

The effect of Ethanol Extract of *Rauwolfia vomitoria* on Hematological Parameters of Chloroform Intoxicated Albino Wistar Rats

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ABSTRACT

Medicinal plants are important sources of new chemical compounds with potential therapeutic effects. Medicinal plants are the richest bioresource of drugs of traditional systems of medicine, modern medicines, nutraceuticals, food supplements, folk medicines, pharmaceutical intermediates, and chemical entities for synthetic drugs. *Rauwolfia vomitoria* is one of the medicinal plants that have served all through the ages as the mainstay in the treatment and preservation of human health. This research is designed to determine the effect of ethanol leaf extract of *Rauwolfia vomitoria* on HB, PCV, WBC, RBC levels of chloroform intoxicated wistar albino rats. The results indicated that, HB, PCV and RBC levels of rats in groups 2, 3 and 4 treated with graded doses of 100mg/kg, 200mg/kg and 300mg/kg b.w of ethanol leaf extract of *Rauwolfia vomitoria* increased significantly ($p < 0.05$) when compared with group 5 (positive control) rats. There was no significant difference ($p > 0.05$) when Hb levels of rats in group 4 were compared to groups 1 and 6. The results also indicated that, WBC levels of rats in groups 2, 3 and 4 treated with graded doses of 100mg/kg, 200mg/kg and 300mg/kg b.w of ethanol leaf extract of *Rauwolfia vomitoria* decreased significantly ($p < 0.05$) when compared with group 5 (positive control) rats (fig. 5). In conclusion, ethanol leaf extract of *Rauwolfia vomitoria* boosted the level of HB, PCV, WBC and RBC in the chloroform intoxicated rats. This explains why it has been used in tradomedicinal practises to treat toxicity because of its blood boosting effects.

Keywords: *Rauwolfia vomitoria*, Hematological, Parameters and Chloroform

INTRODUCTION

[1], has advocated traditional medicine as safe remedies for ailments of both microbial and non-microbial origin. Plants are major source of therapeutic compounds and are the essential foundation of medicine since prehistoric time. Medicinal plants are important source of new chemical compounds with potential therapeutic effects [2,3,4,5,6]. Medicinal plants are the richest bioresource of drugs of traditional systems of medicine, modern medicines, nutraceuticals, food supplements, folk medicines, pharmaceutical intermediates, and chemical entities for synthetic drugs. Plants synthesize thousands of chemical compounds possessing different properties like defense against insects, bacteria, fungi, diseases and herbivorous mammals [7,8]. Herbal and natural products have been used in folk medicine for centuries throughout the world. Some

Indian medicines like Ayurveda, Sindha and Unani entirely and homeopathy to some extent, depend on plant materials or their derivatives for treating human diseases [9,10,11,12,13,14,15]. Medicinal plants are widely used in non-industrialized societies, mainly because they are readily available and cheaper than modern medicines [16,17,18]. Medicinal plants have been discovered and used in traditional medicine practices since prehistoric times [10]. There has been renewed interest in screening higher plants for novel biologically active compounds, particularly those that effectively intervene in human ailments in the field of chronic diseases [19]. Currently, research is focused on the isolation of pharmacologically active compounds from natural sources in the area of those diseases where presently available drugs are not so effective

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[20,21,22,23]. Also herbal medicines are experiencing greater resurgence as many people are turning their attention from modern drugs toward parallel herbal systems which are also known as alternative medicine [24,25]. Plants have been used for centuries as a remedy for human diseases because they possess phytochemicals of therapeutic values [26,27,28,29]. The Indian Traditional medicine like Ayurveda, Siddha and Unani are predominantly based on the use of plant materials [30]. Herbal drugs have gained importance and popularity in recent years because of their safety, efficacy and cost effectiveness [31,32,33,34]. The association of medical plants with other plants in their habitat also influences their medicinal values in some cases. One of the important and well documented uses of plant-products is their use as antioxidant [35,36]. Hence there is an ever increasing need for health safety in the society filled with toxicants [36]. In spite of tremendous strides in modern medicine, in 2004, the U.S. National Centre for complementary and Alternative Medicine of the National Institutes of Health began funding clinical trials into the effectiveness of herbal medicine. For this reason, various medicinal plants have been studied using modern scientific approaches which have shown that due to various biological components, many of these medicinal plants posse a number of properties such as anti-diabetic, antioxidant, anticancer and anti-inflammatory effects, etc. and can be used to treat a wide range of various diseases. The medicinal properties of plants are due to the presence of certain specific substances, referred to as bioactive principles which may be stored in organs like roots, leaves, stem bark, fruits and seeds [14]. Many herbs have shown positive results in-vitro, animal models, or small-scale clinical tests [15]. Plants and their extractshave immense potentials for the management andtreatment of wounds. The phytomedicine for woundhealing are not only cheap and affordable, but are

