



EXPERIMENTAL STUDY OF *AJEYA GHRITA* ON PESTICIDE INDUCED TOXICITY IN ALBINO WISTER RATS

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ABSTRACT

In modern era the habit of using processed food, packed food, use of junk food, food having different coloring agent and flavoring agents, used to increase the taste of food, but it produces a bad effect in our body. Some studies shown that fast food producer does not sell the products with similar ingredient what they advertised. If the body does not have enough antioxidants, free radicals cause oxidative stress. Oxidative stress has been associated with developmental delay and neurological disorders, as well as many other diseases processes. Experimental work in the form of toxicity study against pesticide deltamethrin was induced. This study is undertaken to prove drug effectiveness against the pesticide induced toxicity and its further extended in form of clinical trial.

INTRODUCTION

In recent decades, pharmacology is one of the branches that emerged to explore the internal condition of a human to find out their problems related to health and diseases. It played an important role for new drug discovery as their new formulation is tested first on an animal species and after that go for the human trial to cure and prevent the diseases. It is established that proper observations, blood testing investigations and histo-pathological reports after sacrificing the animals prove effect of any drug. We considered all these points in our mind, planned these studies to assess the safety of the Ayurvedic formulations i.e *Ajeya ghrita* on deltamethrin pesticide induced toxicity on albino-wister rats.

AIMS AND OBJECTIVES

The present study was planned with following aim and objective: -

- To evaluate the safety of *Ajeya ghrita*.on pesticide induced toxicity
- Assessing toxicity study as per OECD guideline.

MATERIAL AND METHODS

The experimental study was carried out at **Siddhartha institute of pharmacy, Dehradun** after obtaining permission from institutional ethical committee, UAU and Institutional Animal Ethics Committee with **Approval number-SIP/IAEC/PCOL/03/2018. Registration No. 1435/PO/Re/S/11/CPCSEA**

Repeated Dose Toxicity

It was done according to OECD guideline 407, ANNEX 2c.

Preparation of Animals: The animals were randomly selected, marked with Picric acid H, B, T, BT, HB, HT for individual identification.

NUMBER OF ANIMALS AND DOSE LEVELS

Animals- Albino wister rats of body weight 150- 275gm of either sex were taken in the Siddhartha institute of pharmacy animal house for research work. These animals were housed in standard polypylene cages with maintained or controlled room temperature (20± 30⁰C) and humidity (55±5%) with 12:12 hour light and dark cycle. All the rats were fed by the pellet and water ad libitum. The guideline of the Committee for the purpose of control and supervision of experiments on animals (CPCSEA) of the Govt. of India were followed and prior permission was granted from the institutional ethical committee (Reg. No.1435/PO/Re/S/11/CPCSEA) for conducting the animal experimental studies

Acclimatization

Animals were acclimatized for 7 days. Acclimatization means the process by which an individual organism adjusts to a change in its environment like change in altitude, temperature, humidity, photo period, pH, body weight, blood pressure, heart rate etc. allowing to maintain performance across a range of environmental condition.

Weighing and Marking of The Animals: Measurement of weight of the animal was done by using electronic weighing machine. All the rats were marked by the picric acid which is a pale-yellow color solution for their identification.

EXPERIMENTAL PROTOCOL: For the experimental study animal were divided into following four groups-

GROUP 1: Normal healthy 6 rats (3 male and 3 female) received the distilled water in dose of 1ml/kg of body weight of rat/day.

GROUP 2: Normal healthy 6 rats (3 male and 3 female) received pesticide deltamethrin analytical standard mixed with corn oil in dose of 2mg/2ml/kg body weight of rats/day in evening hours.

GROUP 3: Normal healthy 6 rats (3 male and 3 female) received test drug i.e. Ajeya Ghrita in dose of 1.1ml/kg body weight of rats/day in morning hour and pesticide with Corn oil, 2mg/2ml/kg body weight of rats/day in evening hour.

GROUP 4: Normal healthy 6 rats (3 male and 3 female) received Standard drug i.e. *Murchit ghrita* in dose of

1.1ml/kg body weight of rats/day in morning hours and pesticide with Corn oil, 2mg/2ml/kg body weight of rats/day in evening hour.

