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Research Article

Effect of Dietary Incorporation of Ayurvedic Pharmaceutical Tiktaka Gritham Residue on Haemato-Biochemical Parameters of Malabari Kids

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ABSTRACT

A feeding trial of 90 days duration was conducted to study the effect of dietary incorporation of ayurvedic pharmaceutical Tiktaka gritham residue based diet on various haemato-biochemical parameters of Malabari kids. Fifteen healthy three months old Malabari kids were selected and divided into three groups of five each, as uniformly as possible regarding body weight, sex and age. The dietary treatments were T1 (control diet), T2 and T3 kid starter incorporated with 10 and 20 per cent of ayurvedic pharmaceutical Tiktaka gritham residue, respectively. Haematobiochemical parameters of the experimental kids were analyzed at the start and end of the feeding trial. On 1st day all the blood parameters were similar among treatment groups. On 90th day tiktaka gritham residue had a significant effect on the concentration of cholesterol, which was significantly higher (P<0.05) in T3 than T1 and T2, with T1 and T2 being similar (P>0.05). All the remaining blood parameters, viz., RBC, WBC, Hb, MCH, MCV and biochemical parameters, viz., total Protein, AST, ALT and total triglycerides were similar between the treatments.

Keywords: *Ayurvedic pharmaceutical Tiktaka gritham residue, Malabari kids, Haematobiochemical parameters.*

INTRODUCTION

Goat rearing is an integral part of the Indian rural economy, particularly in the country's arid, semi-arid and mountainous regions (Kumar, 2007).

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India ranks second in goat population with 148.88 million goats, constituting 27.80 per cent of the country's total livestock population (GOI, 2019).

India is considered as the largest exporter of goat meat to the world market. Chevon contains 20.60 to 22.30 per cent protein and 0.60 to 2.60 per cent fat (Devendra, 1988). High amounts of polyunsaturated fatty acids and conjugated linoleic acid, low amounts of saturated fatty acids and richness of iron make Chevon the most preferred and widely consumed meat. The demand for goat milk, meat, fibre and manure is increasing day by day. Goats are known as poor man's cow as they are playing multifarious roles in the economy of rural people.

Goats are adapted to the widest ecological area. They are the efficient converter of poor quality roughages into good quality products. Malabri goats are the native breed Keralaof and they are renowned for their high prolificacy, excellent growth rate, adaptability to hot humid areas and are principally reared in Kerala for meat. Scarcity of feed resources and increase in feed cost constitute major constraints in goat rearing. This led the nutritionist to focus more on using non-conventional feed resources (NCFR), which are cheaper and locally available agro industrial by-products. Kerala is a state renowned for its ayurvedic tradition has various pharmaceuticals. By-products from these pharmaceuticals mainly include waste products of medicinal herbs which are rich in fibre (Roshma, 2014). Ruminants can effectively utilize this fibre as an energy source without competing for human feed resources. Though various agro industrial byproducts and crop residues are being used in animal feeds to reduce feed cost, the potential of byproducts from ayurvedic pharmaceuticals has not been explored widely.

Gritham is an ayurvedic pharmaceutic product containing ghee as the base. One of the popular gritham is Tiktaka gritham, the residue of which contains plant extracts such as neem (*Azadirachta indica*), Katuka (*Picrorhiza kurroa*), Trayanti, (*Gentiana kurroo*), Kalinga (*Kalinga ornata*), Patola (*Luffa aegyptiaca*), Darvi (*Berberis aristata*) and Musta (*Cyperus rotundus*) and hence it is rich in fibre apart from being high in fat as it is a ghee based product. Moreover grithams are high in Protein also and are hence considered as the protein supplements. Tiktaka gritham residue is available in plenty and is wasted. Hence the present study is planned to evaluate the potential of tiktaka gritham residue, incorporated as an unconventional feed in the rations of Malabari kids to assess the effect of it on haematological parameters in kids.

