ISSN Print: 2394-7500
ISSN Online: 2394-5869
Impact Factor: 8.4
IJAR 2021; 7(2): 18-21
www.allresearchjournal.com
Received: 11-12-2020
Accepted: 14-01-2021

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An analytical study of properties of fenvalerate and *Withania somnifera*

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Abstract
The present study was intended to explore the properties of Fenvalerate and Withania Somnifera. The study was descriptive in nature. The research methodology involved in the present study is to figure out the harmful effects of synthetic pyrethroid fenvalerate under sublethal, para safe lethal doses and after their antagonistic or remedial effects appeared due to herbal treatments discloses the number of immense changes. To attain these results, a number of research technological methods have been carried out established on different principles. The results of the study reveal that sudden changes in fenvalerate administered fishes and later therapeutic modifications due to medicinal plants extract procedure. From the results, it has been confirmed that due to the toxicity of Fenvalerate, all parameters indicated the significant outcomes in the damage appeared. RBC count lessened and Hb reduced. WBC count diminished due to infection, serum glucose level is diminished, but Urea and cholesterol was boosted with the increase in doses. Heavy damage was identified as all haematological and biochemical parameters indicated damage. In the present investigation, it is noticed that remedial plant Ashwagandha fixed the damages in the test fish due to sublethal doses of fenvalerate in various aspects. Investigations were made by several workers so far proved that we can reduce the toxic effects of pesticides in fishes by treating them with Ashwagandha in the pond before taking them as food. As these plants up till now have been used in treatment for various human diseases may also help in the pisciculture practices for human consumption.

Keywords: Properties exploration, fenvalerate and *Withania somnifera*

Introduction
The environmental pollution is the unfavourable alteration of our surroundings through address or indirect effects, of changes in energy patterns, radiation levels, element and animal constitution and large quantity of organisms. It is shaped generally by individual actions, or as a consequence of likely disasters. Pollution has a damaging end product on the alive being which makes it near impractical to sustain life. The contamination of the environment is furthermore core connected to approximately of the diseases that are around at present and this delinquent that wants to be full sensitivity of as quickly as possible, not individual for the sound of the environment but and for the colonize that live in it.
Water pollution is fluctuations in physical, chemical or biological properties of water or release of any sewage, industrial or pesticidal trash which may be fatal to general condition or safeguard. Water polluting agents may be physical (waste heat from industries), chemical (inorganic, organic, heavy metals and pesticides) and biological (pathogens, virus, bacteria etc. When contaminated materials enter lakes, streams, rivers, oceans, and other water bodies, they get dissolved or lie suspended in water or get set on the bed. This consequences in the pollution of water affecting natural activities and ecosystems of aquatic animals. The term "pesticide" is a combined term that includes all chemicals that are used to kill or prevent pests. Some of the generally used pesticides are DDT, Endosulfan, fenvalerate, lindane, Malathion, parathion, diclofon and dieldrin. The most apparent effects of pesticides on organisms are immediate effects of acute poisoning. Pesticides can reach water sources through drift, runoff, soil erosion, leaching and sometimes, accidental or premeditated release.

Synthetic pyrethroids: The vast majority of organic pesticides are synthesized by chemists primarily for the control of household pests. Pyrethroids commercially accessible, to date,

comprise allethrin, resmethrin, d-phenothrin and tetramethrin (For insects of public health importance) and cypermethrin, deltamethrin, fenvalerate and permethrin (Mainly for agricultural insects). Other pyrethroids are also accessible, encompassing furamethrin, kadethrin and tell allethrin (Usually for household insects).

Fenvalerate

Fenvalerate is an insecticide that has been in function since 1976. It is a mixture of four optical isomer which give birth to sundry insecticidal activities. It is an ester of 2-(4-chlorophenyl)-3-methylbutyric acid and alpha-cyano-3-phenoxybenzyl alcohol but lacks a cyclopropane ring. However, in conditions of its insecticidal behaviour, it belongs to the pyrethroid insecticides. The 2-S alpha (or SS) the configuration is the largely insecticidally committed isomer. It is generally frequently second-hand to keep under control insects in agriculture. Fenvalerate does not influence plants but is keen for an comprehensive era of time. In irrigate and on soil surfaces, fenvalerate is photo-degraded by sunlight. Ester cleavage, hydrolysis of the cyano group, decarboxylation to yield2-(3-phenoxy phenyl)-3-(4-chlorophenyl)-4-methyl pentane-nitrile (decarboxy-fenvalerate), and other radical-initiated reactions.

Exposure of fish to pesticides

When pesticides reach aquatic systems, environmental costs will be high. The impacts of pesticides, such as affecting dissolved oxygen depletion and concentrations of less than 0.1 to 1.0 ppm of these pesticides can kill fish. Fish and aquatic animals are exposed to pesticides in three primary ways

1. Dermally, direct absorption through the skin by swimming in pesticide-contaminated waters.
2. Breathing, by direct uptake of pesticides through the gills during respiration.
3. Orally, by swallowing pesticide-contaminated water or feeding on pesticide-contaminated prey.

