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Full Length Research Paper

Impact of feeding soy enriched burfi on the internal body parts of the albino rats

T. Verma[1], J. Singh[2], Ram Niwas[3], D. Singh[4], A. K. Gautam[5] and S. kumar[6]

[1-6]Department of Animal Husbandry and Dairying, Institute of Agricultural Sciences, BHU, Varanasi-221005.

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The present article was designed with the aim to see the impact of feeding soy enriched burfi on the internal body parts of the albino rats. In said context, Out of 200 albino rats, 20 albino rats of similar body weight and body conformation were selected at fifth day after birth and randomly divided into four groups of five each with an average body weight of 26.7± 3gm. The albino rats were fed ad libitum exclusively on the basal ration (maize 25% + Bajra 25% + Gram chunni 50%) in group G1. In rest of the groups, out of 50% gram chunni in basal ration, 25% was replaced with normal burfi in group G2, soy burfi containing 10 % soy flour in group G3 and soy burfi containing 20 % soy flour in group G4 for a period of 42 days. Results revealed that the within treatment groups, when the level of Soy in burfi increases the average gain in weight in albino rats decreased. The differences in the weight of internal organs between the groups were not significant. So, Soy burfi can be a good nutritious substitute of normal burfi.

Key words: Albino rats, basal ration, organs, burfi.

INTRODUCTION

Among the confectionery, burfi is one of the most popular khoa-based sweets in all over the country. The generic nomenclature “burfi” covers a wide range of product variations that include plain, danedar, dudh, chocolate, fruit, and coconut burfi. Typically, it has a mildly caramelized and pleasant flavour. Its colour may range from off-white to creamy or light caramel. Multi-layered and multi-coloured varieties are also produced. The many gourmet combinations include burfi prepared with cashew nut, almonds and pistachio. A mechanized process for commercial production of burfi has been successfully developed (Ramna et al., 1983). Soy protein has two different benefits in the processed food industry. One, the health benefits of Soy proteins plays a major role in manufacturing health (functional) foods. United States food & drug administration issued a health claim for Soy protein in October of 1999. The health claim states “consumptions of 25 gm of Soy protein per day with a diet low in saturated fat may lower the risk of heart diseases”. Other proven health benefits of soy protein are, reducing the risk of different reproductive cancers, combating osteoporosis, alleviating menopause symptoms and managing blood sugar levels in type 2 diabetic patients (FDA). The other is the functional benefits. As far as a food technologist is concerned functional properties mean any food ingredient that performs certain function during food processing. For example, ingredients responsible for texture of bread or cake or overrun in ice-cream. In the food ingredient, protein is considered to possess a number of functional characteristic due to its (tertiary) structure. These benefits of Soy protein can provide a number of benefits if processed properly. Some earlier research works regarding the evaluation of protein based diets and their impact on vital organs of the albino rats have been done (Buckingham, 1985; Yoshida and Kajimoto, 1989; Hammond *et al*., 2006; Akinola *et al*., 2010; Obimba *et* al., 2012). The work regarding the effect of *soy fortified burfi* on the performance of albino rats have not been done so far. In view of the above fact, the present investigation has been carried out to know the impact of feeding *soy fortified burfi* on internal organs of the rats.

MATERIAL AND METHODS

The entire experiment was conducted in the Laboratory of the Department of Animal husbandry and Dairying, Institute

*Corresponding author: ramniwasbhu@gmal.com

Table 1. Impact of feeding protein enriched soya burfi on the organs of albino rats.

Groups	Body wt. (gm.)	Heart wt.	Liver	Spleen	Lung	Kidney
		(%)				
G1	50.51 (39.40-64.30)	0.35 (0.26-0.41)	3.85 (3.33-4.33)	0.25 (0.16-0.34)	0.60 (0.41-0.78)	0.89 (0.65-1.07)
G2	92.45 (79.86-104.90)	0.39 (0.32-0.48)	4.86 (3.22-6.14)	0.28 (0.24-0.32)	0.53 (0.46-0.62)	0.78 (0.55-0.97)
G3	90.84 (75.83-104.35)	0.41 (0.35-50)	4.502 (3.07-5.95)	0.23 (0.20-0.25)	0.56 (0.43-0.66)	0.81 (0.70-0.94)
G4	87.42 (74.56-102.39)	0.38 (0.31-0.46)	4.484 (3.16-6.05)	0.26 (0.20-0.30)	0.55 (0.39-0.71)	0.78 (0.66-0.89)
SEM	4.885	0.029	0.467	0.025	0.055	0.054
CD at 5%	15.051 **(S)**	0.091 (NS)	1.441 (NS)	0.078 (NS)	0.169 (NS)	0.165 (NS)
CD at 1%	21.101 **(S)**	0.128 (NS)	2.021 (NS)	0.109 (NS)	0.237 (NS)	0.232 (NS)

