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Research Article

Role of Curcumin and Cumin on Hematological Parameters of Profenofos Exposed Mice- M*us Musculus*

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ABSTRACT

Swiss albino mice were exposed to profenofos (25mg/kg b.w) alternately for 30 days, thereafter the test animals were orally administered with curcumin (120mg/kg b.w) and cumin (150mg/kg b.w) to observe the medicinal effect on hematological parameters i.e., leucocytes, erythrocytes, platelets count, differential count and hemoglobin level. It was noticed that profenofos exposed mice showed considerable decrease in different blood cells and hemoglobin level. However after treatment of curcumin and cumin the levels of these blood cells were recovered. In a comparative study curcumin was found more effective than cumin.

Key word: Curcumin, Cumin, Leucocytes, Erythrocytes, Platelets, Neutrophil, Hemoglobin

INTRODUCTION

Profenofos (*O*-4-bromo-2-chlorophenyl *O*-ethyl *S*-propyl phosphorothioate) is an organophosphorous pesticide and widely used to control various insects pest of agriculture/horticulture crops in developing countries [1-2]. It is non biodegradable and known for its residual effect on food and drinking water. There are several earlier reports [3-8] in literature referring its adverse effects on population or wildlife which are happened to come under the exposure of profenofos [9]. Analysis of residual quantity of profenofos in agriculture crops and in

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processed food community is in forefront to derive strategic measures for public health safety. Fawzy *et al.,* (2007) [10] and Gomes *et al.,* (1999)[11] have also observed the hapatocellular injuries in liver and tubular degeneration of kidney respectively under the exposure to profenofos. It has also been reported that profenofos exposed animals show decrease in the level of blood cells and hemoglobin in comparison to normal range [12]. It is also reported that some plant extract i.e., *Calotropis gigantean* have anti-inflamatory activity [13] and *Abutilon idicum* & *Panax ginseng* [14].

Generation of free radicals and reactive oxygen stress (ROS) are considered as diagnostic index in profenofos poisoning[15]. It is also reported that curcumin (1, 7-bis (4-hydroxy- 3-methoxyphenyl) -1, 6- heptadiene-3, 5 - dione) have scavenging potential to free radicals and reactive oxygen stress [16]. Seed of cumin (Cuminum cyminum) has antioxidant property [17]. Free radicals are unpaired electrons which usually produce highly reactive free radicals. Due to intracellular reduction of O_2 into ROS or free radicals, this is toxic to cells and tissues [18].

In view of such abnormal changes in hematological parameters, the present investigation has been designed to improve blood cells count and % hemoglobin by treating profenofos exposed swiss albino mice with herbal products i.e., curcumin and cumin.

MATERIALS METHODS

Animals: Thirty male swiss albino mice with average body weight ranging from 22-25gm were obtained from animal house of PG Department of Zoology, Bhagalpur University, Bhagalpur, Bihar. Food and water to mice were provided *ad libitum* (prepared mixed formulated feed by the laboratory itself). Animals were housed in colony rooms with 12 hrs light/dark cycle at 22 ± 2^{o} C during the period (Jan-March, 2011) of experimentation.

Chemicals: Profenofos i.e., chemically *O*-4-bromo-2-chlorophenyl *O*-ethyl *S*-propyl phosphorothioate (50% E.C, specific gravity 1.34, trade name: "Carina", PI Industries Ltd.) was purchased from the local market. Gimsa stain, Glyerol and Ethyl alcohol were used of E. Merk Company.

Treatment Protocol: Animals were placed in five groups and each group containing 6 animals, having body weight 22-25gms. Group- I represents normal control, Group-II- Ethanol control, Group-III-Profenofos exposed, Group-IV-Profenofos exposed curcumin treated and Group-V-Profenofos exposed cumin treated. Following protocols were adopted to treat each group of animals.

Group-I: Normal control given normal feed for 30 days

Group –II: 100µl ethanol orally administered alternately for 30 days.

Group –III: animals were exposed to profenofos @ 25mg/kg b.w at alternate day till 30 days. (Profenofos was dissolved in distilled water to make a stoke solution out of which required volume was orally administered to animals to maintain does as prescribed).

