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EFFECT OF METHANOLIC EXTRACT OF *PARTHENIUM HYSTEROPHORUS* L.ON HAEMATOLOGICAL PARAMETERS IN WISTAR ALBINO RAT

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ABSTRACT

Experiments were carried out to assess the impact of *Parthenium hysterophorus* L. on 14 haematological parameters of wistar albino rats. Rats kept on normal diet were exposed to 12 hr D/L phase. After 10 days of acclimatization of rats in laboratory condition, 20 mg/100g body wt. of methanolic extract of *Parthenium* was given orally. After 10 days of treatment, rats were sacrificed and haematological parameters were analyzed. Total RBC count for control was $6.25X10^6/\mu L$ which significantly ($p < 0.01$) decreased to $5X10^6/\mu L$, haemoglobin of control (17.1 g/dL) also significantly ($p < 0.01$) dropped down to 10.2 g/dL and haematocrit value of treated rats also showed significant decrease of 17.9% ($p < 0.01$). Mean corpuscular Hbg and its mean concentration decreased by 7% and 1.20% which was not significant. The red cell distribution width also showed a non significant reduction from 17.3 gL to 17.2 gL. These results revealed that the rats became anemic after treatment. Total leucocytes and lymphocytes of treated rats showed significant decrease of 28% and 14.10% respectively ($p<0.01$), whereas granulocytes (neutrophills) significantly increased by 11.80%. Overall significant reduction in WBC count signified that rat immune system becomes weak after oral treatment of *Parthenium* extract. The platelet count showed a significant increase of 309% from control. Likewise mid population and platelet distribution width also showed significant increase. The paper deals in detail the haematological impact of methanolic extract of *Parthenium hysterophorus* when fed orally on the basis of 14 blood parameters analysed.

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INTRODUCTION

Parthenium hysterophorus L. an aggressive and exotic weed of family Asteracea, at present has occupied almost all parts of India(Ramaswami, 1997).It is native to subtropics of North and South America (Adkins *et al.,* 1996) and was accidentally introduced in subcontinent in 1955 through imported food grains (Rao, 1956; Maiti, 1983; Vertak, 1968; Mahadevppa, 1996).It is also known as congress weed, carrot weed, star weed, white top, chatak chandani, bitter weed, ramphool and gajar grass.

Direct contact with plant and plant parts results in dermatities in mankind (Bajaj, 2001; Verma et al., 2001; Handa *et al.,* 2001. Presence of pollen in air causes diseases like hay fever,eczema,asthma and rhinities in human (Kaur and Sharma, 1986; Lonkar *et al.*, 1974; Rodriguez, 1975; Rodriguez *et al.*, 1976b; Shen *et al.,* 1976; Subba Rao *et al.*, 1976, 1978; Handa *et al.*, 2001; Towers and Mitchell, 1983; Sharma *et al.,* 2007). In cattle the main problem due to parthenium intoxication are fever, rashes, ulcerations, necrosis in different parts of body etc. The impact of parthenium weed on livestock production is diverse affecting grazing land,animal health, milk and meat quality and marketing of pasture seed and grains (Chippendale and Panetta, 1994; Tudor *et al.*, 1982; Ahmed *et al.,* 1988; Rajkumar *et al.,*1988).

The chemical analysis has indicated that all the plant parts including trichomes and pollens contain toxins called sesquiterpene lactones. The major components of toxin being 'Parthenin' and other phenolic acids such as caffeic acid, vanillic acid, anisic acid, chlorogenic acid, parahydroxy benzoic acid and p-anisic acid are lethal to humanbeings and animals (Narasimhan *et al.,* 1984; Picman *et al.,* 1982; Sharma and Kaur, 1989; Oudhia, 1998). In addition to health hazards a lot of available data also highlights its impact on agriculture as well as natural ecosystem (Chippendale and Panetta, 1994; Evans, 1997). Sesquiterpene lactones (SQLS) exhibit a wide spectrum of biological activities like cytotoxicity, antitumour, allergic, antimicrobial, antifeedant, phytotoxic, anticancers, hypoglycemic and other pharmacological activities (Rodriguez *et al.*, 1976 a). Though, considered nuisance, usage of the biological activities of the plant can make it economically useful.The review of literature revealed that there is great paucity of knowledge pertaining to haematological impact of Parthenium in case of mammals. Keeping in view the knowledge-gap the present project is designed to evaluate the effects of *Parthenium hysterophorus* on haematological parameters of mammals.