MATERIALS AND METHODS

Fifteen weaned healthy Malabari kids of three months of age were selected from the Goat and Sheep unit of Instructional Livestock Farm Complex (ILFC), Pookode. They were divided into three groups of five each, as uniformly as possible with regard to age, sex and body weight, following completely randomized design. The animals were fed on isonitrogenous (CP 23 to 24 %) and isocaloric (TDN 70%) rations formulated as per ICAR feeding standards (ICAR, 2013) and they were randomly allotted to three dietary treatments as follows:

T1- Control, kid starter without tiktaka gritham residue

T2- kid starter with 10 per cent tiktaka gritham residue on dry matter basis

T3- kid starter with 20 per cent tiktaka gritham residue on dry matter basis

All kids were housed individually in well ventilated, clean and dry pens. Kid starter and good quality green fodder were offered to all the kids. Strict management and hygienic practices were adopted throughout the experimental period. All the kids were dewormed before the start of the experiment and subsequently at regular intervals. Clean drinking water was made available to all kids throughout the experiment.

The experimental rations were prepared at Feed Mixing Plant, ILFC. Pookode. The ingredient composition of experimental kid starters of T1, T2 and T3 are

presented in Table 1. Kids were maintained under uniform management conditions and were fed on isonitrogenous and isocaloric rations (ICAR, 2013). They were maintained on their respective feeding regimen for a period of three months.

Data on daily feed and fodder intake and fortnightly body weight will be recorded during the course of the experiment. Blood samples were collected at the beginning and end of the experiment to estimate haemoglobin (cyanomethemoglobin method), plasma protein (direct Biuret method), triglycerides (peroxidase coupled method), total cholesterol (CHOD-PAP method), aspartate aminotransferase (AST) and alanine transaminase (ALT) using standard kits supplied by Agappe Diagnostics, Maharashtra, India.

Statistical Analysis

All the data were analyzed statistically and presented in table as mean with standard deviation $P<0.05$.

RESULTS AND DISCUSSION

Haematological parameters

Blood parameters of the experimental kids were analyzed at the start of the feeding trial, results are presented in Table 2 and graphically presented in Figure 1. The values were similar among treatment groups at the beginning of the experiment. The values that are observed at the end (90th day) of the experiment are presented in Table 3 and graphically depicted in Figure 2. No significant difference was observed between the treatment groups.

Haemoglobin

The average haemoglobin values were find similar among the treatment groups, with values being 10.04, 10.28 and 10.86 g per dl, for kids in groups T1, T2 & T3, respectively. No significant difference in the values was observed at the end of the feeding trial compared to the initial values, similar results were observed by Roshma (2014), Kajagar *et al*. (2020) and Anugna et al. (2020) in Malabari kids.

Red blood cells (RBC)

The mean Red blood cells (RBC) were find similar among treatment groups at the start and end of the experiment. At the beginning of the experiment the values range from 19.61 to 19.38 million per µl and at the end of the feeding trial the values range from 18.12 million per µl. On statistical Analysis, the values were find similar among treatment groups at the start and end of the experiment. The present results are similar, and values are higher than those observed by Kajagar et al. (2020) who observed that values are ranged from 15.43 to 17.06 million per µl at the end of the experiment.

White blood cells (WBC)

The initial and final values of the mean White blood cells (WBC) were similar among the treatment and control groups of the experiment. At the beginning of the experiment the values are ranged from 16.80 to 17.38 thousands per µl and at the end of the experiment the values are ranged from16.54 to 17.2 thousands per µl. On statistical Analysis, the values were find similar among treatment groups fed with 10 and 20 per cent level Tiktaka gritham residue and unsupplemented control groups. Tiktaka gritham residue didn't affect the WBC counts in experimental kids. The findings of the present study are in agreement and values are comparable to Kajagar et al. (2020) who reported that Malabari kids fed on diets incorporated with 0, 10 and 20 per cent level Brahmi gritham residue had similar WBC counts, the values being in the range of 14.20 to 20.36 thousands per µl. The results are higher than Ocheja et al. (2014) who reported that values are ranged from 6.98 to 10.74 thousands per µl.

Mean corpuscular volume (MCV)

The initial values of mean corpuscular volume (MCV) were similar among treatment and control groups. The values are ranged from 17.24 to 16.90 fl and 17.14 to 16.82 fl, at the start and end of the feeding trial, respectively. The values of the present study are higher than that of Anugna et al. (2020), who reported MCV values of 15.54 to 16.54 fl. The findings of the present study are in agreement and

values are comparable to Kajagar et al. (2020) who reported that MCV values were similar among treatment groups, with values being in the range of 16.40 to 17.46 fl in Malabari kids.