The value in the parthensis indicates the range, wt.=Weight, G= Group, S= Significant, NS= Non-significant, SEM= Standard Error Mean, CD=Critical Difference, %=Per cent, gm= Gram.

of Agricultural Sciences, Banaras Hindu University, Varanasi, U.P., India. The study protocol was approved by Central Animal Ethical Committee of the University (No. Dean/11-12/CAEC/254). Standardized and acceptable level of soy fortified burfi (milk fat 4.6 %, soy cake powder 20% and sugar 27%) was prepared for the feeding of rats. Cow milk, Maize, Bajra, and Gram chunni were collected from BHU dairy farm whereas; Soy cakes were collected from the local market of Varanasi. Out of 200 albino rats, 20 albino rats of similar body weight and body conformation were selected at fifth day after birth and randomly divided into four groups of five each with an average body weight of 26.7± 3gm. Each group was housed in cleaned, disinfected and dried cages which had wire mesh grids in their base to facilitate collection of food spillage and faeces. The albino rats were fed ad libitum exclusively on the basal ration (maize 25% + Bajra 25% + Gram chunni 50%) in group G1. In rest of the groups, out of 50% gram chunni in basal ration, 25% was replaced with normal burfi in group G2, soy burfi containing 10 % soy flour in group G3 and soy burfi containing 20 % soy flour in group G4 for a period of 42 days. Fresh and clean water was available ad libitum daily. The food intake of the rats was monitored daily in the morning. The weight of rats and faeces were collected at every 7th day of the trial. At 42 days of age, the rats were kept hunger for 24 hours. The rats were made anesthetics by using chloroform. After slaughter, abdominal cavity was opened and heart, spleen, liver, lungs and kidneys were removed from the body of rats and weighed separately as per technique adopted by Singh et al (2006). The data were statistically analyzed as per technique suggested by Panse and Sukhatme (1978).

RESULTS AND DISCUSSIONS

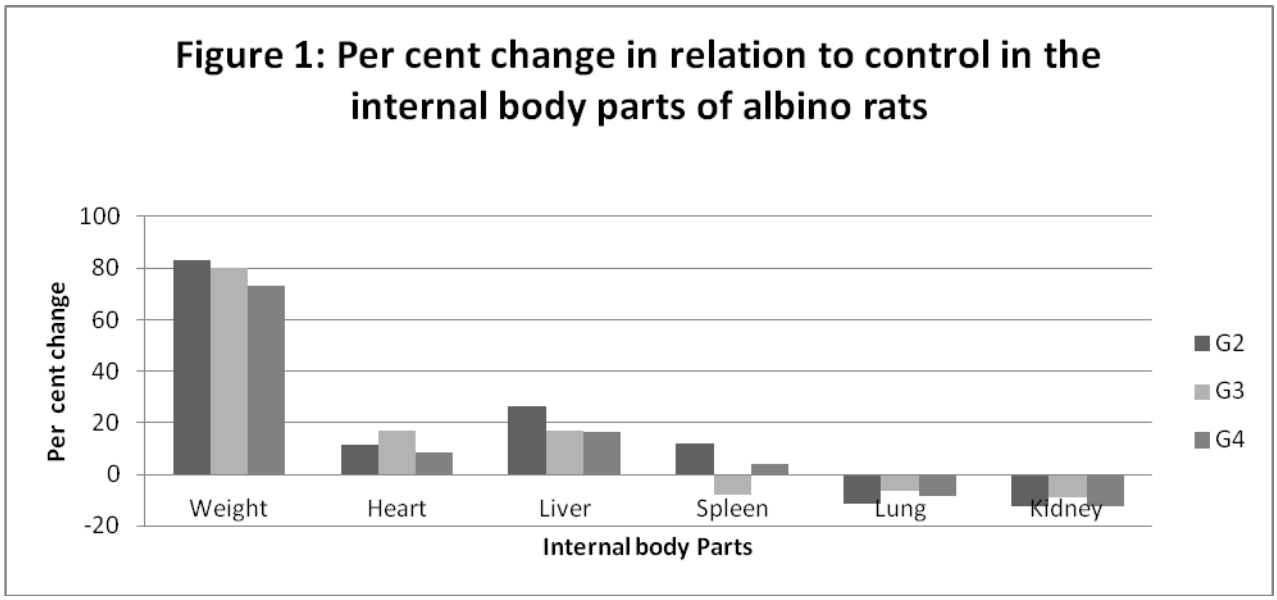
Initial weight: It is clear from the Table 1 that average body weight of the albino rats was significantly (P<0.01) high in the treatment groups as compared to the control group. It was reported to be maximum in group G2 (92.45 gm) with a range of 79.86-104.90 gm, followed by group G3 (90.84 gm) with a range of 75.83-104.35 gm, then in group G4 (87.42 gm) with a range of 74.56-102.39 gm and lowest in group G1 (50.51 gm) with a range of 39.40-64.30 gm. Similarly, the per cent change in relation to control (Table 2 & Fig. 1) in the average initial weight was reported to be the maximum in group G2 (83.03 %), followed by group G3 (79.85%) and then in group G4 (73.07 %) Finding of Kimura *et al*., 1984 and Ani *et al*., 2012 are in agreement with above reports.

