Journal of Animal Research: v.15 n.01, p. 27-30. February 2025

DOI: 10.30954/2277-940X.01.2025.5

Alterations in Haematological Parameters of Albino Rats on Sub-acute Exposure of Ivermectin

Pankaj Kumar Umar[1*], Vidhi Gautam[1], Jyoti[1], Sachin Jain[1], R.K. Sharma[1] and Shashank Vishvakarma[2]

[1]Department of Veterinary Pharmacology and Toxicology, College of Veterinary Science and Animal Husbandry, NDVSU, Jabalpur, M.P., INDIA

[2]Department of Veterinary Gynaecology and Obstetrics, College of Veterinary Science and Animal Husbandry, NDVSU, Jabalpur, M.P., INDIA

**Corresponding author: PK Umar, E-mail: pankajumar12@gmail.com*

Received: Dec., 04, 2024 **Revised:** 22 Jan., 2025 **Accepted:** 30 Jan., 2025

ABSTRACT

The present study was performed to evaluate alterations in haematological parameters on sub-acute exposure of Ivermectin in albino rats. Albino rat weighing 200-300 gm were treated with Ivermectin orally with the help of gavage needle and divided into two groups each group consist six rats. The rats of group I were served as control. However, rats of group II was treated with ivermectin @ 5 mg/kg b.wt. and blood samples were collected on the 28 day of experiment by the help of capillary tube and processed by laboratory methods. Ivermectin @ 5 mg/kg b.wt., orally for 28 days, significantly altered the haematological parameters. It significantly decreased the haematological parameters viz. Hb, PCV and TEC as compared to control. Thus, ivermectin have ability to altered the haematological parameters in albino rats after the sub-acute exposure for 28 days.

HIGHLIGHTS

- Study was conducted to evaluate alterations in haematological parameters on sub-acute exposure of Ivermectin in albino rats.
- Ivermectin @ 5 mg/kg b.wt., orally for long time significantly altered the haematological parameters

Keywords: Ivermectin, haematological parameters, albino rats

Avermectins are a class of macrocyclic lactones with insecticidal and antiparasitic properties. They are the most effective and well-developed class of endectocides and are active against both endo and ectoparasites. Ivermectin, the best studied semi-synthetic derivate of avermectin, has been considered one of the most successful discoveries in the fight against infections caused by roundworm parasites (Azevedo *et al.,* 2019).

Although, Ivermectin is a potent antiparasitic drug, it poses a serious toxicity threat to animals by damaging the various organs of the body systems. These damaging effects are seen in dose-dependent and dose-time dependent manners. The reason is that, ivermectin is lipophilic hence, tend to accumulate in fatty tissues and in the liver it induces oxidative stress leading to tissue damage through lipid peroxidation (Nasr *et al.,* 2016). Various studies on ivermectin have proven its ability to induce nephrotoxicity in many animals like mice, bats, rabbits and rats (DeMarco *et al.,* 2002; Ahmed *et al.,* 2019; Ahmed *et al*., 2020). The main molecular mechanism through which ivermectin exerts nephrotoxic effect is the lipid peroxidation which results from the action of reactive oxygen species (Nasr *et al.,* 2016). This oxidative damage results in histopathological changes like interstitial nephritis, glomerular damage, interstitial infiltration areas of round cells and tubular necrosis as well as elevated levels of serum creatinine, urea and the uric acid in the

How to cite this article: Umar, P.K., Gautam, V., Jyoti, Jain, S., Sharma, R.K. and Vishvakarma, S. (2025). Alterations in Haematological Parameters of Albino Rats on Sub-acute Exposure of Ivermectin. *J. Anim. Res.,* **15**(01): 27-30.

Source of Support: None; **Conflict of Interest:** None

blood (Abd-Elhady and Abou-Elghar, 2013). In toxicity analysis, a combined evaluation of various biochemical parameters provides better identification of the organ being damaged by the drug under investigation (Salman *et al.,* 2022).

MATERIALS AND METHODS

Experimental animals

The study was conducted on healthy albino rats of 6-7 week age, weighing around 180-200 g. The experiment was approved by the Institutional Animal Ethical Committee (IAEC) of College of Veterinary Science and Animal Husbandry, Nanaji Deshmukh Veterinary Science University (NDVSU), Jabalpur. Before the start of the experiment the rats were kept in laboratory condition for a period of 7 days for acclimatization. The rats were maintained with good hygienic conditions and kept in colony cages under standard managemental conditions and provided with standard feed and water *ad libitum*.

Experimental design

Twelve rats were randomly divided into two groups with six rats in each. Group I was treated as control and group II was treated with Ivermectin (5 mg/kg) once daily, orally for 28 days.

Collection of samples

Blood Samples

Blood was collected aseptically on day 0 (pre-treatment) and day 28 (post-treatment) from retro orbital plexus with the help of capillary tube, as described by Archar and Riley (1981). Blood was collected in heparinized vials and used for haematological and biochemical parameters study.

Haematological Parameters

Following parameters were estimated by diatron heamatology analyzer (Abacus-380) –

i. Haemoglobin (Hb) (g/dl)

ii. Total erythrocytes count (TEC) (10^6 /µl)

iii. Packed cell volume (PCV) (per cent)

iv. Total leucocytes count (TLC) (10^3 /µl)

STATISTICAL ANALYSIS

Means and standard error were obtained as per standard procedure. Parameters were analyzed by using the method of complete randomized design with seven treatments allotted to groups of six animals each. The difference between treatments was tested statistically for their significance (Snedecor and Cochran, 1994).