alsosafe as hypersensitive reactions are rarely encountered. These natural agents induce healing and regeneration of tissues by multiple mechanisms. However, according to [15] there is need for scientific validation, standardization and safety evaluation of plants of traditional medicine before recommendation for any therapeutic use. Chloroform also known as trichloromethanehas been used in the past as an anesthetic and as an additive in pharmaceutical preparations. According to Integrated [13], chloroform is primarily used as an organic solvent, although their use is declining due to the carcinogenic nature of chronic chloroform exposure.Although chloroform is no longer in use as a volatile anesthetic agent, cases of occupational exposure as well as intentional inhalation and ingestion still present to clinicians [14]. Chloroform was withdrawn from clinical use because it can cause nervous system depression, anoxia secondary to respiratory depression and airway obstruction, cardiac dysrhythmias potentiated by circulating catecholamines, and hepatotoxicity, which is thought to be secondary to oxidative injury caused by free radicals [18]. *Rauwolfia vomitoria* is one of the medicinal plants that have served all through the ages as the mainstay in the treatment and preservation of human health. It belongs to the family opocynacea and its common names include serpent wood, swizzler stick among others. The parts that are commonly used for herbal remedies are roots, root bark, leaves and stem-bark [14]. The plant is of different species. It has been used across its range in traditional medicine. A decoction or extract of the roots is extensively used to treat diarrhoea, jaundice, venereal disease, rheumatism and snake-bites, and is also used to reduce colic or fever, to calm people with anxiety or epilepsy, and to lower blood pressure [16]. The macerated root, or sometimes the pulped fruit, is used to treat a variety of skin

conditions, and the bark, twigs and leaves are used as a purgative and emetic [14]. Most medicinal plants presently employed by local herbalists are used without much scientific information. It is therefore important to access and document the ethno-medical claims of these medicinal plants. In view of the various tradomedical applications of *Rauwolfia vomitoria*, scientific investigation will help in establishing its efficacy especially those which can be used in the treatment and management of several ailments.

The blood is a major vehicle for the transport of most drugs in the human and animal systems, and as such any alteration in the integrity of blood cells may lead to serious health problems. The hematological system is responsible for the well-being of intact organisms. The vasculature in which blood present surface areas of over 10,000 m² permits this system to interact extensively with other systems in the body [13]. Therefore, changes in the hematological indices may occur as a result of other systemic disease conditions.

Aim and Objectives

The aim of this research was to determine the effect of ethanol leaf extract of *Rauwolfia vomitoria* on hematological

parameters of chloroform intoxicated wistar albino rats.



Figure 1: The leaves of *Rauwolfia vomitoria*

MATERIALS AND METHODS

Methods

Preparation of Plant Material

The leaves of *Rauwolfia vomitoria* were collected, dried and milled to powder

using the grinding machine.

Extraction of Plant Material

A known quantity, 500g of ground leaves of *Rauwolfia vomitoria* were macerated in 1500ml of ethanol with thorough shaking at regular interval for 72h at room temperature (26-28°C). The resulting solution was filtered using Whatman No. 1

filter paper. The filtrates were concentrated using rotary evaporator to obtain slurry of the extract. The semipastry extract was stored in the refrigerator and used for the study.