Insecticides are additionally toxic to aquatic life than herbicides and fungicides. These accumulated pesticides accumulate up the food chain as large fish eat small fish and ultimately as humans consume the fish. The modem medications are ineffective against long-term health issues of human beings caused by such chemical poisoning of the atmosphere and consequently the human body. It is slowly being acknowledged that simply by use of natural herbs and herbal preparations in aquaculture we can negotiate with these problems. The main mechanism of working of withanolides from *W. somnifera* is that it works as a crucial hormone precursors that can convert into human physiologic hormones as required. *W. somnifera* is believed to be amphoteric; i.e., it can support regulate vital physiologic processes like Cognitive enhancement, neuroprotective, improvement of dendrite formation.

Location of the research gap: Large number of the research studies has been conducted in the same domain. Notable research studies are; Javed, M., Usmani, N (2015) [5] and Mudgal, L.K.; Joshi, P.K. (2012) [8], Prusty A.K., Kohli M.P.S., Sahu N.P. (2015) [9]. However, there may be hardly any research study which has been explored in the same research area that has been selected for the present.

Statement of the research problem: The statement of research problem is as under:

"An analytical study of properties of fenvalerate and *Withania somnifera*"

Purpose of the study: The present study consists of below mentioned objectives:

Analysis of properties of Fenvalerate and *Withania somnifera*

1) Control group study of haematological and biochemical parameters of *Clarias batrachus* to find the normal values.
2) Study of toxic effects by the introduction of fenvalerate in 3 varied sublethal concentration for 15 days to analyse alterations in haematological and biochemical parameters of test fish, *Clarias batrachus* (4 fishes per aquarium in three different aquaria)
3) Preparation of herbal extract of *Withania somnifera*.
4) Introduction of fenvalerate treated fishes to three different doses of *W. somnifera* individually in three different aquaria for 30 days.
5) Study of same parameters again to find out the therapeutic effects of *Withania somnifera* against the toxicological effects of fenvalerate.

Hypothesis: Based on richness background of the knowledge, the investigator speculated the below mentioned research hypothesis:

1) There exists no significant difference between male and female students on their conceptual attainment of geometrical concepts.

Methodology and procedure: The methodology of the present study has been stated in the following heads-

Methods employed in this investigation work were authentic and easily executed in laboratory. Also findings produced by them were accurate. Chemicals used were pure and accessible in Research centre and those which were not available, purchased from Dawa Bazar, Indore. Acclimatization was initiated after fishes brought to the laboratory from market. The fishes of average length were transferred to aquarium for acclimatization. Aquarium water was aerated and filtrated. Besides, the blood used here for examination was solely venous or capillary. Plasma (serum) comprises about 93% of water and whole blood about 81%. So the findings in the same organisms are 12% higher in serum. The ideal techniques are those in which whole blood can be employed for the analysis, so two strategies were used for the collection of blood, collection of whole blood straight into reaction vessel and collection in heparinized glass capillaries. Sahli's Acid haematin Method was also used.

Analysis of the data: The data has been analysed as under:

Table A: TLC of *W. somnifera* root extract

S. No.	Solvent System	Rf Value	Inference
1.	Chloroform: Water: Methyl alcohol (6:1:3)	0.84	Withaferin A
2.	Benzene: Chloroform: Ethyl alcohol (5:3:2)	0.82	Withaferin A

Table B: Effect of three doses of fenvalerate [0.25, 0.50 and 0.75(p.p.m)] for 15days on haematological parameters of *Clarias batrachus*

Parameters	Control	0.25 p.p.m	0.50 p.p.m	0.75 p.p.m
RBC. Count (million/cumm)	2.945	1.610	1.450	0.745
WBC. Count (million/cumm)	4.800	3.120	3.980	1.990
Hb (g/dl)	13.0	11.4	10.8	8.5

Table C: Effects of *W. somnifera* extract as [(*Ws* A) 100, (*Ws* B) 200 and (*Ws* C) 300 (mg/kg of body weight)] for 30days after 15days Fenvalerate intoxication (0.25 p.p.m) on haematological parameters of *Clarias batrachus*

Parameters	Control	Fen (0.25)	Ws (A)	Ws (B)	Ws (C)
RBC Count (million/cumm)	2.945	1.610	1.700	3.420	6.620
WBC Count (million/cumm)	4.800	3.120	3.465	3.876	4.776
Hb (g/dl)	13.0	11.4	10.8	12.4	14.8

Table D: Effects of *W. somnifera* extract as [(*Ws* A) 100, (*Ws* B) 200 and (*Ws* C) 300 (mg/kg of body weight)] for 30days after 15days Fenvalerate intoxication (0.50 p.p.m) on haematological parameters of *Clarias batrachus*

Parameters	Control	Fen (0.50)	Ws (A)	Ws (B)	Ws (C)
RBC Count (million/cumm)	2.945	1.450	1.980	3.240	5.420
WBC Count (million/cumm)	4.800	3.980	4.340	4.840	5.780
Hb (g/dl)	13.0	10.8	10.9	11.8	14.6

