

# Effect of Excess Selenium on the Total Protein Content Brain and Muscle in *Wistar* Rats and Ameliorative Effect of Curcumin Co Treatment

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**Abstract:** Selenium is a trace element but at higher dosages can it acts as a pro-oxidant causing toxicity. Curcumin is a anti-oxidant and anti-inflammatory agent. In this study deleterious effect of selenium sub lethal dose on proteins of brain and muscle in *Wistar* strain rats was studied. Simultaneously selenium curcumin co treatment was provided to compare the protective effect of curcumin. Curcumin seems to have ameliorative effect over toxicity caused by selenium.

## Introduction

Selenium is of great physiological importance. Selenium has a dual role as an anti oxidant and oxidant.it has a role as a trace element and as component of enzyme glutathione peroxidase (Schwarz and Flozts 1957; Rotruck et al 1973).Selenium interferes with sulphur metabolism in proteins and causes replacement and formation of seleno methionines and seleno cystenines. Selenium binding to the sulphur binding sites can lead to fatal outcome (Stadman,1974).heavy metals are known to alter the protein metabolism (De Bruin 1976 Dubale and Shah 1981).curcumin is a known anti-inflammatory and antioxidant substance ,the ameliorative effect of curcumin on ethanol induced liver toxicity was seen in rats (Rajakrishnan et al.1999). In this study the protein content was observed after acute and chronic time periods in brain and muscle tissues of rats with simultaneous co treatment with oral dose of curcumin.

## Materials and methods

Healthy 8-10 weeks old wistar strain albino rats weighing 140  $\pm$  2 gms were procured from National infrastructural facility for laboratory

animals, National institution of nutrition Hyderabad. They were maintained in polypropylene cages with stainless steel grill tops, provided with standard mice feed pellets (Hindustan liver limited) and water ad libitum. The animals were allowed to acclimatize to the laboratory conditions for four days before conducting the experiments. Sodium selenite and curcumin were procured from Sigma chemicals(USA).One sublethal dose of selenium was administered to the rats aged 8-10 weeks intra peritoneally.75mg/kg body weight curcumin (Awasthi et al 1996) was administered orally in gum acacia suspension(Theressiamma et al ., 1996).Total protein in the tissue was estimated using method of Lowry et al (1951).Statistical technique used for the analysis of result was one way ANOVA.

## Results

The following are the results of proteins of the present study. Total protein content in brain in 1 day 7 days and 14 days showed a gradual decrease of -8.43,-15.57 and -20.32 respectively.While the total protein levels of muscle showed a gradual depletion of -15.17% ,-24.28% and -32.06% respectively. The curcumin co treated animal brain showed a improvement -3.65,-8.39 and -21.93%.And muscle total protein contents were -9.09 ,-15.17 and -33.23 respectively for 1 day 7days and 14days exposure periods.Maximum depletion of protein content was in the muscle upon 14 days selenium +curcumin exposure. brain and muscle showed a progressive decrease in total protein content in one day 7 days and 14 days selenium exposure. Whereas the curcumin co treatment decreased the protein depletion.

**Table -1 : Total protein content in the Tissues of Wistar Rats after Selenium Exposure and Curcumin and Selenium Exposure**

		MUSCLE	BRAIN
Control	Mean $\pm$ SE	3295.66 $\pm$ 0.494	4193.17 $\pm$ 0.792
1 day Selenium exposure	Mean $\pm$ SE % variation	2795.66 $\pm$ 0.421 -15.17	3839.33 $\pm$ 0.494 -8.43

1 day Selenium + curcumin exposure	Mean $\pm$ SE % variation	2996.00 $\pm$ 0.365– 9.09	4040.00 $\pm$ 0.577 – 3.65
7 days selenium exposure	Mean $\pm$ SE % variation	2495.33 $\pm$ 0.333– 24.28	3540.00 $\pm$ 0.577 – 15.57
7 days selenium + curcumin exposure	Mean $\pm$ SE % variation	2795.66 $\pm$ 0.557 – 15.17	3841.00 $\pm$ 0.365 – 8.39
14 days selenium exposure	Mean $\pm$ SE % variation	2239.00 $\pm$ 0.632 – 32.06	3341.00 $\pm$ 0.365 – 20.32
14 days selenium + curcumin exposure	Mean $\pm$ SE % variation	2200.33 $\pm$ 0.210 – 33.23	3308.67 $\pm$ 0.494 – 21.93

ANOVA TABLE	MUSCLE	BRAIN
S S between groups	5783080.95	4199005.48
S S within groups	42.667	61.5
S S Total	5783123.62	4199066.98
d f between groups	6	6
d f within groups	35	35
d f Total	41	41
M S between groups	963846.825	699834.246
M S within groups	1219	1.757
F	790655.599	398279.652
Significant ( P value)	0.001	0.001

## Discussion

The protein content showed significant depression in both brain and muscle tissue of rats exposed to only selenium toxicity. The ameliorative effect of curcumin given orally to the rats subjected to selenium curcumin co treatment was also observed. The depression in the protein content could be attributed to the formation of seleno methionine and seleno cysteine group which were further denaturing the protein. The decrease could also be due to reduced rate of protein synthesis also. Metals are known to produce hepatic hypertrophy histopathological changes leading to the cellular destruction and necrosis which may cause leakage of proteins from the tissues to the blood (Sastry and Gupta 1978a). Concomitant rise in the serum protein levels in crabs exposed to metal toxicity and in fish exposed to selenium toxicity confirms this. The antioxidant curcumin co treatment seems to have ameliorative effect as the protein depletion was minimized in animals cotreated with curcumin. Curcumin is known to have countered the reactive oxygen species thus prevent damages to tissue and act as anti tumorigenic agent (Krishnaswamy and Raghuramulu 1998).

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