I an increase in mean body weight was noticed where as in group II the reduction in bodyweight was noticed which might be due to stressful hot climate in summers. There were no earlier reports of bodyweight changes. But the present study showed that slight increase in body weight can be achieved feeding herbal immune modulators. Thus, herbal immune modulators are helpful in preventing the body weight losses and maintaining healthy immune system in camel calves.

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