



DIMETHOATE INDUCED ALTERATION IN RHEOLOGICAL PROPERTY OF BLOOD IN SWISS ALBINO MICE

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Abstract-

Dimethoate belongs to organophosphate pesticide widely used in horticulture to kill mites, aphids and other insect pests. It has anticholinesterase activity but it put its harmful effects on non target organisms too. Healthy albino mice of two age group (70 days and 105 days age) were taken as experimental animals and $1/5^{\text{th}}$ LD₅₀ dose of dimethoate were administered via gavage and after the completion of experiment, blood was collected to observe the changes in haematological parameters. A significant reduction was seen in Hb (Haemoglobin), RBC (Red Blood Cells), WBC (White Blood cells), PCV (Packed Cell Volume), RPV (Relative Plasma Viscosity) and WBV (Whole Blood Viscosity). This reduction created haemodilution and ultimately brought the changes in rheological property of blood.

Keywords-

Dimethoate, Gavage, LD₅₀, Rheological property, haemodilution.

Introduction-

Pesticides are being used to enhance the crop production or yield to fulfill the need of exponentially growing population and its excessive use damaged ecosystem and contaminated soil and water. Pesticides use have increased the health issue in non target organisms. Dimethoate is an organophosphate pesticide. Its sublethal concentration has put its effects on blood indices, certain enzymes (LDH, ACP and ALP) and CHL (Akhter, 2023). Sublethal concentration $1/5^{\text{th}}$ LD₅₀ that is 30 mg/kg bw has significantly reduced the value of Hb, RBC, WBC, PCV, RPV and WBV.

Material and Method-

Healthy albino mice of 70 days and 105 days age were taken for experiment and kept under laboratory condition. $1/5^{\text{th}}$ LD₅₀(30 mg/kg bw that is 1.5mg/ml) dose of dimethoate were given for one month period of experiment. Dose was calculated by OECD guidelines (Oghenesuvwe,2014).After the expiry of treatment schedule, blood was collected and haematological analysis was done that include estimation of Hb concentration (Dacie and Lewis, 1991),RBC,WBC and PCV(Dacie and Lewis, 2001),RPV and WBV(Korubo-Owiye et al, 1997).

Unpaired 't' test was used at 5% level of significance. R-software-R version-3.4.1[2017-06-30].

Observation Table-

Parameters	G1A	G2A	t value	G1B	G2B	t value
Hb(gm/dl)	11.33±0.007	8.42±0.044	143.22	12.4±0.008	8.54±0.054	154.56
RBC(*10 ⁹ /l)	8.08±0.012	5.77±0.011	308.15	10.1±0.0548	7.58±0.046	79.55
WBC(*10 ⁹ /l)	11.10±0.070	4.75±0.016	195.28	12.5±0.044	6.78±0.083	135.29
PCV(%)	42.60±0.441	37.40±0.524	17.22	43.5±0.088	41.5±0.013	285.79
RPV(mpas)	1.30±0.005	1.24±0.513	2.60	1.61±0.004	1.60±0.005	2.52
WBV(mpas,at 0.7 s ⁻¹ shear rate)	6.01±0.007	5.73±0.015	36.14	6.08±0.007	6.07±0.008	2.44

The means of groups are significantly different at $p < 0.05$

G1A Group- control group of 70 days age.

G2A Group- Dimethoate treated group of 70 days age.

G1B Group- control group of 105 days age.

G2B Group- Dimethoate treated group of 70 days age.

Result and Discussion-

Dimethoate reduced the Concentration of haemoglobin ,these were found same as found by Adeoti et al.(2017).there are many reasons to decrease the Hb count but the main reason is the liver disease caused by dimethoate, that destruct the RBC thus a reduction appeared in Hb and created the condition of anemia due to haemoglobin deficiency. Dimethoate interrupted the production of hormone hepcidin (produced by liver) that blocked iron absorption and created anemic condition.(Gkamprela et al,2017) .

A significant reduction in RBC was seen after administration of dimethoate, findings were same as found by Salih et al(2010), reduced count of RBC put oxidative stress that induces the macrophages clearance of RBC (Pritini et al, 2019) .

A significant reduction was noted in WBC count after dimethoate treatment in Swiss albino mice, Lone et al (2013)found same result by working on *Rattus rattus* animal. Sarcoidosis, an auto-immune disease results leucopenia. Sarcoidosis is a condition where inflammation occurs in multiple system of the body and immune system get hyper activated and reduces the count of WBC(Gundlach et al, 2016).

A significant reduction in PCV was seen in albino mice after the exposure with dimethoate, same findings were given by Adeoti et al in 2017.Reduction in PCV suggests that dimethoate increased the rate of breakdown of

RBC thus reduced the value of PCV (Moosa and Abbasy, 2012) and created the condition of haemodilution (Temiz et al, 2019) it is positively correlated with RBC count.

Significant reduction observed in RPV, this was different as found by Zhang et al (2010) due to the reduced concentration of fibrinogen haemodilution occurred and reduced the value of RPV thus altered rheological property of blood in Swiss albino mice.

A significant reduction was seen the value of WBV this was different as found by Zhang et al (2010) due to the reduced count of RBC and PCV and created the condition of haemodilution.

RBC, WBC, PCV and fibrinogen have reduced the values of RPV and WBV and diluted the blood (Haemodilution) and reduced the viscosity of blood.

Conclusion-

Use of pesticides has raised the numbers of issues among non target organisms as well as this is the major cause of environmental pollution. Farmers must be educated for the judicious use of pesticides. Dose response relationship should be evaluated for the effective use of pesticides. Health literacy and pesticide use are the two important aspects to overcome the harmful effects of pesticides. We should move towards organic farming to overcome the problem of pesticides.

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