The Effect of Ethanol Leaf Extract of *Rauwolfia vomitoria* on Hepatic Markers of Chloroform Intoxicated Albino Wistar Rats

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ABSTRACT

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 due to its medicinal properties. This research was designed to determine the effect of ethanol leaf extract of *Rauwolfia vomitoria* on hepatic markers (ALT, ALP, AST, GGT and bilirubin) of chloroform intoxicated wistar albino rats. All chemicals and reagents used in this study were of analytical grade. The results indicated that ALT, ALP, AST, GGT activities and bilirubin level decreased significantly ($p<0.05$) in groups 2, 3 and 4 rats treated with graded doses of 100 mg/kg, 200mg/kg and 300mg/kg b.w of ethanol leaf extract of *Rauwolfia vomitoria* when compared with the positive control rats (group 5) treated with 0.5 ml of normal saline as shown in figures 3, 4, 5, 6 and 7. Treatment with graded doses of ethanol leaf extract produced significant decrease ($p<0.05$) in ALT, ALP, AST, GGT activities and bilirubin level compared with the positive control groups. Also there was no significant difference ($p>0.05$) when (negative control) group 1 rats treated with (0.5 ml of normal saline) were compared with group 4 chloroform intoxicated rats treated with 300 mg/kg b.w. of ethanol extract of *Rauwolfia vomitoria* and group 6 (standard control) rats treated with 5 mg/kg body weight of standard drug Chemiron. In conclusion, the results from this research indicated that ethanol leaf extract of *Rauwolfia vomitoria* decreased liver markers in chloroform intoxicated rats as shown in the treated groups when compared with the untreated control (Positive control). As a result ethanol leaf extract of *Rauwolfia vomitoria* can be used to ameliorate hepatic associated diseases.

Keywords: *Rauwolfia vomitoria,* Hepatic, Markers, Chloroform

INTRODUCTION

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 [1,2,3,4,5,6]. They are one of the most important sources of new chemical compounds with potential therapeutic effects [7,8,9]. [10] 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 [11,12,13]. Plants synthesize thousands of chemical compounds possessing different properties like defense against insects, bacteria, fungi, diseases and herbivorous mammals [14,15,16]. Herbal and natural products have been used in folk medicine for centuries throughout the world [17,18,19]. 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 [20, 21, 22]. Medicinal plants are widely used in non-industrialized societies, mainly because they are readily available and cheaper than modern medicines [23,24]. Medicinal plants have been discovered and used in traditional medicine practices since prehistoric times [25,26,27]. 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 [28,29]. 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 [30]. 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. Plants have been used for centuries as a remedy for human diseases because they possess phytochemicals of therapeutic values [31]. The Indian Traditional medicine like Ayurveda, Siddha and Unani are predominantly based on the use of plant materials. Herbal drugs have gained importance and popularity in recent years because of their safety, efficacy and cost effectiveness [32]. 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 [30]. Hence there is an ever increasing need for health safety in the society filled with toxicants [32]. 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 [30]. 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 [9].

Aim

The aim of this research was to determine the effects of ethanol leaf extract of *Rauwolfia vomitoria* on hepatic markers of chloroform intoxicated wistar albino rats.

Figure 1: The leaves of *Rauwolfia vomitoria*

MATERIALS AND METHODS

Preparation of the Plant Extract

The leaves of *Rauwolfia vomitoria* were harvested and washed under tap water to remove contaminants and air dried under shade. They were pulverized using laboratory milling machine and sifted using 0.25 mm sieve. One thousand five hundred gram (1500g) of the powdered leaf sample of *Rauwolfia vomitoria* was soaked in 7500 ml of ethanol for 48 hours with agitation. The resulting methanol

leaf extract was filtered using muslin cloth and evaporated to dryness using rotary evaporator at a temperature of 45^0C. The concentrated ethanol leaf extract of *Rauwolfia vomitoria* was used for subsequent analyses.

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 semi-pastry extract was stored in the refrigerator and used for the study.

Determination of Hepatic Markers

Hepatic markers were determined using standard methods [21].

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 bodyweight of standard drug Chemiron).