Preparation of Dose For Toxicity

For inducing toxicity, we mixed pesticide in corn oil as a food vehicle in dose of 2ml/kg body weight of rats/day in evening hours.

Duration of Study – 30 days

Calculation of Dose

Rat dose was calculated on the basis of body surface area ratio (Paget and Barnes, 1964).

Human Dose – 12 gm with Luke warm water in divided dose as per API.

Dose in Rat per Kg body weight= 0.018(conversion factor for rat) x Human dose x 5

Dose in rats per kg of body weight= 0.018 x 12 x 1.09 x 5= 1.1 ml/kg body weight/day

(Where human dose is 24 gm/day and 1gm= 1.09ml)

Shows dosing in various groups of toxicity study.

Dosing Chart of Various Groups	
GROUP	DOSING SCHEDULE
GROUP I	Normal control group (distilled water) 1ml/kg body weight of rats/day
GROUP II	Pesticide control group (pesticide+ Corn oil) 2mg/2ml/kg body weight of rats/day
GROUP III	Test drug control group (Ajeya ghrita) 1.1 ml/kg body weight of rats/day+ pesticide+ Corn oil, 2mg/2ml/kg body weight of rats/day
GROUP IV	Standard drug control group (Murchit ghrita) 1.1 ml/kg body weight of rats/day+ pesticide+ Corn oil, 2mg/2ml/kg body weight of rats/day

Administration of Doses: Dose was given by gavage tube using an oral feeding needle. After 7-day Acclimatization.

OBSERVATIONS

Animals were observed individually after dosing at least once during the first 30 minutes, periodically during the first 24 hours, with special attention given during the first 4 hours, and daily thereafter, for a total of 30 days. All observations viz. changes in skin and fur, eyes and mucous membranes, salivation, diarrhea, lethargy, sleep and coma, morbidity and mortality were recorded.

Body weight- Twice a week

Food and water consumption(daily)- Normal

Cage side activity- Normal activity

Mortality- No mortality

Fecal consistency- Normal

HAEMATOLOGICAL TESTS- Blood Sample collected from orbital sinus of one eye from toxic study group is evaluated for hematological, parameters like Hb, WBC, RBC, Neutrophils, Lymphocytes, Eosinophils, Monocytes, Basophils, Platelets, LFT, KFT etc.

Place: Hi- Tech Path Labs Dehradun.

List of Chemicals

S.no.	Name of Chemical	Company
1.	Deltamethrin pesticide	Garda chemicals, Maharashtra
2.	Corn oil	Sigma Aldrich, Bangalore
3.	Normal saline	Merck Chemical Pvt. Ltd. Mohali
4.	Picric acid	Neelam International Co. (India)
5.	Chloroform	Merck specialties Pvt. Ltd. Mumbai
6.	Formalin	Central Drug House Pvt. Ltd. New Delhi

List of Equipment

S.no.	Name of Equipment	Company
1.	Oral Feeding gavage	Orchid Scientific and Innovative India Pvt. Ltd. Ambad, Nasik, Maharashtra.
2.	Metabolic Cages	G.T. Scientific Works, Nishat bagh, Ambala.
3.	Capillaries tube	Doon surgical, Dehradun
4.	Water Bottle	Doon Surgicals, Dehradun
5.	Weighing machine	Doon surgicals, Dehradun

RESULT OF ANIMAL STUDY

Results showing finding of observation in all four group in animal study

	Normal group		Pesticide group		Test drug group		Standard group	
	BT	AT	BT	AT	BT	AT	BT	AT
Skin and fur	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Eyes	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Mucous membrane	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Salivation	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Lethargy	Nil	Nil	Nil	present	Nil	Nil	Nil	Nil
Sleep	Normal	Normal	Normal	increased	Normal	Normal	Normal	Increased
Coma	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Convulsions	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Tremors	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Diarrhea	Nil	Nil	Nil	present	Nil	Nil	Nil	Nil
Morbidity	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Mortality	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

RESULTS

Showing weight in all four group before and after treatment and inter-comparison between all those group:

	WEIGHTS OF RATS (Mean±SD)		Within the group comparison using paired t test BF-AF	P value	Result
	BF	AF			
GROUP 1 (N=6)	195.8±53.42	210.8±53.5	-15.00±3.162 t-value=-11.619	<0.01	SIG
GROUP 2 (N=6)	204.1±53.42	200.0±55.3	4.167±17.72 t-value=0.576	>0.05	NS
GROUP 3 (N=6)	212.5±41.07	238.3±40.5	-25.833±2.041 t-value=-31.000	<0.01	SIG
GROUP 4 (N=6)	195.8±43.06	231.6±44.4	-35.833±3.764 t-value=-23.320	<0.01	SIG
Inter group comparison by one-way ANOVA test	F-value = 20.252	P-value = <0.001		<0.01	SIG

Table showing the effect in change in weight in all four group i.e. normal control group, pesticide group, test drug group and standard group on weight in albino- wistar rats

- Significant change in weight were observed in group-1, group-3 and group-4 but non- significant change in weight was observed in group-2 before and after feeding, while in inter-group comparison, change in weight were significant.

Showing weight of organ in all four group before and after feeding and inter-comparison between all those group

Group	Organ weight(gm) (mean±sd)			
	Liver (n=6)	Kidney (n= 6)	Testies (n=3)	Ovaries (n=3)
GROUP 1	15.77±0.88	2.00±0.62	0.78±0.08	0.77±0.03
GROUP 2	14.74±0.92	2.26±0.53	0.80±0.14	1.16±0.38
GROUP 3	11.86±0.12	1.63±0.21	0.80±0.07	0.74±0.03
GROUP 4	15.77±0.88	2.00±0.62	0.78±0.08	0.77±0.03
Inter group comparison by one way ANOVA test	F-Value- 457.13 P value- 0.00	F value- 1.515 P value- 0.241	F value- 0.039 P value- 0.989	F value- 3.296 P value- 0.079
RESULT	SIG	NS	NS	NS

Table showing the effect of test drug in all four group i.e. normal control group, pesticide group, test drug group and standard group on organ weight (liver, kidney, testis and ovaries) of albino- wistar rats after dissection.

- There is non- significant difference in weight of kidney, testis and ovaries but Significant change in weight of liver in all groups comparison.

Showing finding of hemoglobin level in all four group before and after feeding and inter-comparison between all those group:

	Hemoglobin (gm) (Mean±SD)		Within the group comparison using paired t test BF-AF	P value	Result
	BF	AF			
GROUP 1 (N=6)	14.86±0.852	14.60±0.822	0.267±0.728 t=0.897	>0.01	NS
GROUP 2 (N=6)	14.01±1.225	9.817±0.697	4.200±1.624 t=6.337	<0.001	SIG
GROUP 3 (N=6)	14.53±0.862	14.18±1.802	0.350±1.984 t=0.432	>0.05	NS
GROUP 4 (N=6)	13.71±0.804	10.33±0.288	2.983±0.598 t=12.219	<0.01	SIG
Inter group comparison by one way ANOVA test	F value= 12.359 P value =0.000	F value= 9.572 P value=0.001		<0.001	SIG

Table showing change in hemoglobin level in all group, here significant change were found in group-2 and group- 4, and on inter- group comparison by using one way Anova test showed Significant change, while group-1 and group- 3 showed non-significant change.

Showing Change in Neutrophil Values in All Groups.

	Neutrophils (Mean±SD)		Within the group comparison using paired t test BF-AF	P value	Result
	BF	AF			
GROUP 1 (N=6)	35.66±3.266	34.38±3.289	1.288±2.774 t=1.133	>0.01	NS
GROUP 2 (N=6)	34.50±5.431	34.38±5.431	81.33±7.118 t=-10.812	<0.01	SIG
GROUP 3 (N=6)	36.83±2.858	3.300±8.438	3.833±8.841 t = 1.062	>0.01	NS
GROUP 4 (N=6)	35.167±3.971	32.33±3.882	2.833±4.956 t=1.400	>0.01	NS
Inter group comparison by one way ANOVA test	F value= 74.826 P value = 0.000	F value= 65.126 P value=0.000		<0.001	SIG

Table shows change in neutrophils in all four group, significant change was found in the value of group- 2 but rest groups showed non-significant change. Inter- group comparison shows significant change.