Mean corpuscular haemoglobin (MCH)

The mean corpuscular haemoglobin (MCH) were similar among experimental groups at the start and end of the experiment. At the beginning of the experiment the values are ranged from 5.61 to 5.37 pg and at the end of the feeding trial the values are ranged from 4.66 to 5.77 pg, in the groups, T1, T2 and T3, respectively, with values being similar (P>0.05). The values of the present study are in agreement with those observed by Kajagar et al. (2020) and Anugna et al. (2020).

Serum biochemical parameter

The serum biochemical parameters of the Malabari kids were analyzed at the beginning (1 st day) of the experiment, results are presented in Table 3. The values that are observed at the end of the experiment (90 th day) are presented in Table 3. On statistical Analysis, the values were found similar (P>0.05) among treatment groups.

Total Protein

The average serum total protein levels of kids at the beginning (1st day) and end of the experiment (90th day) were 5.69, 5.1, 5.61 g per dl and 6.1, 5.69, 6.07 g per dl, in groups, T1, T2 and T3, respectively. Statistical Analysis of the data indicated that there was no significant difference (P>0.05) between experimental groups. The present results are similar with Kajagar (2019) who observed that Malabari kids that were fed with Brahmi gritham residue at 0, 10 and 20 per cent had similar total protein values at the start and end of the feeding trial, values being in the range of 6.57 to 6.56 g per dl. The present results are, however contradictory to the findings of Babekar and Bdalbagi (2015), who reported that the total protein values were significantly higher in (P<0.05) in Sudan Nubian goats.

AST

The average serum AST levels of kids at the beginning of the feeding trial were 92.89, 94.28 and 110.77 U/L and at the end of the experiment were 99.56, 103.81 and 113.46 U/L in the groups T1, T2 and T3, respectively. On statistical Analysis, the values were find similar among treatment groups (P<0.05). The results are in agreement and values are comparable to Anugna (2019) who observed that Malabari kids fed with Panchagavya gritham residue at 0, 10 and 20 percent had similar AST values and Al- sherwany (2015) who reported that Hamdani ewes fed on crushed fenugreek seed at the rate 0.6 and 1.2 g per kg live body weight were similar among treatment groups and unsupplemented control groups.

ALT

The average serum ALT levels of kids at the start of the experiment were 27.58, 22.33, 21.68 U/L, and at the end of the feeding trial were 18.81, 16.89, 17.78 U/L in the groups T1, T2 and T3, respectively. Statistical Analysis of the data revealed that the values were similar among treatment groups (P<0.05). Similarity in ALT values between treatments as seen in this study are in agreement with those of Al-Sherwany (2015) who observed that the ALT values of Hamdani ewes fed on crushed fenugreek seed at the rate of 0.60 and 1.20 g per kg live body weight were similar among themselves and also with the unsupplemented control group. The findings also tend to agree with Anugna (2019) who observed that ALT values were similar among Malabari goats fed with 10 and 20 per cent and without panchagavya gritham residue.

Total cholesterol

The average total cholesterol levels of kids in groups, T1, T2 and T3 at the beginning of the experiment were 88.04, 88.48, 88.31 and at the end of the experiment were 66.78, 67.46, 75.73 mg per dl, respectively. The total cholesterol values were similar among treatment groups at the start of the experiment. On statistical Analysis of data at the end of the feeding trial revealed that T3 had significantly higher total cholesterol values when compared to T2 and supplemented control groups. The findings of the present study are in contrast to those observed by Anugna (2019) and Kajagar (2019) who observed that Malabari kids that were fed with Panchagavya gritham residue

and Brahmi gritham residue at 0, 10 and 20 per cent had similar similar total cholesterol values.

Total triglycerides

The serum triglyceride levels of kids in groups T1, T2 and T3, at the beginning of the experiment (1st day) were 28.31, 25.92 and 28.44 mg per dl, respectively. The values at the end of the trial (90th day) in kids of groups T1, T2 and T3 were 28.04, 26.01 and 28.69 mg per dl. Statistical Analysis revealed that the values were similar (P>0.05) between treatments. Similar results ate observed by Roshma (2014), Kajagar (2019) and Anugna (2019).