Group-IV: After 30 days of profenofos exposure, curcumin (120mg/kg b.w) was orally administered daily till next 30 days. Curcumin, a product of *Curcuma longa* was dissolved in ethanol (1mg/1ml) and required volume of it was orally administered to animals to maintain doses as prescribed.

Group-V: After 30 days of profenofos exposure, cumin (150mg/kg b.w) was orally administered daily till next 30 days. Cumin seeds powder (1gm/10ml) was dissolved in distilled water for 4hrs. Collected extract was filtered through double layered muslin cloth and filtrated was further centrifuge at 5000g for 5min to get clear supernatant. Extract was concentrated in a vacuum evaporator and out of which required volume was orally administered to animals to maintain does as prescribed).

Anesthesia: Animals were anesthetized by injecting intra peritoneal with a mixture ketamine (83 *m*g/g) and xylazine (13 *m*g/g) administered intra peritoneal.

Hematological study: Blood sample was collected from different groups of animal's retro orbital vein puncture for hematological study. Erythrocytes (RBCs) count, leucocytes count, platelets count differential blood corpuscle count and hemoglobin test were performed according to Schaim (1986) method.

RESULTS

Experimental findings of each group of animals were presented in Tables (1) & 2 and further illustrated in Figs. 1-4. The results depicted in Table -1 show that there was significant decrease in blood counts and hemoglobin in profenofos exposed group of mice where leucocytes, erythrocytes, platelets count and hemoglobin were decreased up to 70%, 56%, 15% and 44% respectively on 30^{th} days of exposure. After 30days, different herbal treatments curcumin (120mg/kg b.w) and cumin (150mg/kg b.w) in different exposed animal groups were orally administered till 30 days and again hematological analysis was performed. It was observed that in all groups of mice blood components were noticed to achieve normal range. Platelets which

play an important role in homeostasis and coagulation process in the body was found to decrease after 30days of starting treatment whereas curcumin and cumin treated animal got success in retaining its count near to normal in comparison of control group.

Table: 1 Hematological analysis in different group of experimental Swiss albino mice (data represent mean value of replicates).

Group of mice	Total count of leucocytes ($x10^3\mu l$)	Total count of erythrocytes ($x10^6\ \mu l$)	Platelets ($x10^3$ µl)	Hemoglobin (g/dl)
Normal control	20.7	12.3	940.5	14.2
Ethanol control	19.5	10.5	935.6	13.4
Profenofos	6.4	5.5	800.4	8.0
Curcumin	11.6	9.5	856.5	14.0
Cumin	11.0	9.0	840.0	13.0

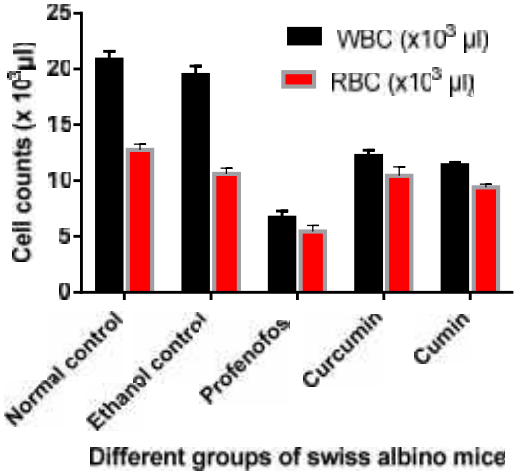

Fig:1 effect of curcumin and cumin on WBC and RBC count of profenofos exposed Swiss albino mice Blood was drown from tail (n=6), cells were counted with automated counter. Values are exposed as the mean ± SEM. P<0.05

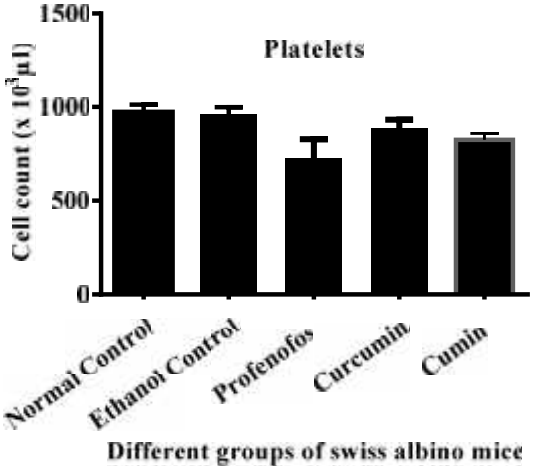

Fig:2 effect of curcumin and cumin on Platelets count of profenofos exposed Swiss albino mice Blood was drown from tail (n=6), cells were counted with automated counter. Values are exposed as the mean ± SEM. P<0.05