Determination of Hematological Parameters

Hematological Parameters were

determined using standard methods of

Experimental Design

Forty eight (48) Wistar albino rats were used in this study. They were randomly distributed into six (6) groups of 8 rats each. Oxidative stress was induced in the rats and this was performed by intraperitoneal injection of chloroform (100 mg/kg b/w). The rats were fed graded doses of ethanol extract of *Rauwolfia vomitoria* through oral intubation method. The groups and doses administered are summarized below

Group 1: (Negative control rats without Chloroform intoxication): rats were treated with [0.5 ml of normal saline].

Group 2: (Chloroform intoxicated rats): rats were treated with (100 mg/kg b.w. of ethanol extract of *Rauwolfia*

vomitoria).

Group 3: (Chloroform intoxicated rats): rats were treated with (200 mg/kg b.w. of ethanol extract of *Rauwolfia vomitoria*).

Group 4: (Chloroform intoxicated rats): rats were treated with (300 mg/kg b.w. of ethanol extract of *Rauwolfia vomitoria*).

Group 5: (Positive control rats with Chloroform intoxication) were treated with (0.5 ml of normal saline).

Group 6: (Standard control rats with Chloroform intoxication) were treated with (5 mg/kg body weight of standard drug Chemiron).

Statistical Analysis

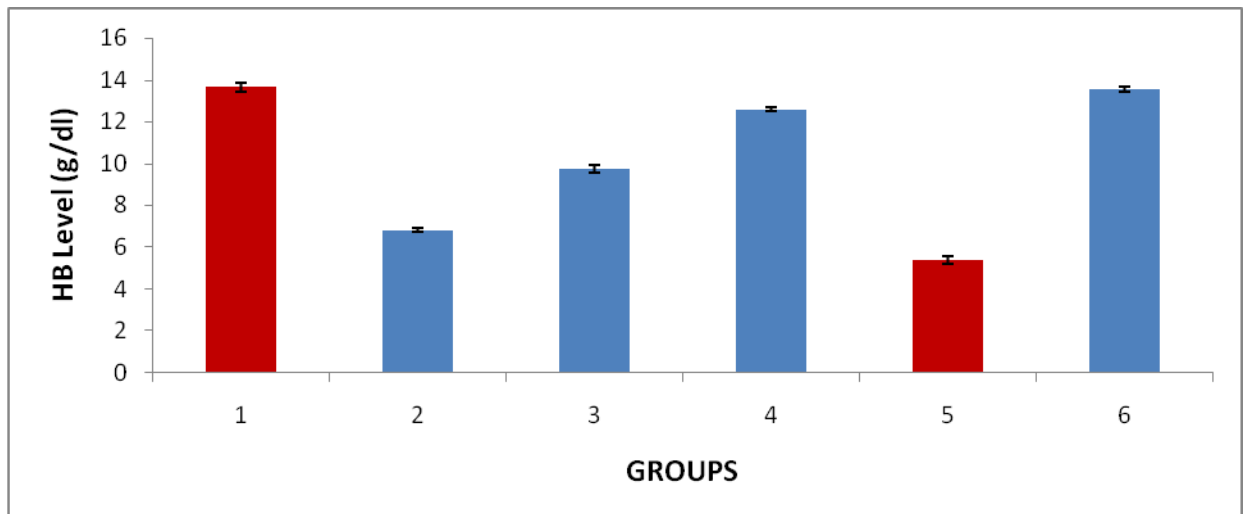
Results were expressed as mean \pm standard deviations where applicable. The data were subjected to one-way analysis of variance (ANOVA), followed by Post hoc

Duncan multiple comparison test using SPSS software version 21 and $p < 0.05$ was regarded as significant.

RESULTS

The results indicated that, HB, PCV and RBC levels of rats in groups 2, 3 and 4 treated with graded doses of 100mg/kg, 200mg/kg and 300mg/kg b.w of ethanol leaf extract of *Rauwolfia vomitoria* increased significantly ($p < 0.05$) when compared with group 5 (positive control) rats (figs. 2, 3 and 5). There was no significant difference ($p > 0.05$) when Hb levels of rats in group 4 were compared to

groups 1 and 6 (fig.2). The results indicated that, WBC levels of rats in groups 2, 3 and 4 treated with graded doses of 100mg/kg, 200mg/kg and 300mg/kg b.w of ethanol leaf extract of *Rauwolfia vomitoria* decreased significantly ($p < 0.05$) when compared with group 5 (positive control) rats (fig. 4).