Table 1: Ingredient composition of Kid starter (%)

Ingredients	T1 (Control – without tiktaka gritham residue) kg	T2 (Treatment – with tiktaka gritham residue 10%) kg	T3 (Treatment – with tiktaka gritham residue 20%) kg
Maize	37	10	-
Soybean meal	38	35	33
Deoiled rice bran	22	42	44
Calcite	2	2	2
Salt	1	1	1
Gritham residue	0	10	20
Total	100	100	100

*To every 100 kg of all the **kid starters**, 10 g of Vitamin AD3E supplement (containing 10 lakh I.u of Vitamin A, 2 lakh I.u of Vitamin D3 and 1 lakh IU of Vitamin E) and 50 g of trace mineral mixture.

Table 2: Haematological parameters of experimental kids

Variable	Day	T_1	T2	T3	F-value (P-value)
Hb, g/dl	Initial	11.02 ± 0.58	9.88 ± 0.39	10.40 ± 0.48	1.361^{ns} (0.293)
	Day 90	10.04 ± 0.25	10.28 ± 0.52	10.86 ± 0.59	0.792^{ns} (0.475)
RBC, millions/µl	Initial	19.61 ± 1.13	18.16 ± 0.48	19.38 ± 1.36	0.542^{ns} (0.595)
	Day 90	18.12 ± 0.56	17.97 ± 0.72	18.79 ± 0.9	0.342^{ns} (0.717)
WBC, thousands/µl	Initial	16.8 ± 1.6	13.5 ± 0.94	17.38 ± 0.48	3.572^{ns} (0.061)
	Day 90	16.54 ± 1.35	13.84 ± 0.98	17.2 ± 0.55	3.083^{ns} (0.083)
MCH, fl	Initial	5.61 ± 0.14	5.4 ± 0.21	5.37 ± 0.13	0.627^{ns} (0.551)
	Day 90	4.66 ± 1.05	5.71 ± 0.21	5.77 ± 0.08	1.02^{ns} (0.39)
MCV	Initial	17.24 ± 0.75	16.66 ± 0.65	16.9 ± 0.36	0.227^{ns} (0.8)
	Day 90	17.14 ± 0.97	16.9 ± 0.71	16.82 ± 0.58	0.046^{ns} (0.955)

ns Non-significant (P>0.05)

Table 3: Serum biochemical parameters of experimental kids

Variable	Day	Dietary treatments			F-value (P-value)
		T1	T2	T3	
Total Protein, g/dl	Initial	5.69 ± 0.35	5.10 ± 0.12	5.61 ± 0.29	1.37^{ns} (0.291)
	Day 90	6.10 ± 0.28	5.69 ± 0.16	6.07 ± 0.27	0.897^{ns} (0.434)
AST, U/L	Initial	92.89 ± 7.35	94.28 ± 5.2	110.77 ± 9.57	1.72^{ns} (0.22)
	Day 90	99.56 ± 8.77	103.81 ± 5.5	113.46± 10.07	0.73^{ns} (0.502)
ALT, U/L	Initial	27.58 ± 4.41	22.33 ± 4.61	21.68 ± 1.78	0.715^{ns} (0.509)
	Day 90	18.81 ± 0.79	16.89 ± 1.86	17.78 ± 1.66	0.401^{ns} (0.679)
Cholesterol, mg/dl	Initial	88.04 ± 2.00	88.48 ± 1.65	88.31 ± 2.01	0.014^{ns} (0.986)
	Day 90	66.78 ± 1.08^{b}	67.46 ± 1.08^{b}	75.73 ± 0.81^{a}	24.881** (<0.001)
Triglycerides, mg/dl	Initial	28.31 ± 1.41	25.92 ± 1.07	28.44 ± 1.38	1.203^{ns} (0.334)
	Day 90	28.04 ± 2.15	26.01 ± 0.77	28.69 ± 1.35	0.835^{ns} (0.457)

** Significant at 0.01 level (P<0.01); ns Non-significant (P>0.05); Means having different letter as superscript differ significantly within a row

