Advances in Bioresearch
Adv. Biores., Vol 8 (4) July 2017: 78-79

Print ISSN 0976-4585; Online ISSN 2277-1573
Journal's URL:http://www.soeagra.com/abr.html
CODEN: ABRDC3
DOI: 10.15515/abr.0976-4585.8.4.7879

Advances in Bioresearch

ORIGINAL ARTICLE

Acute And Chronic Toxicity Of Herbicide After Oral Exposure On Albino Rat

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ABSTRACT
Isoproturon is an important herbicide of phenyl urea group. Present study was undertaken to evaluate the toxicity of herbicide on non targeted mammals, by observation of lethal toxicity and biochemical alteration in serum enzyme ALT, AST and Cholinesterase. LD_{50} was estimated by log-dose probit regression method. Isoproturon dose equivalent to LD_{25} was administered orally for acute (1and 2 day) treatment and LD_5 for chronic (15, 30, and 60 days) treatment to Rat through gabage tube. Control was also run simultaneously for each treatment. LD_{50} of Isoproturon found to be 8915.00 mg/kg b wt. Isoproturon induced significant increase in serum enzyme ALT and AST, while Cholinesterase decreases significantly.
***Key words**: Isoproturon, Acute, Chronic, LD_{50}, Herbicide, Toxicity*

Received 09/02/2017 Revised 20/05/2017 Accepted 08/04/2017

How to cite this article:
Yogesh Kumar verma, Soma Bhowmiock and Vijay Kumar Singh. Acute And Chronic Toxicity Of Herbicide After Oral Exposure On Albino Rat. Adv. Biores., Vol 8 [4] July 2017: 78-79.

INTRODUCTION

The undesired effect of pesticides has been noted as a serious to human health concern. Herbicides such as Isoproturon use to control pest because of low toxic than other herbicides. Isoproturon is an inducer of hepatic drug metabolizing enzyme [1]. Pesticides residue in food particle produces ill effect when concentration exceed to safe tolerance level. Among different categories of pesticides Isoproturon, a phenyl urea herbicide use against annual grasses and broad leaved weeds in cereal production and resulting in both surface water and ground water pollution [2]. Isoproturon degraded in soil producing carbon dioxide and degradation product [3]. Present study deals with the effect of Isoproturon toxicity and serum enzyme after acute and chronic oral exposure on Albino Rat.

MATERIAL AND METHOD

Albino rats [*Rattus norvegicus*] of almost same weight (120±5g) were selected randomly irrespective of age and sex from inbred colony. Rats were maintained in the polypropylene cages (Temperature 25±5^{o}C, relative humidity 60±5% and photoperiod 12 hours/day). The rats were fed on Gold Mohar rat feed obtained from Hindustan lever Ltd. Calcutta. Food was withdrawn 1 hr prior to autopsy. The water was provided *ad. libitum.*

Isoproturon [3-(4-isopropylphenyl)-1,1 dimethyleurea; 3-p-cumenyl-1,1-dimethylurea.] is a phenyl urea herbicide in liquid form was obtained from Reidal chemical pvt. ltd. Meerut UP. Required solution of Isoproturon was prepared in ground nut oil. . Doses were given orally by gabage tube as per kg body weight. The mortality and survival number of rats were recorded for each dose after 96 hours. The data were analyzed statistically by log-dose/probit regression line method [4].

RESULT AND DISCUSSION

The mortality percentage noted after 96 hours showed a corresponding increase with the increase dose of Isoproturon. Regression line and regression equation has been established and median lethal dose has

been calculated for the treatment. The regression equation has been established: Y=4.93+3.45(x-3.94). The fiducial limits obtain m_1=9120.00, m_2=8710.00. The estimated mean value of median lethal dose is 8915.00 mg/kg body weight for albino rats, which indicate that its mammalian toxicity is very low. The reported LD_{50} of Isoproturon for mice was 3305 mg/kg wb.wt.[5]. Isoproturon inhibits the synthesis of ATP [6] and cause energy loss.

The activity of ALT and AST enzyme in serum of Albino rats treated with different treatment exposures (acute and chronic) show significant increase compared with control values. These enzymes show non-significant changes after recovery treatment for 45 days compare to control value (table-I&II). Increase in ALT and AST might be an indication of initial injury occurring in advance gross hepatic pathology and any condition leading to change in membrane permeability causing a generalized release of enzymes from the cell [7].

Cholinesterase enzyme (ChE) activity in serum of Isoproturon treated Albino rats was found to be decreased in compare to control value. It was significant decreased for 1 day acute and 60 days chronic exposure and non-significantly for other treatment, likewise 45 days recovery treatment (table-III). The present finding reveals that low dose exposure of herbicide is not able to change the ChE activity. This might be due to low quantity of toxic ingredient. Non significant decrease in recovery assessment indicates the toxic contents get eliminated very fast.

TABLE –I: ALT Activity (IU/L) in serum of Rat treated with Isoproturon

Treatment	Time in days					
	1	2	15	30	60	45
Control	35.75±1.55	36.74±0.92	35.23±0.69	37.68±0.48	37.19±0.75	36.21±0.76
Isoproturon	38.97±1.57[a]	37.06±0.93[c]	34.38±1.59[c]	38.75±2.07[b]	39.99±0.93[a]	37.01±0.67[c]

Each value is a mean ± SE, n = 5, Statistical difference from control: a= highly significant at P<0.01, b= significant at P 0.05, c= non-significant at P>0.05, general mean= average mean of each treatment days.

TABLE –II AST Activity (IU/L) in serum of Rat treated with Isoproturon

Treatment	Time in days					
	1	2	15	30	60	45
Control	46.75±0.92	46.14±0.75	46.53±1.15	47.58±1.14	47.79±1.25	46.21±0.56
Isoproturon	48.77±1.07[a]	48.06±0.83[b]	46.08±1.29[c]	49.65±1.07[b]	50.69±0.96[a]	48.81±0.87[b]

Each value is a mean ± SE, n = 5, Statistical difference from control: a= highly significant at P<0.01, b= significant at P 0.05, c= non-significant at P>0.05, general mean= average mean of each treatment days.

TABLE –III Cholinesterase Activity (U/I) in serum of Rat treated with Isoproturon

Treatment	Time in days					
	1	2	15	30	60	45
Control	1453.7±16.7	1494.4±64.9	1508.6±55.4	1473.8±45.8	1483.5±66.4	1450.8±56.4
Isoproturon	1060.2±55.6[a]	1452.1±27.7[c]	1160.5±40.8[b]	1258.3±44.5[b]	990.8±74.5[a]	1398.3±32.4[c]

Each value is a mean ± SE, n = 5, Statistical difference from control: a= highly significant at P<0.01, b= significant at P 0.05, c= non-significant at P>0.05, general mean= average mean of each treatment days.

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