



International Conference of Sabaragamuwa University of Sri Lanka 2015 (ICSUSL 2015)

Effect of coconut kernel residues on serum lipid concentrations of rats

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Abstract

The coconut kernel residues are underutilized by products in coconut milk and coconut oil industries. The residue from coconut milk (MR) and virgin coconut milk (VOR) can be used effectively for human consumption. Therefore, studying its nutritional effects on serum lipid profile is very important to promote for human consumption. The objective of this study was to determine the nutritional effect of VOR and MR incorporated diets on serum lipid profile of rats. The experimental diet was prepared by incorporating 10 % or 20 % VOR or 10 % or 20% MR. The control diet did not include VOR or MR. The blood samples were drawn at base level and thereafter at 30 days intervals. The initial concentrations were compared with the concentrations at each days using unpaired t test for testing significant differences ($p=0.05$). The increase of serum TC concentration of rats fed with 10 and 20 % MR and 20 % VOR was 19 %, 17 % and 16 % respectively while the increase shown by control group and 10 % VOR group was 20 % and 22 % respectively at 120 days although there is no significant change. Significant increase in serum HDL-C was shown by rats fed with 20 % VOR in 30 days. Triacylglyceride, TAG, concentrations of rats fed with 20 % VOR significantly decreased significantly by 22 % in 120 days while the control group increased significantly by 31 %. However, 10 % VOR and 20 % MR fed group showed insignificant decrease in serum TAG. This study reveals that VOR and MR can potentially decrease the serum level of TC and TAGs in human.

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Peer-review under responsibility of International Conference of Sabaragamuwa University of Sri Lanka 2015 (ICSUSL 2015).

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Keywords: coconut kernel residue; edible fibre; serum total cholesterol; serum triacylglycerides

1. Introduction

Dietary fibre has been defined as the remnants of plant cells, polysaccharides, lignin and associated substances resistant to hydrolysis by human alimentary enzymes. Considerable amounts of work have been carried out to determine the nutritional characteristics of various by-products of plant based food using both human and animals and inconsistent results were observed^{1,2,3}. Coconut (*Cocos nucifera*) is one of the major fruit crops used for preparation of coconut oil and coconut milk which are used in food, pharmaceutical and cosmetics industries and domestic food preparations. The preparation of coconut oil and milk leave behind coconut meal which is rich in food grade fibre and used as an effective substitute for food grade fibre^{4,5}. Approximately 30 - 40 % of coconut meal is formed during the virgin coconut oil production process and may be considered for production of food grade fibre⁵. The aim of this study is to investigate effects of residue by-products obtained from expelling of oil or milk from coconut on serum lipid profile. Wistar rats were fed with coconut milk residue (MR) or virgin coconut oil residue (VOR) incorporated diets for a period of 120 days and the effect on serum lipid concentrations was determined. The results of this study are likely to encourage the wide utilization of coconut residue as a functional food.

2. Material and Methods

2.1 Coconut milk residue (MR) and virgin coconut oil residue (VOR)

Coconut milk residue (MR) and virgin coconut oil residue (VOR) were prepared by using the methods reported previously⁵.

2.2 Experimental feed

The basal and the control rats feed was broiler starter feed procured from local market. The 10% and 20% VOR feeds were prepared by addition of 10 % or 20 % VOR to control feed. The 10 % and 20% MR feeds were prepared by adding 10 % or 20% MR to the control feed.

2.3 Analysis of serum lipids concentrations

Thirty five Wistar rats (8 weeks old male; 200 g) were purchased from the Medical Research Institute of Sri Lanka. The animals were divided into five groups of 7 animals each and were kept in an air conditioned ($25 \pm 1^\circ \text{C}$) and light controlled room. The rats were fed with basal feed for a period of one week for familiarization of the feed. The basal blood samples (0.5 ml -1ml) were drawn from rats after a 14 hour fasting period from coccygeal vein of the Wistar rats as per the protocol of Animal house, Medical Research Institute of Sri Lanka. Blood samples were collected at monthly intervals after the commencement of the experimental feed, transferred to 1.5ml eppendorf tubes and centrifuged for 10 minutes at 5800 g to separate serum. The samples were analysed for TC, HDL-C and TAG using Randox analysis kit (UK).

2.4 Statistical analysis

Experiment carried out in randomized block design. The results were expressed as mean values with standard deviation (n=7) and significant difference ($p < 0.05$) in rows were analysed by one way ANOVA using SAS (1998). Initial means values were compared with those of different time intervals by student t test at $p < 0.05$ level. Mean values with different letters in rows are significantly different compared to the mean value of basal level.

3. Results and discussion

As shown in Table 1 serum total cholesterol concentration of rats in general increased during 120 days with the exception of a significant decline at 60 days in rats fed with control and MR incorporated feeds.

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