Showing Change in Blood Urea Values in All Groups

	Blood urea (Mean±SD)		Within the group comparison using paired t test BF-AF	P value	Result
	BF	AF			
GROUP 1 (N=6)	38.33±2.160	3.767±0.615	34.567±2.168 t = 39.061	<0.01	SIG
GROUP 2 (N=6)	34.00±2.683	65.167±9.888	31.167±9.020 t = -8.463	>0.05	NS
GROUP 3 (N=6)	36.83±3.656	35.00±7.430	1.833±9.766 t = 0.460	>0.05	NS
GROUP 4 (N=6)	38.16±3.764	34.33±3.764	3.833±3.656 t=2.568	<0.01	SIG
Inter group comparison by one way ANOVA test	F value=34.368 P value = 0.00	F value= 39.200 P value=0.820		>0.05	NS

Table shows effect of test drug in all groups i.e. in normal group, pesticide group, test group and standard group on blood urea level of albino-wistar rats before and after feeding.

There is significant change in group-1 and group- 4 but on inter-group comparison, non-significant change was found by using one way Anova test.

Showing Changes in Serum Creatinine Values in All Groups

	Creatinine (Mean±SD)		Within the group comparison using paired t test BF-AF	P value	Result
	BF	AF			
GROUP 1 (N=6)	0.450±0.152	38.167±3.189	-37.717±3.245 t = -28.471	<0.01	SIG
GROUP 2 (N=6)	0.533±0.197	1.583±0.256	-1.050±0.356 t = -7.217	>0.01	NS
GROUP 3 (N=6)	0.517±0.183	0.383±0.306	0.133±0.472 t = 0.692	<0.01	SIG
GROUP 4 (N=6)	0.517±0.147	0.433±0.121	0.0833±0.240 t = 0.850	>0.01	NS
Inter group comparison by one way ANOVA test	F value=14.284 P value = 0.000	F value= 14.909 P value=0.880		>0.05	NS

Table shows effect of test drug in groups, i.e. in normal group, pesticide group, test group and standard group on Serum creatinine level of albino-wistar rats before and after feeding.

There is significant change in group-1 and group- 3 and rest all group shows non-significant changes. Inter-group comparison shows non-significant change.

Showing Changes in Uric Acid Values in All Groups

	Uric acid (Mean±SD)		Within the group comparison using paired t test BF-AF	P value	Result
	BF	AF			
GROUP 1 (N=6)	3.450±0.217	1.550±1.631	1.900±1.559 t = 2.984	0.031	SIG
GROUP 2 (N=6)	4.083±0.392	7.217±0.560	-3.133±0.829 t = -9.262	0.01	SIG
GROUP 3 (N=6)	4.850±0.345	3.850±0.423	1.000±0.597 t = 4.105	0.009	NS
GROUP 4 (N=6)	5.017±0.343	4.217±0.615	0.800±0.438 t = 4.472	0.664	NS
Inter group comparison by one way ANOVA test	F value= 67.563 P value = 0.008	F value= 82.457 P value= 0.001		0.001	SIG

Table shows effect of test drug in all groups on serum uric acid level of albino-wistar rats before and after feeding. There is significant change in group-1 and group-2, rest group shows non-significant change. Inter-comparison between groups show significant change.

Showing Changes In Bilirubin (T) Values In All Groups

	Bilirubin (T) (Mean±SD)		Within the group comparison using paired t test BF-AF	P value	Result
	BF	AF			
GROUP 1 (N=6)	0.422±0.0691	0.338±0.34	0.033±0.048 t = 1.700	0.150	NS
GROUP 2 (N=6)	0.412±0.068	0.768±0.135	-0.357±0.162 t = -5.391	0.03	SIG
GROUP 3 (N=6)	0.432±0.061	0.377±0.093	0.055±0.131 t = 1.029	0.351	NS
GROUP 4 (N=6)	0.438±0.043	0.233±0.044	0.086±0.051 t = 4.142	0.009	NS
Inter group comparison by one way ANOVA test	F value=21.238 P value =0.001	F value= 18.628 P value=0.446		0.446	NS

Table shows effect of test drug in all groups on bilirubin level of albino-wistar rats before and after feeding. There is significant change in group-2, rest all groups show non-significant change. There is non-significant change on inter-group comparison by using one way Anova test.