Statistical Analysis

Results were expressed as mean± 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 ALT, ALP, AST, GGT activities and bilirubin level decreased significantly ($p<0.05$) in groups 2, 3 and 4 rats treated with graded doses of 100 mg/kg, 200mg/kg and 300mg/kg b.w of ethanol leaf extract of *Rauwolfia vomitoria* compared with the positive control rats (group 5) treated with 0.5 ml of normal saline as shown in figures 2, 3, 4, 5 and 6. Treatment with graded doses of ethanol leaf extract produced significant decrease ($p<0.05$) in ALT, ALP, AST, GGT activities and bilirubin level compared with the positive control groups (figures 2, 3, 4, 5 and 6). Also there was no significant difference ($p>0.05$) when (negative control, group 1) rats treated with (0.5 ml of normal saline) were compared with group 4 rats treated with 300 mg/kg b.w. of ethanol extract of *Rauwolfia vomitoria* and group 6 (standard control) rats treated with 5 mg/kg bodyweight of standard drug Chemiron.

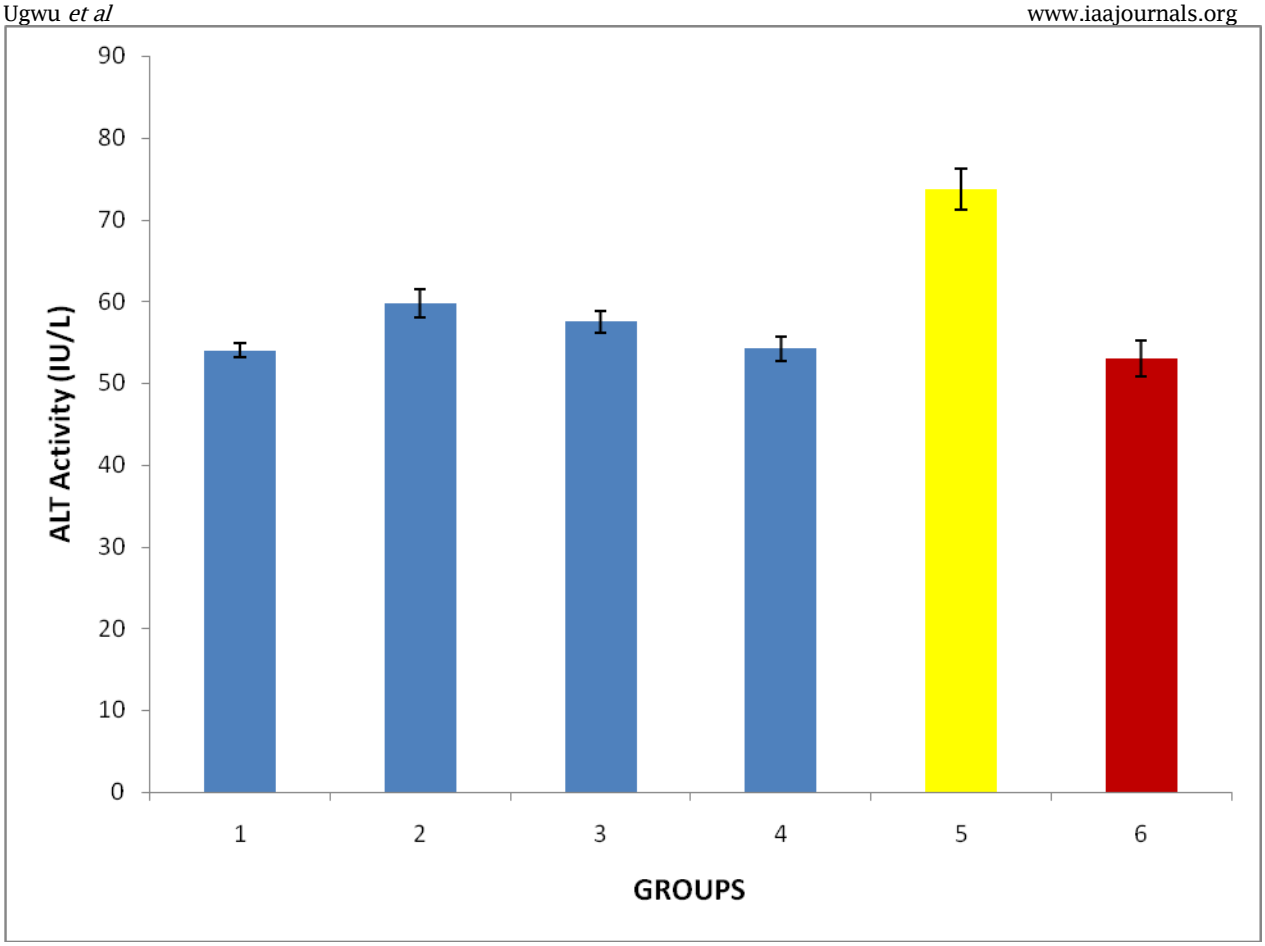

Fig 2:The ALT activity of rats treated with ethanol extract of *Rauwolfia vomitoria*
Data are shown as mean ± standard deviation (n=4).