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Fig. 2: The levels of HB in rats treated with ethanol extract of *Rauwolfia vomitoria* (Mean±SD)

Group 1: Rats received [0.5 ml of normal saline).

Group 2: Rats received (100 mg/kg b.w. of ethanol extract of *Rauwolfia vomitoria*).

Group 3: Rats received (200 mg/kg b.w. of ethanol extract of *Rauwolfia vomitoria*).

Group 4: Rats received (300 mg/kg b.w. of ethanol extract of *Rauwolfia vomitoria*).

Group 5: Rats received (0.5 ml of normal saline)

Group 6: Rats received (5 mg/kg body weight of standard drug Chemiron).

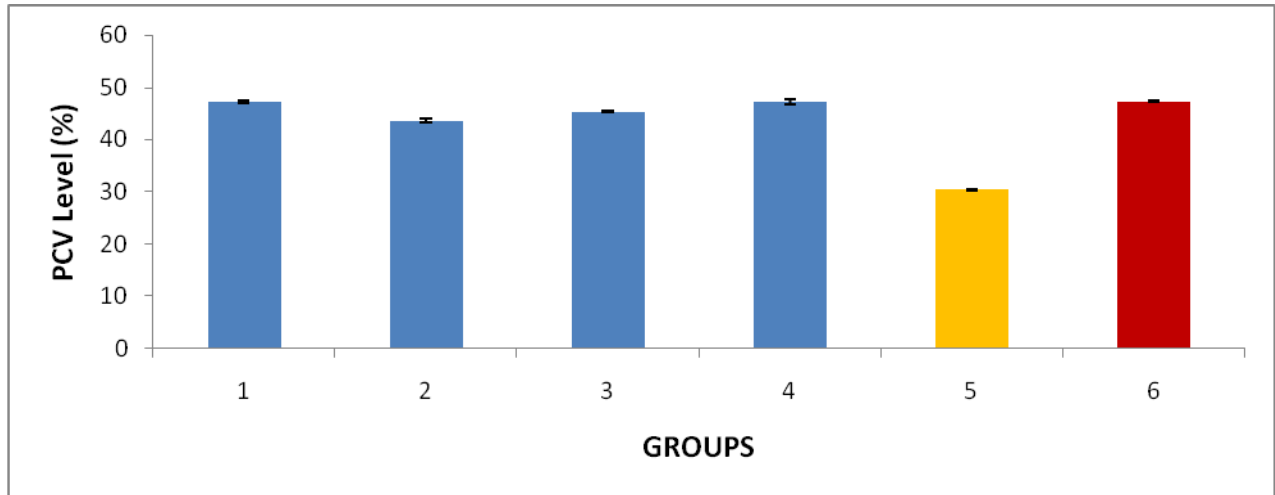


Fig. 3: The levels of PCV in rats treated with ethanol extract of *Rauwolfia vomitoria* (Mean±SD)

Group 1: Rats received [0.5 ml of normal saline).

Group 2: Rats received (100 mg/kg b.w. of ethanol extract of *Rauwolfia vomitoria*).

Group 3: Rats received (200 mg/kg b.w. of ethanol extract of *Rauwolfia vomitoria*).

Group 4: Rats received (300 mg/kg b.w. of ethanol extract of *Rauwolfia vomitoria*).

Group 5: Rats received (0.5 ml of normal saline)

Group 6: Rats received (5 mg/kg body weight of standard drug Chemiron).