MATERIALS AND METHODS

This study was carried out on 10 healthy adult albino rats weighing approximately 70 -90 g for the experiment. The albino rats were procured with the help of local animal supplier. They were divided in two groups, control and experimental and kept in large cages at room teperature 25 ± 5^{o}C. Rats were exposed to photoperiod of 12 hr. per day. The cages were cleaned regularly to avoid rat smell and to maintain proper hygienic conditions. After 10 days of acclimatization on laboratory conditions, 20mg/100g body weight of methanolic extract of *Parthenium* was given orally. Now rats were sacrificed and blood samples were taken from both the groups after 14 days and various parameters were analyzed.

Preperation of extract

The plant was collected from the adjacent areas of the department of Zoology, Ranchi University, Ranchi. Five hundred grams of dried aerial parts of the plant was grounded into fine powder and subjected to soxhlet extraction with methanol for 24 hr. The dark brown extract thus obtained was evaporated to dryness in a flash evaporator at room temperature and the residue designated as methanolic extract of *Parthenium* (MEPH)was used as toxicant for further studies.

Hematological studies

Haematological analysis was performed on whole blood using automated haematology analysers. Fourteen parameters of haemogram test,namely total leucocytes($10^3\mu$L), granulocytes(%), lymphocytes(%), midpopulation(%), totalRBC ($10^6/\mu$L), haemoglobin(g/dL), haematocrit(%), mean corpuscular volume, mean

corpuscular haemoglobin (pg), mean corpuscular haemoglobin concentration(%), red cell distribution width(fL), platelet($10^3/\mu L$), platelet distribution width(%) and mean platelet volume(%) were measured in control and treated rats following standard methods.

RESULTS

The effects of oral administration of methanolic extract of *Parthenium hysterophorus*(MEPH) on haematological parameters of rats are shown in Table 1.

Total RBC count for control as $6.25\times10^6/\mu L$ decreased significantly ($p<0.01$) to $5\times10^6/\mu L$, haemoglobin of control (17.1g/dL) also significantly ($p<0.01$) droped down to10.2g/dL and haematocrit value of treated rats also showed significant decrease of 17.9%($p<0.01$) (Table 1). Mean corpuscular Hbg decreased by 7% and Mean corpuscular Hbg concentration decreased by 1.20% which was non-significant. The red cell distribution width also showed a non significant reduction of 0.1gL. These results revealed that the rats become anemic after treatment. Total leucocytes and lymphocytes of treated rats showed significant decrease of 28% and 14.10 ($p<0.01$), whereas neutrophils significantly increase by 11.80%. Overall significant reduction in WBC count signified that rat immune system becomes weak after oral treatment of *Parthenium*

Table 1: Effect of doses of methanolic extract of *Parthenium hyterophorus* on haematological parameters in rats

S.N.	Parameters	Control	Treated	Change in %
1	Tot-leucocytes (10^3 / μL)	8±0.5	*5.7±0.2	28↓
2	Granulocytes (%)	34.5±1.1060	*46.6±2.6457	11.80↑
3	Lymphocytes (%)	59±2	*44.9±4	14.10↓
4	Mid population (%)	6.2±0.2	*8.5±0.3818	2.30↑
5	Total RBC ($10^6/\mu$L)	6.25±0.25	*5±0.5	20↓
6	Hemoglobin (g/dl)	17.1±0.1892	*10.2±0.709	40↓
7	Haematocrit (%)	46.7±0.1	*28.8±0.9712	17.90↓
8	Mean corpuscular volume (fL)	56.7±0.2516	54.2±2.2	4↓
9	Mean corpuscular hemoglobin (pg)	20.7±0.7762	19.1±0.1	7↓
10	Mean Crop hemo. Conc.	36.6±2	35.4±2	1.20↓
11	Red cell distribution width f(1)	17.3±0.6245	17.2±0.1532	0.1↓
12	Platelet ($10^3/\mu$L)	135±5	*553±2	309↑
13	Red cell distribution width (%)	16.4±0.5291	*17±0.9165	0.60↑
14	Mean platelet volume (%)	8.8±0.4%	8.3±0.3055	0.50↓

