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# FOOD CONSUMPTION PATTERN AND WEIGHT GAIN OF ALBINO RATS FED WITH IRRADIATED AND NON-IRRADIATED DIET

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## ABSTRACT

**Food is vital for human existence or conservation and preservation of food is pre-requisite for food security and it provides economic stability and self-reliance to a nation. Food irradiation has been described as a versatile, efficacious and safe process. The Soya mix was formulated and subjected to radiation processing at 0.75kGy, to know the effect of radiation processing on food consumption patterns and weight gains. The ten days old Wister albino rats were selected for experiment, the feeding was given for 5 weeks. In I and II week the intake of control diet was more than the experimental diet, where as in III and IV week the intake of experimental diet was more than the control diet. In V week there was only slight difference in control and experimental diet food intake. The weekly weights of control diet rats gain more when compared with experimental diet rats except in II and III week. In experimental diet rats there was slight increase in II and III week. However there was no much difference in the weight gain of control and experimental diet rats. Hence, the study concluded that there was a significant difference at 1% level in the food consumption pattern and weight gain of albino rats fed with control and experimental Soya mix. No much difference was observed in the irradiated and non-irradiated diets.**

**KEYWORDS :** Soya mix, irradiation processing, control diet (non-irradiated) and experimental (irradiated) diet

Radiation is not a modern, man-made creation. We get natural radiation from the sun and other natural components of our environment, such as gases and deposits of uranium are in rock structures (Makhal, 2004). Food irradiation is an important application of nuclear energy for the benefit of mankind ( Kamat, 2005). Irradiation should be our next step in food safety and should play an integral part in our continued demand for food safer (David, 2000).Laboratory animals themselves act as measuring instruments for toxicological investigations. It is vital to investigate the effects of feed- sterilization processes on the wellbeing of the laboratory animal (Conning, 1967). Animal feeding is, a group of animals, mainly rats were fed with diet consisting of the food under trail (irradiated food) and their growth, longitivity, metabolic activity etc., were compared with those obtained with the non-irradiated food.

Extensive studies were carried out and the parameters studied were body weight, hematological studies, clinical blood chemistry, urine analysis, organ weight, histopathology, postmortem observations, data on fertility, litter size, birth weight, weaning weight, lactation etc. Development of value added products from wheat and soy bean composite flours and studied their nutritional quality. The study found that the composite flours are rich in fat, crude fiber, ash, sugar and anti-nutrients like phytic acid and polyphenols (Bhagya et al., 2002). Weight gains and reproductive characteristics of mice and rats were reportedly not affected by consumption of irradiated feed at 25 or 45 kGy. Effects on feed intake are less consistent. In contrast, heat treatment of diets has been found to reduce growth rates. In other experiments, no effects of feeding fish meal that had been treated with a dose of 8 kGy on organ weight, hematological, histological and enzymological or fertility characteristics were found (www.sterigenics.com).

Animal experimentation was done for five weeks by using Wister albino rats to assess the impact of irradiation on food consumption pattern and weight gain of albino rats were studied.

## MATERIALS AND METHODS

Ten days old Wister albino rats were purchased from the NIN (National Institute of Nutrition), Hyderabad. For two to three days they were fed with NIN standard diet till the experiment begins. On the starting day, all the animals were weighed and distributed randomly according to their weights. The mean weight of albino rats in 2 groups was 37.4 g. There were 12 animals, 3 males and 3 females per treatment. The animals are identified by making different cuts on the ears which were written on the tags of that related cut and were placed in clean polypropylene individual cages.

The two treatments were given, one as control

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(non-irradiated diet) and experimental (irradiated diet).

**Preparation of Diets for Feeding Animals**

The low dose radiation levels proposed for the current study were0.75 kGy. The Soya mix was irradiated in gamma chamber in irradiation plant at Acharya N.G. Ranga Agricultural University (Department of Horticulture), Hyderabad.The animals were fed with control and experimental diets of formulated Soya mix. These mixes were in powder form, the diet was prepared by mixing the powder with enough warm water and salt, steam it for 3 minutes and then cool the diet and mash it. The diet was fed in katories and hot water was used to feed the animals.

**Method of Feeding**

The formulated diets were weighed on a triple beam balance to maintain uniformity in feeding. These diets were prepared twice in a week and stored in air tight container under refrigerator condition.

**Food Consumption of the Animals**

Each and every rat in different groups was fed by the diets in the steel cups. Water is boiled and then cooled it and given to the rats in a separate steel katories. Care was taken, that hot water was provided to avoid contamination. The food consumption record of the animals was maintained daily. The food left over by the rats was weighed daily to obtain accurate weight of the food consumption for five weeks time period.

**Weight Gain of the Animals**

The animals were weighed twice a week and changes in weight of rats were noted individually, to note the differences in between the control and experimental samples.