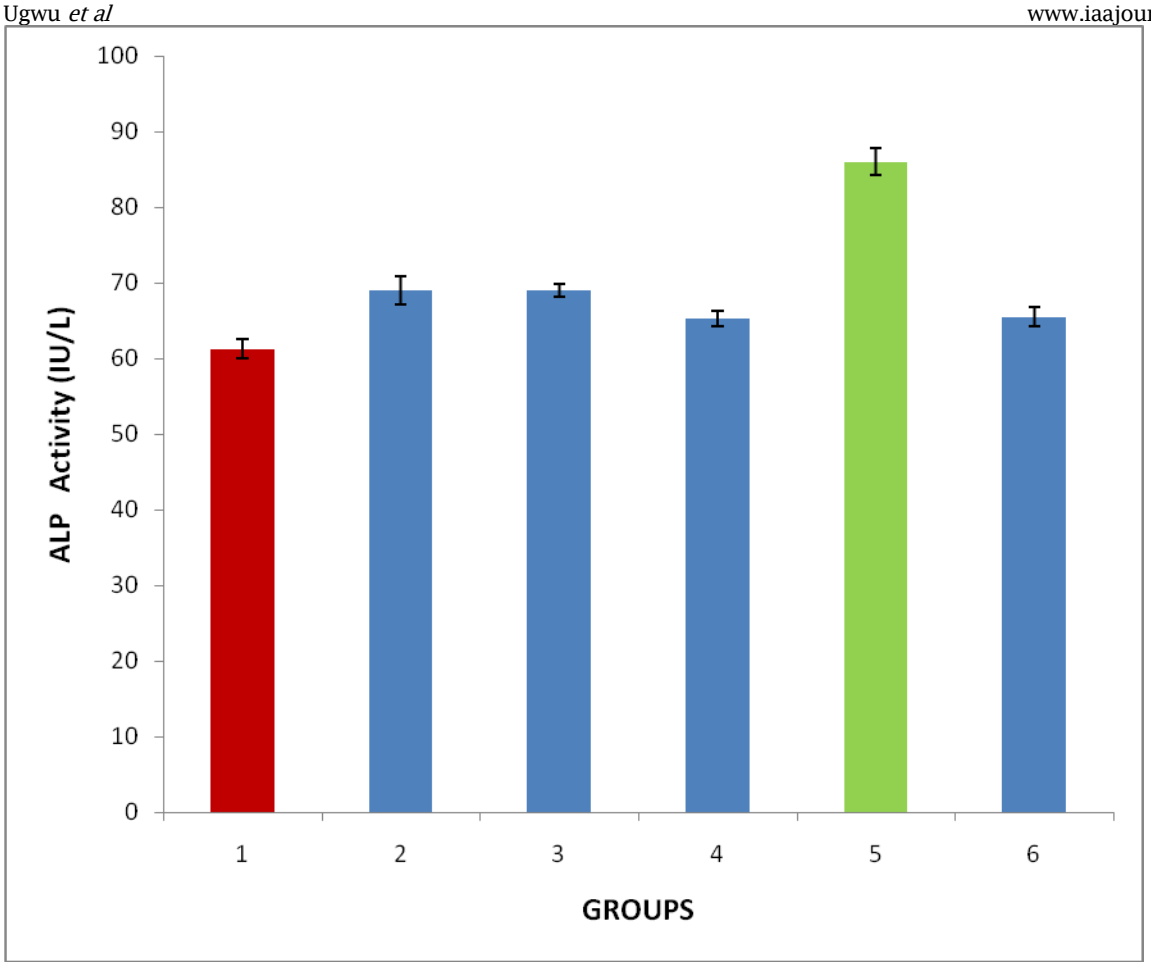

Fig 3:The ALP activity of rats treated with ethanol extract of *Rauwolfia vomitoria*. Data are shown as mean ± standard deviation (n=4).