RESULTS AND DISCUSSION

Haematological studies

In the present research work, haematological study was carried out to study the alterations in haematological parameters on sub-acute exposure of ivermectin in albino rats.

Haematological parameters

Haemoglobin concentration (Hb)

The mean values of haemoglobin concentration in rats treated with ivermectin have been presented in table 01.

The concentration of Hb in control was 14.56±0.56 g/dL and 14.60±0.57 g/dL on day 0 and day 28 of the study, respectively. Ivermectin significantly reduced the concentration of Hb on day 28 of the study and this decrease was 10.78±0.89 g/dL.

Total erythrocytes count (TEC)

The mean values of Total erythrocytes count in rats treated with ivermectin ivermectin have been presented in table 01.

The values of TEC in control was 7.65±0.71 x10^6/µl and 7.46±0.85 x10^6/µl on day 0 and day 28 of the study, respectively. Ivermectin significantly reduced the concentration of TEC on day 28 of the study and this decrease was 4.31±0.97 x10^6/µl.

Table 1: Effect of subacute exposure of ivermectin on Haematological parameters in albino rats

Haematological parameters	Control		Ivermectin (5 mg/kg) once daily, orally for 28 days
Hb (g/dL)	Day 0	14.56^{a}±0.56	14.71^{a}±0.78
	Day 28	14.60^{a}±0.57	10.78^{b}±0.89
TEC (x10^{6}/µl)	Day 0	7.65^{a}±0.71	7.71^{a}±0.68
	Day 28	7.46^{a}±0.85	4.31^{b}±0.97
PCV (per cent)	Day 0	43.69^{a}±1.70	45.15^{a}±2.58
	Day 28	43.80^{a}±1.72	32.35^{b}±2.69
TLC (x10^{3}/µl)	Day 0	5.30^{a}±1.06	5.51^{a}±1.13
	Day 28	5.21^{a}±1.06	10.63^{b}±1.07

Values are mean of six observations.

Means with different superscripts in same column differs significantly *(P≤0.05)*.

Packed cell volume (PCV)

The mean values of Packed cell volume in rats treated with ivermectin have been presented in table 01.

The values of PCV in control was 43.69±1.70 per cent and 43.80±1.72 per cent on day 0 and day 28 of the study, respectively. Ivermectin significantly reduced the value of PCV on day 28 of the study and this decrease was 32.35±2.69 per cent.

Total leucocytes count (TLC)

The mean values of Total leucocytes count in rats treated with ivermectin have been presented in table 1.

The values of TLC in control was 5.30±1.06 x10^{3}/µl and 5.21±1.06 x10^{3}/µl on day 0 and day 28 of the study, respectively. Ivermectin significantly enhance the value of TLC on day 28 of the study and this increase was 10.63±1.07 x10^{3}/µl.

CONCLUSION

Ivermectin at the dose of 5 mg/kg body wt., administered orally, daily for 28 days in albino rats altered the haematological parameters. The concentration of Hb, TEC, PCV was significantly reduced and the value of TLC was significantly enhanced.

REFERENCES

Abd-Elhady, H.K. and Abou-Elghar, G.E. 2013. Abamectin induced biochemical and histopathological changes in the albino rat, *Rattus norvegicus*. *J. Plant Prot. Res.*, **53**(3): 263-270.

Ahmed, A.E., Alshehri, A., Al-Kahtani, M.A., Elbehairi, S.E.I., Alshehri, M.A., Shati, A.A. and El-Mansi, A.A. 2020. Vitamin E and selenium administration synergistically mitigates ivermectin and doramectin-induced testicular dysfunction in male Wistar albino rats. *Biomed. Pharmacothe.*, **124**(1): 109841.

Ahmed, S.A., Shawky, A.A., Abdellatefe, A.E., Abdelraouf, A.E., Abd-Elreheem, E.M., Nasr, B.O. and Ali, E.M. 2019. Protective effects of vitamin E and grape seed oil against acute hepatorenal ivermectin toxicity in mice biochemical and histopathological studies. *GSC Biologic, Pharmaceut. Sci.*, **7**(2): 87-94.

Azevedo, R., Mendes, A.M. and Prudêncio, M. 2019. Inhibition of Plasmodium sporogonic stages by ivermectin and other avermectins. *Parasit. Vect.*, **12**(1): 1-8.

Nasr, H.M., El-Demerdash, F.M. and El-Nagar, W.A. 2016. Neuro and renal toxicity induced by chlorpyrifos and abamectin in rats. *Environ. Sci. Pollut. Res.*, **23**(2): 1852-1859.

Archar, R.K. and Riley, J. 1981. Standardized method of bleeding in rats. *Lab. Anim.*, **15**(1): 25-28.

DeMarco, J.H., Heard, D.J., Fleming, G.J., Lock, B.A. and Scase, T.J. 2002. Ivermectin toxicosis after topical administration in dog-faced fruit bats (*Cynopteru sbrachyotis*). *J. Zoo Wildlife Med.*, **33**(2): 147-150.

Salman, M., Abbas, R.Z., Mehmood, K., Hussain, R., Shah, S., Faheem, M. and Martínez, J.L. 2022. Assessment of Avermectins-Induced Toxicity in Animals. *Pharmaceuticals*, **15**(3): 332.

Snedecor, G.W. and Cochran, W.G. 1994. Statistical Methods, 8th Edition., The Lowa State College Press, Inc. USA, pp. 950.