IOSR Journal Of Pharmacy And Biological Sciences (IOSR-JPBS)
e-ISSN:2278-3008, p-ISSN:2319-7676. Volume 13, Issue 6 Ver. II (Nov – Dec 2018), PP 62-66
www.Iosrjournals.Org

The effect of ethanolic extract of Tridaxprocumbens on potassium bromate induced hepatotoxicity in adult wistar rats.

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Abstract: *The toxic effect of potassium bromate on humans has drawn so much attention due to toxicity being related to some vital organs like the kidney and liver. However, numerous medicinal plants contain biologically active compounds that have shown to be useful in improving the life and treatment of diseases.This study seeks to assess the effect of ethanolic extract of Tridaxprocumbenson potassium bromate induced hepatotoxicity in adult wistar rats.Twenty (20) adultwistar rats weighing between 180 – 200g were divided into four groups of five rats each. Group A was the control and was administered distilled water only for 14 days, Group B were administered 100mg/kg of potassium bromate only for 14 days, Group C 300mg/kg of Tridaxprocumbens leaf extract only for 14 days and Group D 100mg/kg of potassium bromate only for 7 days prior to treatment with 300mg/kg of ethanolic extract of Tridaxprocumbens for 7 days. Twenty four hours after the last administration, the animals were anaesthetized, sacrificed and the livers harvested. The dry mass of the extract was used for preliminary phytochemical analysis. The preliminary phytochemical analysis of ethanolic extract of the leaf of Tridaxprocumbensindicated the presence of flavonoids, alkaloids, saponins, tannins, terpenes, phenolic compounds and cardiac glycosides. Histological observation showed restoration of the liver architecture to normal after treatment with Tridaxprocumbens. Findings from this study show that ethanolic extract of Tridaxprocumbens leaf has got hepatoprotective effect against potassium bromate induced hepatotoxicity.*

Keywords: *Potassium Bromate, Hepatotoxicity, Tridaxprocumbens*

Date of Submission: 14-12-2018 Date of acceptance: 29-12-2018

I. Introduction

Potassium bromate ($KBrO_3$) is an oxidizing agent that is primarily used as a dough conditioner for flour [1] and has been used as a food additive mainly in the bread-making process [2]. It is also used in pharmaceutical and cosmetic industries and is a constituent of cold wave hair solutions [3]. $KBrO_3$ is generated as a by-product of ozonisation of water containing bromide [4,5]. This biotransformation results in the generation of free radicals which causes oxidative damage to essential cellular macro molecules, thereby leading to marked nephrotoxicity and cancer in experimental animals [6]. Previous reports have stated that potassium bromate induces multiple organ toxicity in humans and experimental animals [7,8]. Studies have also shown its potential ability in inducing cancer, liver failure, kidney failure, deafness, pains, redness of the eye and skin [9,10]. Due to its toxicity, several countries like United Kingdom, Nigeria and Canada have banned the use of $KBrO_3$.

Herbs are natural remedies for the disease with higher safety profile and efficacy. They contain numerous biologically active compounds which are helpful in improving the life and treatment of diseases [11]. Its clinical importance could be one of the reasons 1.42 billion people in the world are dependent on traditional medicines for the treatment of various ailments [12]. With the increase in the number of people seeking remedies and health approaches free from side effects caused by synthetic chemicals, medicinal plants are moving from fringe to main stream use. *Tridaxprocumbens*is native of tropical America and naturalized in tropical Africa, Asia, Australia and India. Extract of this plant have been shown to prevent hair fall and check haemorrhage from cuts and bruises with its leaves and flowers possessing antiseptic, insecticidal and parasitical properties [13]. Previous studies have reported medicinal properties of *Tridaxprocumbens* against blood pressure, bronchial catarrh, malaria, dysentery, diarrhoea, stomach ache, headache and wound healing [14].

The liver is the major detoxifying organ in the body and contains enzymes involved in detoxification mechanism. It is vital to the body's metabolic functions and immune system. Because of its multidimensional functions and its relationship to the gastrointestinal tract, the liver is prone to diseases produced by drugs, xenobiotics and oxidative stress [15]. The present study was focused on evaluating the protective effect of *Tridaxprocumbens* against potassium bromate induced toxicity in the liver.