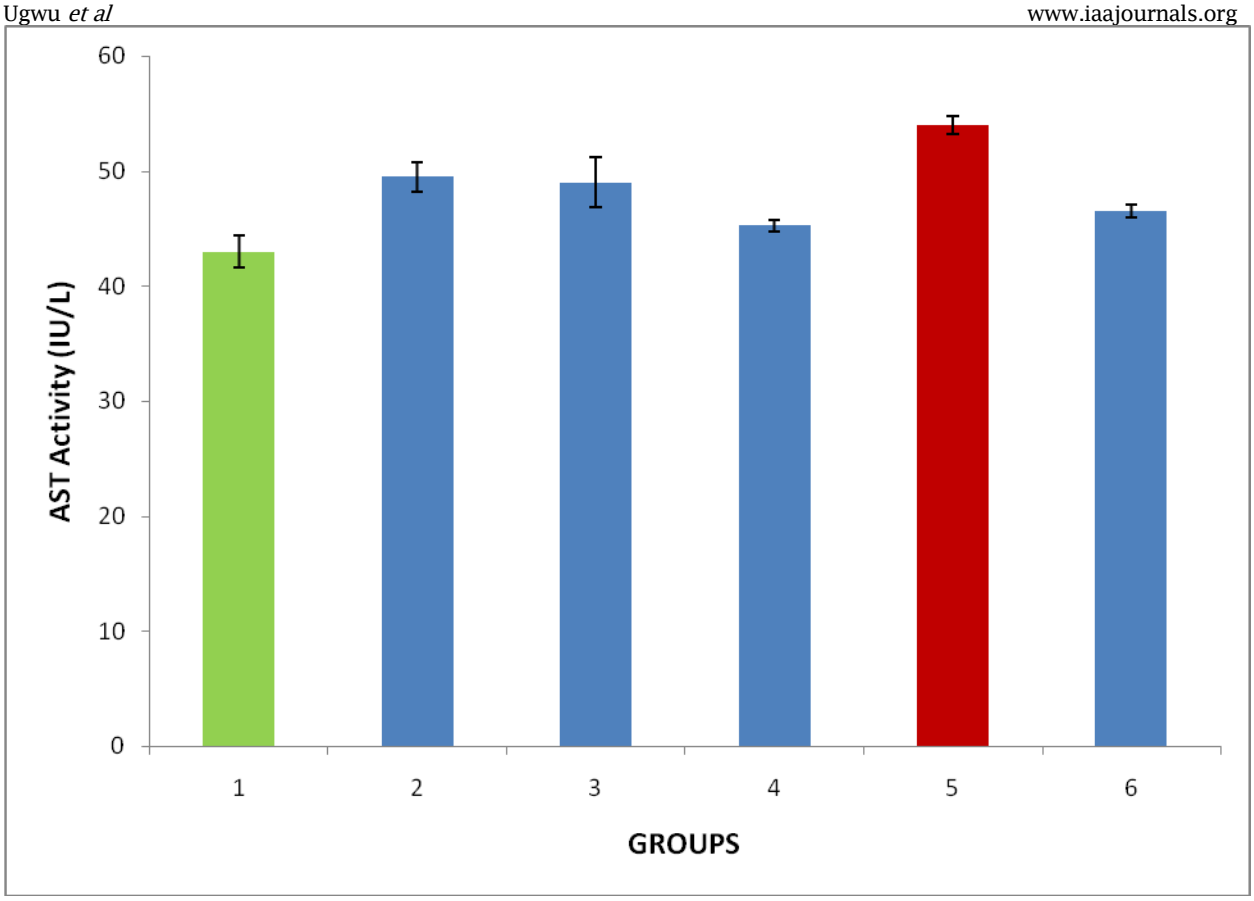

Fig 4:The AST activity of rats treated with ethanol extract of *Rauwolfia vomitoria.*
Data are shown as mean ± standard deviation (n=4).