Heart: The per cent heart weight of the body weight (Table 1) was not showed any significant differences between the groups. Although, it was recorded to be maximum in group G3 (0.41 per cent) followed by group G2 (0.39 per cent) and lowest in control group (0.35 per cent). The percent change in heart weight in soy burfi fed groups increased to 17.14, 11.43 and 8.57 per cent in G3, G2 and G4 respectively than

Table 2. Per cent change in relation to group G1 in the internal organs of albino rats

Groups	Weight	Heart	Liver	Spleen	Lung	Kidney
	(%)					
G2	83.03	11.43	26.23	12.00	-11.67	-12.36
G3	79.85	17.14	16.88	-8.00	-6.67	-8.99
G4	73.07	8.57	16.36	4.00	-8.33	-12.36

G= Group, %=Per cent, gm= Gram



the control group (Table 2). Roopashree *et al*. (2009) found normal range of heart weight in Cassia species fed group which is at par to above finding.

Liver: The percent liver weight of the body weight increased in burfi fed groups than the values found in control group. However, this increase was not significant. The maximum percent increase in liver weight was found to be in burfi fed group G2 (26.33 per cent) than in other soy burfi fed groups, which were more or less similar i.e. groups G3 (16.88 per cent) and G4 (16.36 per cent) than the control group (Table 2 & Fig. 1). The percent liver weight of the body weight (Table 1) was recorded to be maximum in group G2 with a range of 3.22 to 6.14 (average 4.86 per cent) and minimum in group G1 with a range of 3.33 to 4.33 (3.85 per cent). The similar results was found by Malatesta et al., 2005 while studying on reversibility of hepatocyte nuclear modifications in mice fed on genetically modified soybean.

Spleen: The per cent spleen weights of the body weight (Table 1) in all the groups were at par. This might be due to the constant recruitment of lymphocytes to blood from spleen. Joel et al., (2009) studied the effect of three GM Corn Varieties on Mammalian Health which corroborates with the above observation.

Lungs: The per cent lungs weight of the body weight (Table 1) decreased in all the treatment groups than that of control group. However, these differences were not significant. The per cent lungs weight was maximum in group G1 with a variation of 0.41 to 0.78 (average 0.60 per cent) and minimum in group G2 with a variation of 0.46-0.62 (average 0.53 per cent). It is clear from the data that lungs per cent weight decreased with the addition of both burfi and soy burfi in the feed. This reduction was highest in group G2 (11.67 %) followed by group G4 (8.33 %) as compared to the value of control group (Table 2 & Figure 1). Ani *et al*. (2012) studied on growth performance and haematological indices of rats fed mucuna seed meal-based diets and found similar results.

Kidney: The per cent kidney weight of the body weight (Table 1) decreased maximum in groups G2 and G4 (0.78 per cent) and minimum in group G3 (0.81 per cent) as compared to control group (0.89 per cent). No significant differences could be observed amongst different treatment groups. The per cent reduction was similar in group G2 & G4 (-12.36 per cent) as compared to the value of control group (Table 2 & Figure 1). Finding of Kimura et al., 1984; Hammond et al., 2004; Malatesta et al., 2005; Joel et al., 2009; Ani et al., 2012 are in agreement with the above reports regarding the initial weight, heart, liver, spleen, lungs and kidney.

CONCLUSION

It can be concluded that there is significant increase ($P<0.01$) in body weight in burfi fed groups as compared to control. As the levels of Soy in burfi increases, the average gain in weight of albino rats becomes lower, but no significant changes could be observed in the internal organs. So, Soy burfi can be a good and cheaper nutritious substitute of normal burfi.

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