II. Materials and Methods

Experimental Animals

Twenty healthy wistar rats weighing between 180-200g were obtained from the animal house of Gregory University, Uturu. The rats were fed with Guinea feeds (pelletized) and water was provided ad libitum. They were allowed to acclimatize for a period of two weeks before commencement of treatment. The ethical committee of the College for animal care and use, Gregory University, Uturu approved the study design in compliance with the National regulation for animal research.

Collection and Preparation of Plant Material

Fresh leaves of *Tridaxprocumbens* were obtained from Okigwe, Imo State and were washed with water to remove sand and debris, put in a sieve to drip off water and then dried at 50^{o}C in a thermostatically controlled oven. The leaves were then crushed into fine powder using a manual blender. The coarse powder was soaked in ethanol for two days before it was filtered into a beaker with a filter paper. The beaker was later placed in a water bath to dry up the remaining ethanol. 1g of the extract was dissolved in 10ml of distilled water and administered to the animals. Potassium bromate was procured from the Biochemistry Department, Gregory University, Uturu. 0.5g of potassium bromate was dissolved in 10ml of distilled and administered to the animals.

Phytochemical Screening of the Extract

Preliminary phytochemical studies were carried out using the methods of Trease and Evans [16]. The freshly prepared ethanolic extract of *Tridaxprocumbens*was qualitatively tested with the aim of assessing the presence of some biologically active compounds such as sterols, alkaloids, tannins, glycosides, saponins, phenolic compounds and flavonoids.

Experimental Protocol

The twenty wistar rats were randomly divided into four (4) groups of five animals each, designated as groups A, B, C and D. Group A served as the control group and received distilled water only, Group B received 100mg/kg of potassium bromate only for 14 days, Group C received 300mg/kg of ethanolic extract of *Tridaxprocumbens*only for 14 days and group D received 100mg/kg of potassium bromate only for 7 days prior to post treatment with 300mg/kg of ethanolic extract of *Tridaxprocumbens* for 7 days. The extracts were administered orally once daily. After the twenty eighth day, the animals from various groups were weighed and their weight recorded. Twenty four hours after last administration the animals were anaesthetized by chloroform inhalation and dissected. The liver tissues were harvested, weighed and fixed in 10% formal saline for histological examination.

Histopathological Analysis

The liver tissues from the control and treated animals were fixed in 10% formal saline. The tissues were processed by passing through ascending grades of alcohol and then cleared in xylene after which it was embedded in paraffin wax. Rotatory microtome was used to obtain tissue sections of 3-5µm thick. The sections were deparaffinised, hydrated and stained using haematoxylin and eosin (H&E) dye. The sections were then mounted using neutral dibutylphthalate xylene (DPX) medium for microscopic examination at x400 magnification.

III. Result

The phytochemical analysis of the ethanolic extract of the leaf of *Tridaxprocumbens*indicated the presence of flavonoids, alkaloids, saponins, tannins, terpenes, phenolic compounds and cardiac glycosides.