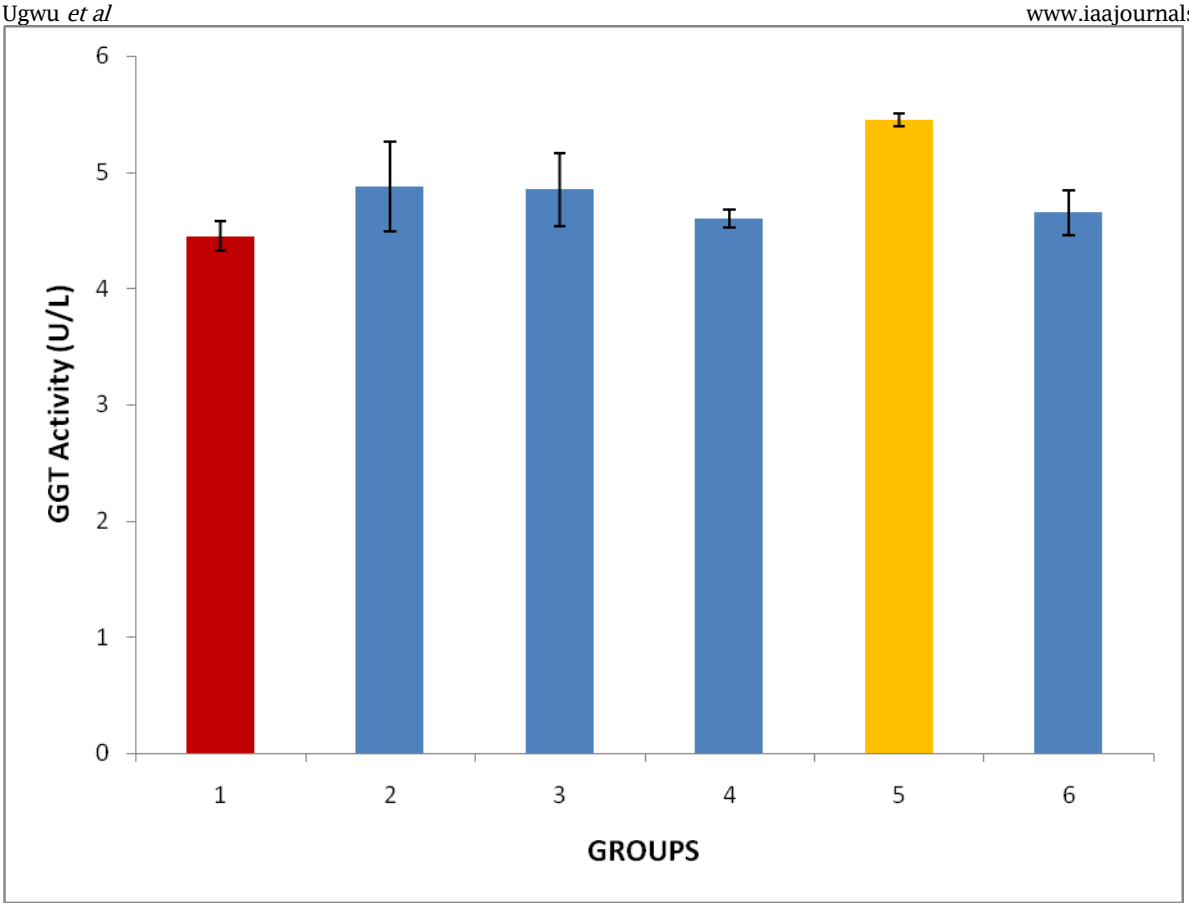

Fig 5:The GGT activity of rats treated with ethanol extract of *Rauwolfia vomitoria*. Data are shown as mean ± standard deviation (n=4).