Showing Changes in Bilirubin (D) Values in All Groups

	Bilirubin (D) (Mean±SD)		Within the group comparison using paired t test BF-AF	P value	Result
	BF	AF			
GROUP 1 (N=6)	0.252±0.061	0.250±0.063	0.0016±0.09 t = 0.415	0.695	NS
GROUP 2 (N=6)	0.265±0.437	0.517±0.203	-0.252±0.219 t = -2.816	0.244	NS
GROUP 3 (N=6)	0.277±0.043	0.245±0.062	0.0317±0.097 t =0.799	0.460	NS
GROUP 4 (N=6)	0.320±0.035	0.233±0.044	0.0833±0.056 t =3.639	0.015	SIG
Inter group comparison by one way ANOVA test	F value=8.991 P value =0.001	F value= 7.987 P value=0.002		0.002	SIG

Table shows effect of test drug in groups on bilirubin(D) level of albino-wistar rats before and after feeding. There is significant change in group-4 and change in rest groups were non-significant. Inter- comparison between group shows significant change.

Showing Changes in Sgot Values in All Groups

	SGOT (Mean±SD)		Within the group comparison using paired t test BF-AF	P value	Result
	BF	AF			
GROUP 1 (N=6)	69.833±5.037	66.33±4.967	3.500±2.719 t = 3.130	0.026	SIG
GROUP 2 (N=6)	72.167±7.600	101.50±6.834	-29.33±12.565 t = -5.719	0.069	NS
GROUP 3 (N=6)	65.337±10.270	62.667±12.307	2.667±21.906 t = 0.298	0.778	NS
GROUP 4 (N=6)	71.833±2.401	64.167±6.882	7.667±7.633 t = 2.460	0.057	NS
Inter group comparison by one way ANOVA test	F value=9.990 P value =0.00	F value= 9.473 P value=0.447		0.447	NS

Table shows effect of test drug in groups on SGOT level of albino-wistar rats before and after feeding. There is significant change in normal control group, rest all groups were found non- significant. Inter-comparison between groups shows the non-significant change.

Showing Changes in Sgpt Values in All Groups

	SGPT (Mean±SD)		Within the group comparison using paired t test BF-AF	P value	Result
	BF	AF			
GROUP 1 (N=6)	24.50±3.937	23.83±3.061	0.667±1.751 t = 0.933	0.394	NS
GROUP 2 (N=6)	22.667±2.503	56.33±12.533	-33.667±13.808 t = -5.972	0.619	NS
GROUP 3 (N=6)	21.667±3.983	21.500±6.686	0.167±7.468 t = 0.054	0.959	NS
GROUP 4 (N=6)	23.167±3.764	20.833±1.941	2.333±3.445 t =1.659	0.158	NS
Inter group comparison by one way ANOVA test	F value=27.756 P value =0.00	F value= 24.344 P value=0.00		0.00	SIG

Table showing effect of test drug in groups on SGPT level of albino-wistar rats before and after feeding. There is significant change in inter comparison between the groups and single group showing non-significant change.

Showing Changes In Sod Values In all Groups

	Sodium oxide Dismutase (Mean±SD)		Within the group comparison using paired t test BF-AF	P value	Result
	BF	AF			
GROUP 1 (N=6)	11.59±0.010	11.595±0.013	-0.0016±0.0147 t = -0.277	0.793	NS
GROUP 2 (N=6)	11.59±0.013	10.565±0.424	1.032±0.430 t = 5.878	0.002	SIG
GROUP 3 (N=6)	11.60±0.003	11.605±0.054	-0.005±0.0054 t = -2.236	0.050	SIG
GROUP 4 (N=6)	11.60±0.012	11.58±0.012	0.0133±0.015 t = 2.169	0.082	NS
Inter group comparison by one way ANOVA test	F value= 34.317 P value = 0.00	F value= 34.353 P value=0.001		0.001	SIG

Table shows effect of test drug in groups on SOD level of albino-wistar rats before and after feeding. There is significant change in group-2 and group-3 but non-significant in group-1 and group-4. Inter-group comparison between groups shows significant change.