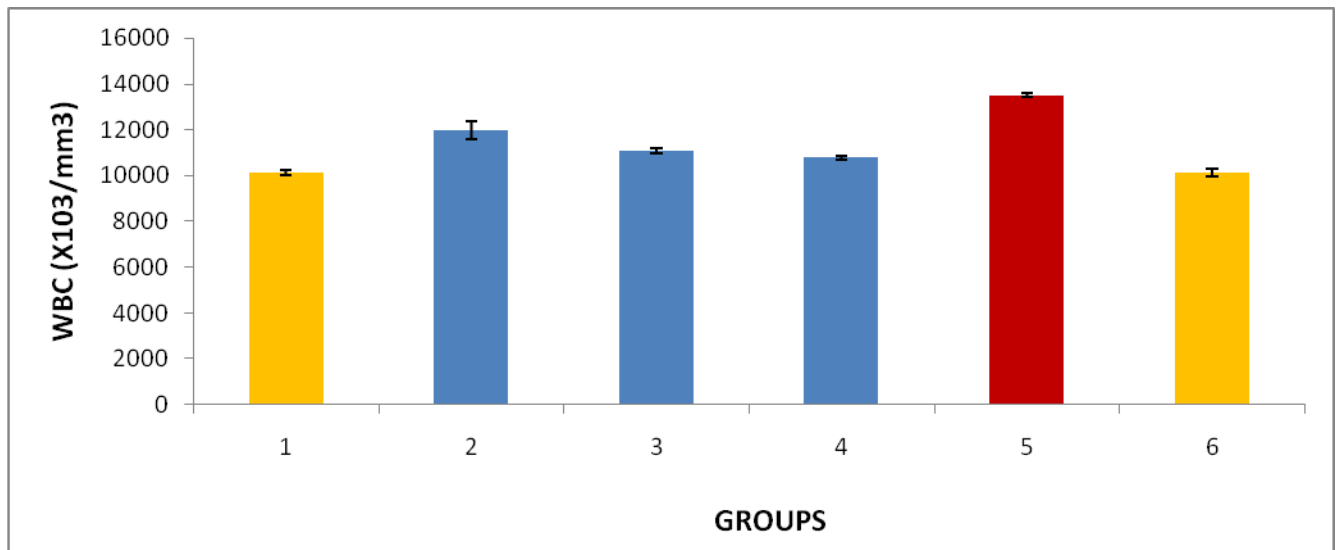


Fig. 4: The levels of WBC in rats treated with ethanol extract of *Rauwolfia vomitoria* (Mean±SD)

Group 1: Rats received [0.5 ml of normal saline).

Group 2: Rats received (100 mg/kg b.w. of ethanol extract of *Rauwolfia vomitoria*).

Group 3: Rats received (200 mg/kg b.w. of ethanol extract of *Rauwolfia vomitoria*).

Group 4: Rats received (300 mg/kg b.w. of ethanol extract of *Rauwolfia vomitoria*).

Group 5: Rats received (0.5 ml of normal saline)

Group 6: Rats received (5 mg/kg body weight of standard drug Chemiron).