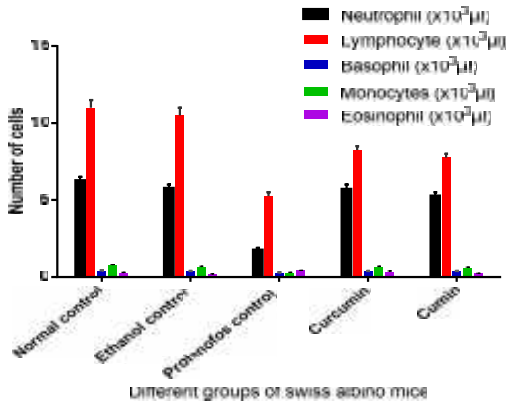

Fig:3 effect of curcumin and cumin on hemoglobin of profenofos exposed Swiss albino mice. Blood was drown from eye (n=6), cells were counted with automated counter. Values are exposed as the mean ± SEM. P<0.05

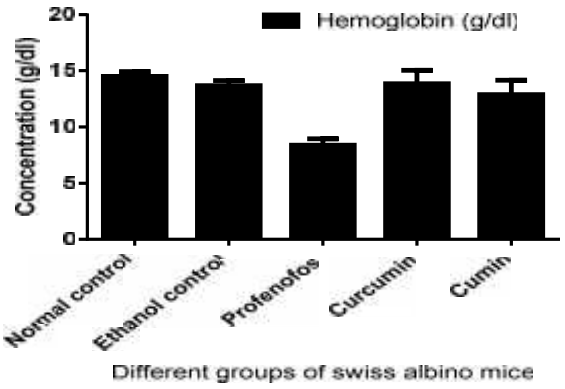

Fig: 4 effect of curcumin and cumin on differential count of profenofos exposed Swiss albino mice. Blood was drown from eye (n=6), cells were counted with automated counter. Values are exposed as the mean ± SEM. P<0.05

From results it was also found significant changes in differential count of leucocytes like neutrophil, lymphocytes, basophil, monocytes and eosinophil (Table 2, Fig 4) before starting the proposed treatment but its numbers got increased after the administration of these herbals.

Table: 2 differential counts of leucocytes were found from different groups of Swiss albino mice (data represent mean value of replicates).

Groups	Neutrophil ($x10^3$ µl)	Lymphocyte ($x10^3$ µl)	Basophil ($x10^3$ µl)	Monocytes ($x10^3$ µl)	Eosinophil ($x10^3$ µl)
Normal control	6	10.5	0.35	0.75	0.20
Ethanol control	5.5	10.0	0.30	0.60	0.15
Profenofos	1.6	5.0	0.2	0.20	0.03
Curcumin	5.4	8.0	0.3	0.60	0.15
Cumin	5.0	7.5	0.3	0.57	0.12

DISCUSSION

Present results and previous studies show clearly that profenofos caused malefic effects on human, animals and environment. It is unwisely used in crop protection and agricultural pest control in developing countries. Our results provide evidence for good effect of curcumin

(120mg/kg b.w) and cumin (150mg/kg b.w) on hematological parameters of profenofos (25mg/kg b.w) exposed animals.

It has also been reported that due to profenofos, hematological parameters were decreased substantially in mice [20-23].

The present findings revealed reduction in numbers of both RBCs and platelets probably due to suppressive and toxic effect on bone marrow and subsequently on haematopoiesis. Since platelets are synthesized in bone marrow, so the double suppressing effect on RBCs and platelets would be explained [24]. The reduction of haemoglobin as well as RBCs counts may be attributed to the toxic effect of profenofos and decrease of leucocytes may be due to the inflammation induced as defence mechanism. In order to control the profenofos exposure on blood cells and hemoglobin percentage, the present findings suggest that curcumin has better efficacy than cumin to reduce the profenofos exposure in Swiss albino mice.

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