Showing Changes in Catalase Values in All Groups

	Catalase (Mean±SD)		Within the group comparison using paired t test BF-AF	P value	Result
	BF	AF			
GROUP 1 (N=6)	39.71±0.378	39.79±9.557	-0.0783±0.571 t = -0.336	0.750	NS
GROUP 2 (N=6)	39.510±0.447	37.062±0.547	2.448±0.804 t = 7.455	0.01	SIG
GROUP 3 (N=6)	39.438±0.428	40.498±0.073	-1.060±0.393 t = -6.610	0.001	SIG
GROUP 4 (N=6)	39.353±0.419	40.288±0.160	-0.935±0.391 t = -0.855	0.002	SIG
Inter group comparison by one way ANOVA test	F value=49.769 P value =0.00	F value= 63.963 P value=0.001		0.001	SIG

Table shows effect of test drug in groups on catalase level of albino-wistar rats before and after feeding. There is significant change in all group except group-1 and inter-comparison group shows significant change.

DISCUSSION ON HEMATOLOGICAL REPORTS

- ❖ Some significant changes were found in hematological and biochemical parameters i.e. group 2, group 3 and 4, when it comparing with the normal control group 1.
- ❖ There are some significant values are in weight of liver (<0.001) were found significant result but weight of ovaries (0.079), kidney (0.241) and testis (0.989) were found Not significant result.
- ❖ Hematological and biochemical parameters including HB result in group 2(<0.01) and 4(<0.01) were found significant and inter-comparison between both groups found significant <0.01) result. In neutrophil group 2(<0.01) were found significant and rest all three group were found not significant (>0.01) result and inter-comparison between groups

shows significant (<0.01) result. In lymphocyte parameter only inter-comparison between both groups were found significant (<0.01) result and all single group found not significant (>0.01) result. In blood urea and serum creatinine parameter in single group found significant result in group-1(<0.01) and group-4(<0.05) in blood urea and group-1(<0.01) and group-3(<0.05) were found significant in serum creatinine and inter-group comparison found not significant (>0.05) result. In uric acid group-1(<0.01) and group-2(<0.01) were found significant in single group and rest group found not-significant (>0.05) result. In Bilirubin(T) group-2(<0.05) were found significant result while inter-comparison between group found non-significant (>0.01) result. In Bilirubin(D), group-4(<0.05) were found

significant result and rest groups non- significant (>0.05) result and on inter-comparison between groups significant result were obtained. In SGOT, group-1 (<0.05) found significant result and rest groups were non- significant (>0.05) result were obtained and inter-comparison of groups not significant (>0.05) result were found. SGPT and Serum ALP were found non- significant (>0.05) result in all four groups while serum ALP was found significant (<0.05) result in group-1 rest all found non- significant result. In SOD and CAT were found statistically significant result in group-2 and group-3 and in CAT significant result were obtained in group-2, Group-3 and group-4 and group-1 were found non- significant result. On inter- comparison between groups were found non- significant result.

- ❖ Higher the level of SGOT is a sign of liver pathology and damages. Raised level of SGPT level suggested about the liver damages, viral hepatitis, bile duct problems, congestive heart failure etc. increased serum ALP level is recommended diseases such as extrahepatic bile obstruction, intra hepatic cholestasis, infiltrative liver disease and hepatitis. Raised urea level indicates urinary tract infection, congestive heart failure, Gastro-intestinal bleeding, shock etc. It also results in impaired kidney function. Raised level of Albumin shows, anxiety, confusion, severe shortness of breath, chest pain, gasping breathing and increased heart rate.
- ❖ Elevated creatinine function signifies prostate cancer, bacteremia, impaired kidney function, kidney disease and improper filtration of toxins outside the bodies. Blood urea nitrogen level increased having possibility of improper functioning of kidney, congestive heart failure and shock. Higher amount of uric acid indicates the potentials to develop gout and kidney stones and total protein caused risk in development of inflammatory changes in liver and kidney Later on it gets converted into liver and kidney diseases etc.