Table E: Effects of *W. somnifera* extract as [(*Ws* A) 100, (*Ws* B) 200 and (*Ws* C) 300 (mg/kg of body weight)] for 30days after 15days Fenvalerate intoxication (0.75 p.p.m) on haematological parameters of *Clarias batrachus*

Parameters	Control	Fen (0.75)	*Ws* (A)	*Ws* (B)	*Ws* (C)
RBC Count (million/cumm)	2.945	0.745	1.265	3.190	5.220
WBC Count (million/cumm)	4.800	1.990	2.770	4.120	6.780
Hb (g/dl)	13.0	8.5	9.1	11.6	14.4

Table F: Effect of three doses of fenvalerate [0.25, 0.50 and 0.75(p.p.m)] for 15 days on biochemical parameters of *Clarias batrachus*

Parameters	Control	0.25 p.p.m	0.50 p.p.m	0.75 p.p.m
Glucose (mg/dl)	48.5	36.4	29.7	24
Cholesterol (mg/dl)	210	303	198	240
Urea (mg/dl)	16.6	17.4	18.7	19.8

Table G: Effects of *W. somnifera* extract as [(*Ws* A)100, (*Ws* B)200 and (*Ws* C)300 (mg/kg of body weight)] for 30days after 15days Fenvalerate intoxication (0.25 p.p.m) biochemical parameters of *Clarias batrachus*

Parameters	Control	Fen. 0.25	*Ws* (A)	*Ws* (B)	*Ws* (C)
Glucose (mg/dl)	48.5	36.4	31.5	28.2	24.8
Cholesterol (mg/dl)	210	303	192	184	176
Urea (mg/dl)	16.6	17.4	17.2	17.0	16.8

Table H: Effects of *W. somnifera* extract as [(*Ws* A)100, (*Ws* B)200 and (*Ws* C)300 (mg/kg of body weight)] for 30days after 15days Fenvalerate intoxication (0.50 p.p.m) biochemical parameters of *Clarias batrachus*

Parameters	Control	Fen. 0.50	*Ws* (A)	*Ws* (B)	*Ws* (C)
Glucose (mg/dl)	48.5	29.7	26.2	22.2	16.5
Cholesterol (mg/dl)	210	198	182	165	141
Urea (mg/dl)	16.6	18.7	17.2	16.9	16.8

Table I: Effects of *W. somnifera* extract as [(*Ws* A)100, (*Ws* B)200 and (*Ws* C)300 (mg/kg of body weight)] for 30days after 15days Fenvalerate intoxication (0.75 p.p.m) biochemical parameters of *Clarias batrachus*

Parameters	Control	Fen. 0.75	Ws (A)	Ws (B)	Ws (C)
Glucose (mg/dl)	48.5	24	20.2	18.4	15.3
Cholesterol (mg/dl)	210	240	232	222	216
Urea (mg/dl)	16.6	19.8	19.0	18.2	16.9

Interpretation and results of the data: The data has been interpreted as under:

The data presented in Table B, C, D, E and Charts 1,2,3sho *W. somnifera* the haematological parameters of *Clarias batrachus*. RBC Count (million/cumm): Fenvalerate toxication in all the three doses showed a gradual decrease from control values. *W. somnifera* recovered the RBC count much greater than control groups in all doses. As the concentration of fenvalerate increased, a remarkable decrease in RBC count observed but, Ashwagandha significantly increased RBC count and values obtained are very high. Haemoglobin (Hb) (g/dl); Gradual decrease in Table B, observed in all doses of fenvalerate. *W. somnifera* raised Hb much more from control values. As concentration of fenvalerate increased remarkable drop in Hb observed. It lessened to large extent. Ashwagandha improved the Hb concentration and values observed were highly significant. White Blood Cell Count (WBC Count) (million/cumm): Decrease in WBC count after fenvalerate was examined. *W. somnifera* regained WBC count greater from the control values in the heavy doses. WBC count declined after administration of fenvalerate. Ashwagandha significantly improved the values of WBC count. Thus it has been detected from above that fenvalerate causes more loss as doses rise in 15 days procedure, it may be due to that in early stages of the damage, the fish has been physiologically become susceptible. Glucose (mg/dl): Glucose values tend to drop gradually after given fenvalerate to fishes and this effect of fenvalerate is toxic. *W. somnifera* effectively increased the serum glucose level. Values are directly proportional to the number of doses of *W. somnifera*. Glucose values diminished due to toxicity of fenvalerate but a significant continuous improvement in all values was detected to greator extent after Ashwagandha treatment. Cholesterol (mg/dl): Gradual rise in cholesterol was detected in all the three doses. *W. somnifera* help to reduce the cholesterol to normal. When fenvalerate doses were administered cholesterol inflated and Ashwagandha significantly lowered it. Urea (mg/dl): Urea inflated as fenvalerate concentration rose. *W. somnifera* was found helpful in reducing the urea to the normal level. Urea also showed lowered when Ashwagandha was given after fenvalerate treatment.

Competing interest: The research declared that no potential if interest with respect to authorship, research and publication of this article.

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