## RESULTS AND DISCUSSION

**Food Consumption of Wistar Albino Rats Fed Control And Experimental Diet For Five Weeks Period**

The results of the mean weekly food intake of albino rats fed with control and experimental diets were shown in table no.1. The food intake in I and II week was found to be high for both control and experimental diets. Mean values for I week was 17.8 and 15.73 and II week was 22.31 and 20.75 for control and experimental diets respectively. In III week (18.13 and 19.48) and Iv week (18.8 and 19.26) there was a decrease in food intake when compared with I and II week for both control and experimental diets.

**Table 1:Mean Weekly Food Intake of Albino Rats fed with Control and Experimental Soya Mix**

| No. of Weeks | Mean ± SD (g) | | 't' Value | Remarks |
|---|---|---|---|---|
| | Control diet | Experimental diet | | |
| I | 17.800 ± 0.885 | 15.733 ± 1.162 | 3.479 | Significant at 1% level |
| II | 22.317 ± 2.670 | 20.750 ± 1.775 | 0.880 | Significant at 1% level |
| III | 18.133 ± 1.502 | 19.483 ± 2.076 | - 1.291 | Significant at 1% level |
| IV | 18.800 ± 0.961 | 19.267 ± 2.187 | 0.493 | Significant at 1% level |
| V | 22.617 ± 1.2254 | 22.150 ± 1.07 | 0.703 | Significant at 1% level |

Fourteen foods irradiated with three or 6 million rep and subsequently stored in the frozen state have been fed adlibitum to rats for 8 to 12 weeks as 35% of the dry weight of the diet. The remaining 65 % of the diet was a non-irradiated nutritionally adequate semi-synthetic ration. Comparable non-irradiated foods were used as controls. Covariance analysis of the weight gains, caloric consumption, and initial weights was performed to determine low-levels of toxic products in the irradiated foods. Thirteen foods (bacon, snap beans, beef, beets, bread, cereal bar, corn, haddock, fresh ham, powdered milk, spinach, straw berries and turkey) have been found to be non-toxic by this technique. A suggestion of low level toxicity of 6 X IO6 rep irradiated peaches has been obtained; 3 X 10" rep irradiated peaches have been shown to be non-toxic .

**Weight Changes of Wistar Albino Rats Fed Control And Experimental Diet For Five Weeks Period**

The results of the mean weekly weights recorded by albino rats fed with control and experimental diets were shown in table no.2. The basal weight of the control and experimental diet rats was 39.6g and 39.3g respectively. By comparing with the basal weights, the weight gain increments were high in I and II weeks. The control and experimental diets mean values for I and II weeks were 46.58g and 43.95g; 60.42g and 63.11g respectively. The gain in weight was more in I and II, whereas from II week to V week the weight gain was less for both control and

**Table 2: Mean Weekly Weight recorded by Albino rats fed with Control and Experimental Soya Mix compared as against the Basal Weight**

| No. of Weeks | Mean ± SD (g) | | 't' Value | Remarks |
|---|---|---|---|---|
| | Non-irradiated | Irradiated | | |
| I | 46.583 ± 8.4280 | 43.958 ± 5.719 | 0.631 | Significant at 5% level |
| II | 60.42 ± 8.393 | 63.11 ± 8.707 | -0.544 | Significant at 1% level |
| III | 65.89 ± 7.589 | 66.93 ± 5.460 | -0.272 | Not Significant |
| IV | 70.150 ± 7.784 | 67.017 ± 2.886 | 0.925 | Significant at 1% level |
| V | 76.350 ± 9.577 | 72.633 ± 10.909 | 0.627 | Significant at 1% level |
| Basal Weight (g) | 39.6 | 39.3 | ------- | |

experimental diets.

Among the difference between the weekly weights, the control diet albino rats gain more weights when compared with experimental diet albino rats except in II and III week. In experimental diet rats there was slight increase in II and III week weights. However for control diet rats there was random weight gain was observed from I week to V week, this was not seen in experimental diet rats.The variation in weight gain and reduction depends on the individual albino rats. Their intake, utilization varies from rat to rat. These are some reasons leads to the variation in mean weight gain of the albino rats fed with control and experimental diets.

Gain in body weight as a measure of the nutritive value of dietary proteins has been most popular. Aaron, (1981) in most of his experiments has taken growth rate as the criterion of amino acid adequacy. They estimated the retention of nitrogen in the body for maintenance and growth. The overall growth of the body measured as gain in weight or length or both often used as an estimation of gain in body nitrogen. The correlation between gain in weight and gain in nitrogen was good in the rats.

In the present study, the difference in food consumption of albino rats between the control and experimental diets was significant @1% level from I to IV week and in V week there was no significant difference. The weekly weight gains of the experimental diet rats were slightly increase in II and III week. However, for control diet rats there was random weight gain was observed from I to V week (except in II week); this was not seen in experimental diet rats. The food intake and weight gain of albino rats depends on individual rats. The experimental diet albino rat's gain more weight. In food consumption pattern, there was no difference between the control and experimental diet rats.

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