

References

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Effect of *Caryota urens* L. (Kithul) treacle on serum lipid parameters of normal rats

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Abstract

Traditionally, in Sri Lanka, treacle prepared from *Caryota urens* L. (Kithul) sap has been used as a sweetener for many centuries and it has been used in sweet foods, drinks, confectionary and some medicinal preparations such as Arista. In recent studies we found that *C. urens* treacle posses anti-oxidant and anti-hyperglycemic properties as claimed in Sri Lankan ethanomedicine. Antioxidant and anti-hyperglycemic activities of natural products have shown to correlate with serum lipid profile of animal models. Therefore, in this study, we examined the effect of *C.urens* treacle on serum lipid profile using normal rats.

Two groups of adult male Wister rats were selected (8 rats/group) and one group was supplied daily with a standard diet containing 56% sucrose (control) while the other group was supplied with a standard diet containing 56% *C.urens* treacle (treatment) for 28 consecutive days. Rats were fasted overnight on day 1 and blood was collected from the tail and serum separated. Total Cholesterol (TC), High Density Lipoprotein (HDL) and Triglyceride (TG) contents in serum were estimated using Randox test kits and Low Density Lipoprotein (LDL) content was calculated using Friedewald equation.

Animals supplied with a diet containing treacle showed significantly ($P < 0.05$) lower TG (53.15 ± 3.62 mg/dl), LDL (20.12 ± 3.06 mg/dl) and athero index (0.50 ± 0.08) compared to control (TG; 67.35 ± 5.45 mg/dl, LDL; 29.76 ± 3.05 mg/dl and athero index 1.05 ± 0.11). Further treacle diet showed significant ($P < 0.05$) increase in good lipid parameters such as HDL (65.36 ± 4.80 mg/dl) and HDL/TC ratio (67.56 ± 3.44 %) compared to control (HDL; 43.96 ± 3.74 mg/ml and HDL/TC ratio 49.63 ± 2.51 %). However, total cholesterol content in treacle diet (96.11 ± 2.84 mg/ml) and control diet groups (87.89 ± 4.13 mg/dl) did not significantly differ ($P > 0.05$).

According to the results, it can be concluded that *C. urens* treacle has a significant beneficial effect on serum lipid profile over white sugar (sucrose) as a sweetener.

1. Introduction

Traditionally, in Sri Lanka, treacle prepared from *Caryota urens* L. (Kithul) sap has been used as a sweetener for many centuries and it has been used to prepare a variety of sweet foods, drinks and some medicinal preparations such as arista. In Sri Lankan ethnomedicine it is claimed to possess health benefits such as anti-ageing and anti-diabetic but those have not scientifically tested. In recent studies we found that *C. urens* treacle possesses anti-oxidant and anti-hyperglycemic properties. Antioxidant and anti-hyperglycemic activities of natural products have shown correlation with serum lipid profile therefore in this study, we examined the effect of *C.urens* treacle on serum lipid profile using normal rats.

2. Methods and Materials

Sample: Authentic treacle sample (5 kg bulk) prepared at Kithul treacle processing center at Rojasangama, Kotmale was used for this study.

Animals: Adult male Wister rats obtained from Medical Research Institute, Colombo 08, Sri Lanka were used. The animals were maintained under standard laboratory conditions (12-h light/dark cycle, 25 ± 2 °C and humidity 50 - 65%) and were fed with commercial diet (Master Feed Ltd., Colombo, Sri Lanka) for 2 weeks before start the experiment.

Diets: A standard diet was made having following composition (in weight %) protein, 10; oil, 2.5; fiber, 5.0; mineral, 2.5; methionine, 0.2; starch, 10; and sucrose 56. In treatment diet, sucrose content of the standard diet was substitute with *C. urens* treacle. Both standard and treacle added diets were prepared dried in oven at 50 °C until the moisture content reached to 14 - 13.5 %. Then two diets were packed separately in polythene bags (40 g/bag) and stored in -20 °C until use.

Experiment design: After 14 days of acclimatization, rats were randomly divided into two groups (8 rats/group) and one group was supplied daily with 40 g of standard diet and other group with 40 g of treacle added diet for 28 consecutive days. Tap water was provided to both groups. Daily food intake and body weight gain (weekly) were recorded during the experiment. On the day 1 post treatment, rats were fasted for 14 h and blood was collected from tail vein under ether anesthesia under aseptic conditions. The collected blood samples were allowed to clot at 25 ± 2 °C for 15 minutes and serum was separated by centrifuging at 6,000 rpm for 5 minutes at 4 °C. Total cholesterol, high density lipoproteins and triglyceride content in serum were estimated using Randox test kits. LDL content was calculated using Friedewald equation [1].

Data analysis: Data were analyzed using GLM procedure in SAS 6.12 version and mean separation was done using Duncan's Multiple Range Test

3. Results

Daily food intake and total body weight gain did not show significant ($P>0.05$) difference between treatment (25.0 ± 1.6 & 72.8 ± 10.6 g respectively) and control (24.0 ± 2.4 &

65.6±12.7 g respectively) groups. The results of serum lipid profile of the two groups are given in Table 1.

Table 1. Total cholesterol (TC), triglyceride (TG) and high density lipoprotein (HDL) and low density lipoproteins (LDL) contents of serum of control and treatment groups.

Sample	TC (mg/dl)	TG (mg/dl)	HDL (mg/dl)	LDL (mg/dl)	HDL/TC (%)	Athero index*
Control	87.89±4.13 ^a	67.35±5.45 ^a	43.96±3.74 ^a	29.76±3.05 ^a	49.63±2.51 ^a	1.05±0.11 ^a
Treatment	96.11±2.84 ^a	53.15±3.52 ^b	65.36±4.80 ^b	20.12±3.06 ^b	67.56±3.44 ^b	0.50±0.08 ^b

Results are presented as mean ± SEM (n=8) and values in a column with different superscript letters are significantly different at P<0.05.

* Athero index = (TC-HDL)/HDL

Animals supplied with a diet containing treacle showed significantly (p<0.05) lower TG and atherosclerosis index compared to control (Table 1). Further treacle diet showed significant (p<0.05) increase in good lipid parameters such as HDL and HDL/TC ratio than control. However, total cholesterol content in treacle diet group and control group was not significantly different (Table 1).

4. Conclusion

According to the results, it can be concluded that *C. urens* treacle has significant beneficial effect on serum lipid profile over white sugar (sucrose) as a sweetener

References

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