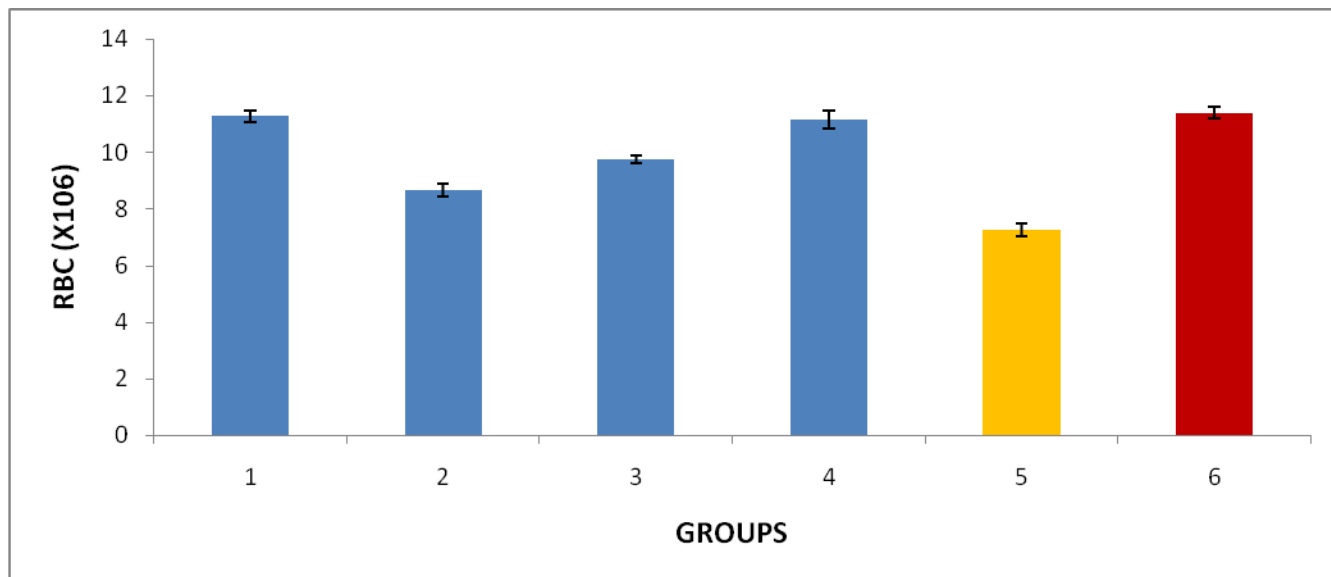


Fig. 5: The levels of RBC in rats treated with methanol extract of *Rauwolfia vomitoria* (Mean±SD)

Group 1: Rats received [0.5 ml of normal saline).

Group 2: Rats received (100 mg/kg b.w. of ethanol extract of *Rauwolfia vomitoria*).

Group 3: Rats received (200 mg/kg b.w. of ethanol extract of *Rauwolfia vomitoria*).

Group 4: Rats received (300 mg/kg b.w. of ethanol extract of *Rauwolfia vomitoria*).

Group 5: Rats received (0.5 ml of normal saline)

Group 6: Rats received (5 mg/kg body weight of standard drug Chemiron).

DISCUSSION

The effect of ethanol leaf extract of *Rauwolfia vomitoria* on hematological parameters of chloroform intoxicated albino wistar rats.

The assessment of haematological parameters could be used to reveal the deleterious effect of foreign compounds including plant extracts on the blood constituents of animals [30]. The occurrence of anaemia in diabetes mellitus has been reported due to the increased non-enzymatic glycosylation of RBC membrane proteins [2]. If a herb or medicinal plant is toxic, this can be reflected in a reduction in some or all of

the haematological parameters measured in a full/complete blood count because of direct toxicity to or lysis of the cells in the blood [2]. If however it is non toxic or actually nourishing and immunity boosting, this will reflect in the maintenance or increase in levels of some of the haematological parameters and cells especially those implicated as imparting immunity, though this increase

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will not be as high as the increase seen in a pathological state [30].

The results indicated that, HB, PCV and RBC levels of rats in groups 2, 3 and 4 treated with graded doses of 100mg/kg, 200mg/kg and 300mg/kg b.w of ethanol leaf extract of *Rauwolfia vomitoria* increased significantly ($p < 0.05$) when compared with group 5 (positive control) rats. There was no significant difference ($p > 0.05$) when Hb levels of rats in group 4 were compared to groups 1 and 6. The results indicated that, WBC levels of rats

in groups 2, 3 and 4 treated with graded doses of 100mg/kg, 200mg/kg and 300mg/kg b.w of ethanol leaf extract of *Rauwolfia vomitoria* decreased significantly ($p < 0.05$) when compared with group 5 (positive control) rats. White blood cells fight infection and elevated levels may indicate other problems, such as: infection, stress, inflammation, trauma, allergy, or certain diseases [26]. A high white blood cell count (leukocytosis) usually requires further investigation.

CONCLUSION

In conclusion, ethanol leaf extract of *Rauwolfia vomitoria* boosted the levels of HB, PCV, WBC and RBC in the chloroform intoxicated rats. This explains why it has

been used in tradomedicinal practises to treat toxicity because of its blood boosting effects.

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