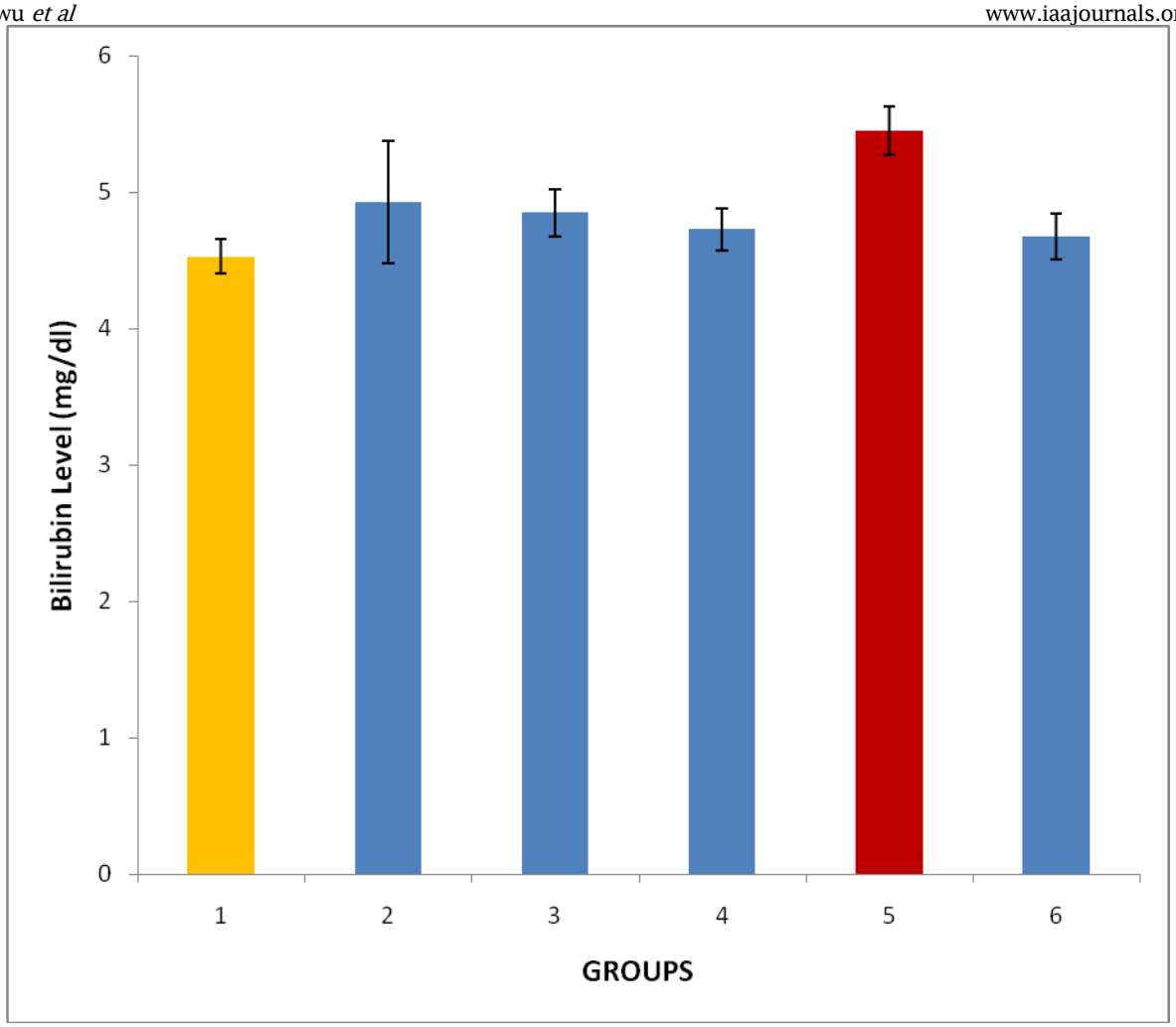

Fig 6:The Bilirubin Level of rats treated with ethanol extract of *Rauwolfia vomitoria*.Data are shown as mean ± standard deviation (n=4).

DISCUSSION

This study was designed to evaluate the ameliorative effect on the liver of chloroform intoxicated Wistar albino rats treated with graded doses of ethanol leaf extract of *Rauwolfia vomitoria.* The results indicated that ALT, ALP, AST, GGT activities and bilirubin level decreased significantly ($p<0.05$) in groups 2, 3 and 4 rats treated with graded doses of 100 mg/kg, 200mg/kg and 300mg/kg b.w of ethanol leaf extract of *Rauwolfia vomitoria* compared with the positive control rats treated with 0.5 ml of normal saline as shown in figures 3, 4, 5, 6 and 7. Treatment with graded doses of ethanol leaf extract produced significant decrease ($p<0.05$) in ALT, ALP, AST, GGT activities and bilirubin level compared with the positive control groups (figures 2, 3, 4, 5 and 6). The decreased level in liver markers compared to the known standard drug in group 6 (Standard control) shows that the extract can be used to ameliorate hepatic damages in liver of chloroform intoxicated rats. This agrees with the work of [21] who obtained similar results on serum amino transferase and alkaline phosphatase activities of rats treated with *Rauwolfia vomitoria* Afzel (Apocynaceae) extract. The liver is the key site of metabolism of xenobiotics and also plays a role in synthesis of drugs. Liver malfunction will impair the function and metabolism of drugs and xenobiotics in the blood [21]. Aminotransferases are cytosolic enzymes widely distributed in tissues with highest concentration in liver and heart but with ALT more specific to the liver and AST to the heart. Damage to the membrane architecture of cells due to exposure to toxicants will lead to their spillage into blood [21].

CONCLUSION

The ethanol leaf extract of *Rauwolfia vomitoria* decreased the activities of liver markers in serum of the rats when compared with the positive group. This means that hepatic damages can be ameliorated with the used of this medicinal plant. In conclusion, the results from this research indicated that ethanol leaf extract of *Rauwolfia vomitoria* can decrease liver markers in chloroform intoxicated rats as shown in the treated groups compared with the untreated control (Positive control). As a result ethanol leaf extract of *Rauwolfia vomitoria* can be used to ameliorate hepatic associated diseases.

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