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

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Haemoglobin
Lymphocytes
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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/μL which significantly (p < 0.01) decreased to 5X10^6/μL, 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.

**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/μL which significantly (p < 0.01) decreased to 5X10^6/μL, 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.
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.


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 human beings 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.*, 1976a). 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 temperature 25±5°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 μL), granulocytes (%), lymphocytes (%), midpopulation (%), totalRBC (10^6/μL), haemoglobin (g/dL), haematocrit (%), mean corpuscular volume, mean
corpuscular haemoglobin (pg), mean corpuscular haemoglobin concentration(%), red cell distribution width(fL), platelet(10^3/μL), 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 6.25×10^6/μL decreased significantly (p<0.01) to 5×10^6/μL, haemoglobin of control (17.1g/dL) also significantly (p<0.01) dropped down to 10.2g/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>
<thead>
<tr>
<th>S.N.</th>
<th>Parameters</th>
<th>Control</th>
<th>Treated</th>
<th>Change in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tot-leucocytes (10^3 / μL)</td>
<td>8±0.5</td>
<td>*5.7±0.2</td>
<td>28↓</td>
</tr>
<tr>
<td>2</td>
<td>Granulocytes (%)</td>
<td>34.5±1.1060</td>
<td>*46.6±2.6457</td>
<td>11.80↑</td>
</tr>
<tr>
<td>3</td>
<td>Lymphocytes (%)</td>
<td>59±2</td>
<td>*44.9±4</td>
<td>14.10↓</td>
</tr>
<tr>
<td>4</td>
<td>Mid population (%)</td>
<td>6.2±0.2</td>
<td>*8.5±0.3818</td>
<td>2.30↑</td>
</tr>
<tr>
<td>5</td>
<td>Total RBC (10^6/μL)</td>
<td>6.25±0.25</td>
<td>*5±0.5</td>
<td>20↓</td>
</tr>
<tr>
<td>6</td>
<td>Hemoglobin (g/dl)</td>
<td>17.1±0.1892</td>
<td>*10.2±0.709</td>
<td>40↓</td>
</tr>
<tr>
<td>7</td>
<td>Haematocrit (%)</td>
<td>46.7±0.1</td>
<td>*28.8±0.9712</td>
<td>17.90↓</td>
</tr>
<tr>
<td>8</td>
<td>Mean corpuscular volume (fL)</td>
<td>56.7±0.2516</td>
<td>54.2±2.2</td>
<td>4↓</td>
</tr>
<tr>
<td>9</td>
<td>Mean corpuscular hemoglobin (pg)</td>
<td>20.7±0.7762</td>
<td>19.1±0.1</td>
<td>7↓</td>
</tr>
<tr>
<td>10</td>
<td>Mean Crop hemo. Conc.</td>
<td>36.6±2</td>
<td>35.4±2</td>
<td>1.20↓</td>
</tr>
<tr>
<td>11</td>
<td>Red cell distribution width f(1)</td>
<td>17.3±0.6245</td>
<td>17.2±0.1532</td>
<td>0.1↓</td>
</tr>
<tr>
<td>12</td>
<td>Platelet (10^3/μL)</td>
<td>135±5</td>
<td>*553±2</td>
<td>309↑</td>
</tr>
<tr>
<td>13</td>
<td>Red cell distribution width (%)</td>
<td>16.4±0.5291</td>
<td>*17±0.9165</td>
<td>0.60↑</td>
</tr>
<tr>
<td>14</td>
<td>Mean platelet volume (%)</td>
<td>8.8±0.4%</td>
<td>8.3±0.3055</td>
<td>0.50↓</td>
</tr>
</tbody>
</table>

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

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

*Indispite 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 *Heteropeustes 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 anemia 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 lymphocyte decreased significantly with a significant increase in neutrophil 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.

REFERENCES