*indicate significant ($p<0.01$) difference between control and treated groups when student's t-test was applied between treated and control groups

extract. Inspite of this,platelet count showed highly significant increase of 309% from control. Likewise mid population and platelet distribution width also showed significant increase.

DISCUSSION

Blood is an reflector of the overall animal health and provides important profiles for the toxicological impact on animal tissues. A significant decrease($p<0.01$) in RBC count, leucocytes, lymphocytes, haemoglobin, haematocrit, mean corpuscular volume, mean corpuscular haemoglobin,mean corpuscular haemoglobin concentration,red cell distribution width and mean platelet volume of treated rats was recorded. Adequate haemoglobin percentage needed for the normal physiology of animals, which depends on the erythrocyte count. MEPH may induce inhibition of RBC formation that reduces the RBC counts and leads to a decrease in Hb content. The depletion in RBC count and Hb content can be attributed to defective haemopoiesis (Choudhari and Deshmukh, 2007). Other possible factors affecting adversely may be reduced food intake by animals or internal haemorrhages (Kumar *et al*., 1999).

Goel *et al*. (1982) have reported haemolysis leading to anemia in *Heteropneustes fossilis* after malathion exposure. Panigrahi and Mishra (1978) have reported a decrease in RBC count, Hb percent and incease in WBC in *Colis fasciatus* exposed to metal. Fall in Hb content and RBC count can be correlated with induction of aneamia in experimental animals after exposure to toxic compounds (Widmann, 1984; Cella

and Watson, 2000). The decrease in Hb content and RBC count can be correlated with paling of animals, weakness and morbidity (Cella and Watson, 2000; Kumar *et al*., 1999; Choudhari and Deshmukh, 2007).

Significant decrease in WBC count of treated rats on subchronic treatment of MEPH observed in the present study can not be attributed to the stimulation of immune system (Oluwole, 2001). Shivani Maurya and Kushwaha,(2010) have reported that Ethanolic extract of *Parthenium* (EEPH) induces leucocytoses in rats. Leucocytosis is considered as an adaptive value for the tissue pathology under chemical stress of toxicant.The leucocytosis may also be attributed for the removal of cellular debris of necrosed tissue in the rats under the toxic stress (Mc leay and Brown, 1974). An increase in WBC count after chemical stress recorded in the study done by Shivani Maurya and Kushwaha, 2010 is an accordance with various workers (Pandey *et al*., 1976 b; Goel and Garg, 1980; Sastry and Sharma, 1980; Goel *et al*., 1981, 1982; Agrawal *et al.,* 1982; Sharma *et al*., 1984; Tyagi, 1984; Goel and Maya, 1986), but in the present study WBC decresed.

Differencial leaucocyte count is an important tool in diagnosing diseases in animals (Hesser, 1960). Mammalian neutrophils are responsible for phagocytosis and disposal of foreign materials or debris of damage tissues. The percentage of lymphocycyte decreased significantly with a significant increase in neautrophil count in the present study. Lucky and Zdenek,(1977) has reported a decline in lymphocytes associated with an elevation of neutrophils during infection of dropsy. Garg (1981), Mishra and Srivastawa (1979) have also shown similar decrease in lymphocytes associated with an increase in neutrophil in *Channa punctatus* and *Colisa fasciatus*, respectively under chemical stress.The increased neutrophils in present study may also account for the removal of dead and damaged cell debris from the tissue under toxic stress of the compounds present in methanolic extract of *Parthenium hysterophorus*.

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