DISCUSSION ON HISTOPATHOLOGICAL REPORTS

- ❖ In this we assess the hepatic and renal cells ovaries and testis changes were found in toxicological study doses form in different groups when it compares with the all four groups. Weight of liver (<0.05) means that are significant result, when comparing all groups. Weight of kidney (>0.05) it means all groups having non-significant results. Weight of Ovaries (>0.05) recommended the non-significant result in all groups. Weight of testis (<0.05) shows significant result in all groups.
- ❖ Histopathological reports showed the moderate changes hepatotoxicity, nephrotoxicity and moderate changes in ovaries and testis occurs in group II i.e. pesticide group while in group III and IV having mild changes in liver, kidney, ovaries and testis. But in group normal finding of these parameters.
- ❖ **Liver:** The histopathological changes in liver reveals that the normal control group had completely normal Hepatic lobular architecture maintained consisting of portal triad, central vein and hepatocytes and its canalicular pattern. Region around portal triad and central vein area appears normal. No inflammation or edema or degenerative changes or fibrosis or pigment collected, histologically unremarkable hepatic parenchyma. Hepatic lobular architecture almost maintained consisting of portal triad, central vein and hepatocytes and its canalicular pattern. Sections showed predominant changes around periportal region showing moderate fatty degeneration in hepatocytes along with congestion and moderate lymphocytic infiltration. Edema also noted occasionally in few periportal region. In group I histologically unremarkable hepatic parenchyma on liver were found. Moderate toxic hepatic changes were found in group II. While in group III section were showed receding toxic hepatic change with evidence of regeneration in liver. predominant changes around periportal region with mild fatty degeneration in hepatocytes. Group IV mild toxic hepatic change were found.
- ❖ **Kidney:** The histological changes in kidney are Both kidneys show similar morphology, showing almost normal in morphology. No inflammation or edema or congestion, cystic change and histologically unremarkable kidney noted in Group I. In pesticide group II, both kidneys show similar morphology, showing. Moderate nephrotoxicity, tubular vacuolar degeneration, however architecture of tubules is maintained. Moderate congestion with moderate lymphocytic infiltration also noted in tubules. Edematous changes noted in between tubules, glomeruli appear almost normal in morphology and moderate toxicity were found. In Group III showed both kidney similar morphology, showing minimal tubular degeneration, architecture of tubules is maintained. Receding nephrotoxicity were found in both kidney, congestion with mild lymphocytic infiltration also noted in tubules. Edematous changes not noted in between tubules. Group IV minimal nephrotoxicity on bilateral kidney showed.
- ❖ **Testies:** The histological changes in testis are showing seminiferous tubules with evenly spaced and maturing and appears to be normally developed and unremarkable testicular parenchyma in group I. In toxic group II have been showed changes in section were moderately widely spaced seminiferous tubules due to edema in between present and moderate testicular edema along with cystic change. Few of seminiferous tubules are dilated and cystic filled with proteins fluid. Having moderate testicular edema along with cystic changes. In group III receding testicular edema and cystic changes were found in testies and IV sections showed receding testicular edema and cystic change in testies.

- ❖ **Ovaries:** Histological changes in Ovaries sections show developing follicles like primordial follicles, primary follicles, pre antral and antral follicles and corpus luteum, graafian follicle and atretic follicles amid ovarian stroma. Surface show epithelium and histologically unremarkable ovary parenchyma in group I. in group II section show unremarkable ovarian parenchyma with mild dilated fallopian tube. Sections show developing follicles like primordial follicles, primary follicles, pre antral and antral follicles and corpus luteum, graafian follicle and atretic follicles amid ovarian stroma. In group III unremarkable ovarian parenchyma were found. In group IV unremarkable ovarian parenchyma were found in ovaries.
- ❖ In brief, the present study provides useful information regarding toxicity study of deltamethrin on the basis of hematological, biochemical and histological changes.

CONCLUSION

Haematological parameter and biological parameter like SGOT, SGPT, ALP, serum uric acid, urea, creatinine, bilirubin etc level significantly higher in group II i.e. Pesticide group. Histopathological reports showed the mild to moderate Hepato, Renal, Ovaries and Testis toxicity changes in relation to group I, III and IV. This result shows that test drug having properties to treat the toxicity against the deltamethrin pesticide.