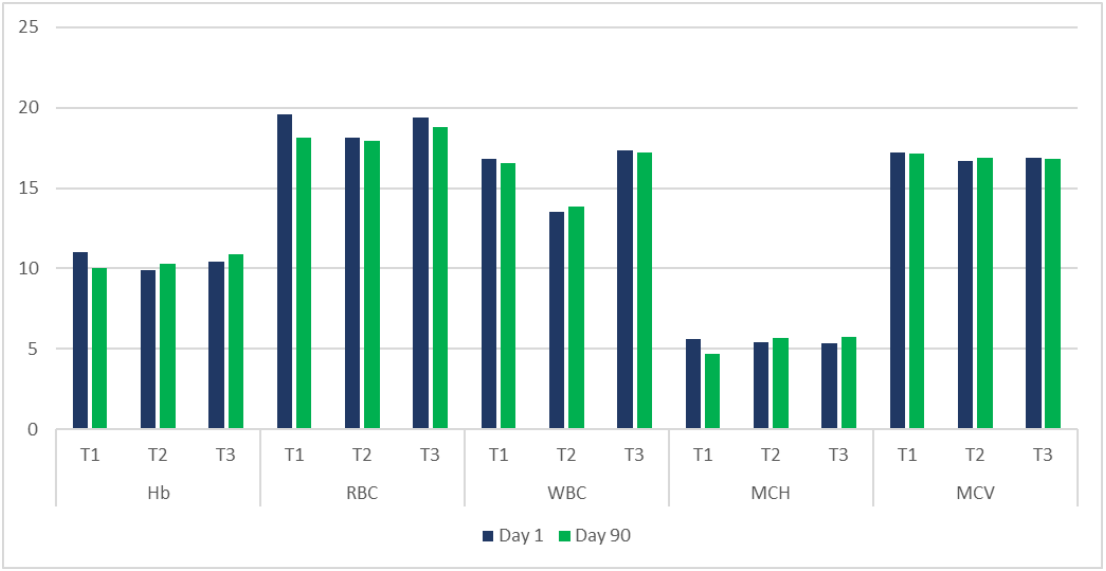

Fig 1: Haematological parameters of experimental kids

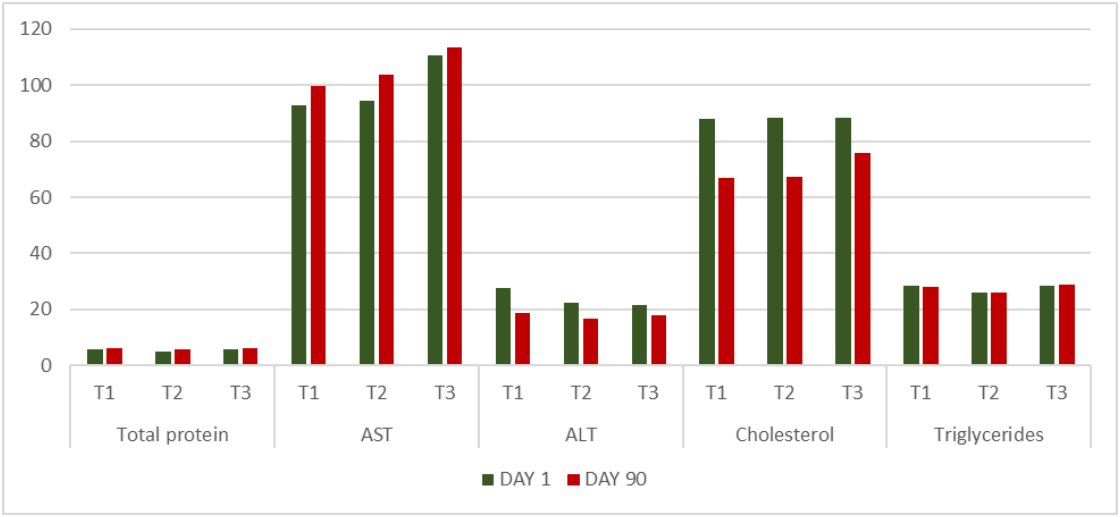

Fig 2: Serum biochemical parameters of experimental goats

CONCLUSION

All the haemato biochemical values are within the normal range and all parameters except total cholesterol were similar in the treatment groups compared to the control group. From the study it is evident that Tiktaka gritham residue can be safely incorporated in the rations of Malabari kids without affecting haematological parameters.

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Conflict of Interest:

The authors declare that they have no conflict of interest

Author Contribution:

Study conception and design: Febina.c and Biju Chacko, Data collection: Febina.c, Analysis and interpretation of result: Febina.c, Sunanda C and Biju Chacko, Original manuscript preparation: Febina. c,and Biju Chacko, Manuscript review and editing: Senthil Murugan S, Surej Joseph Bunglavan and John Abraham. All authors reviewed the

results and approved the final version of the manuscript.

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