Hispathological Findings

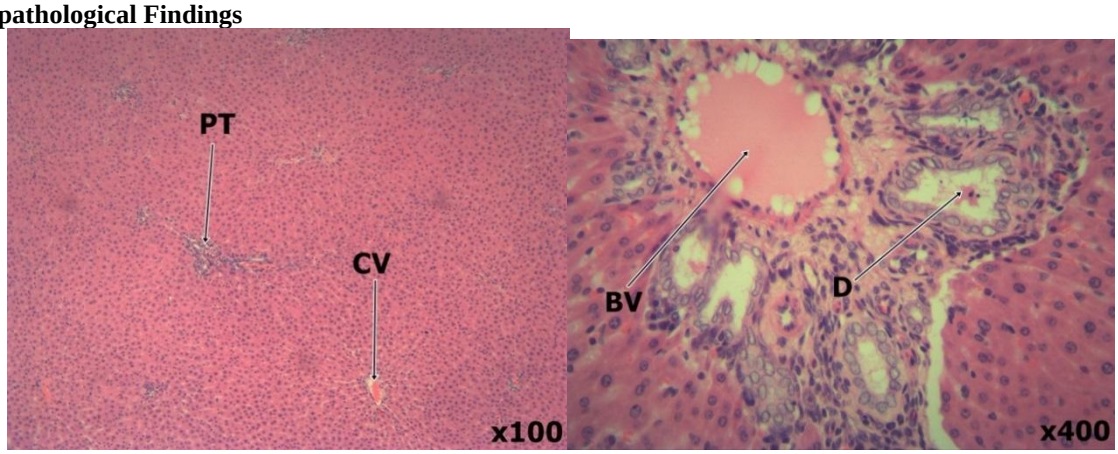

Plate 1: Photomicrograph section of the liver of control (group A) animals showing well preserved liver architecture with normal Portal Triad (PT), Central Vein (CV), Blood Vessels (BV) and Ductules (D).

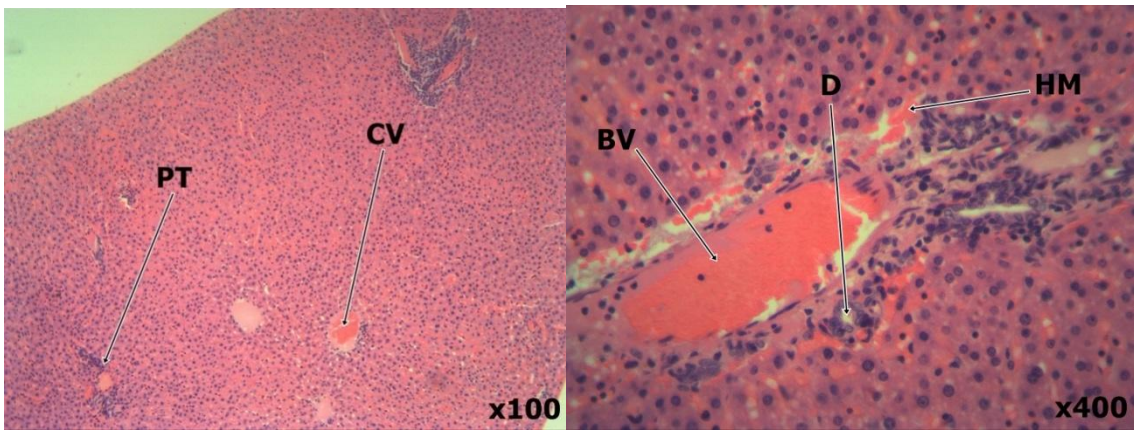

Plate 2: Photomicrograph section of the liver of group B animals showing distortion of the liver architecture and severe Haemorrhage (HM) into the stroma.

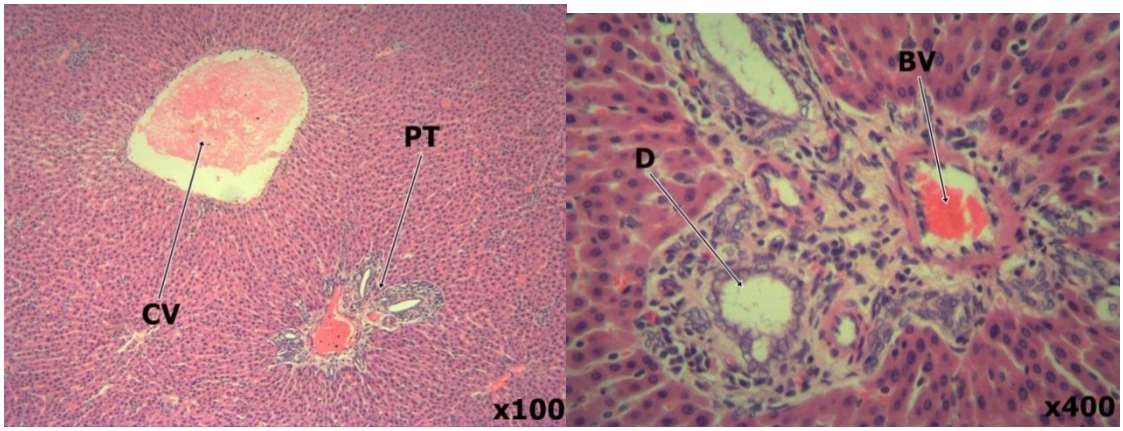

Plate 3: Photomicrograph section of the liver of group C animals showing well preserved liver architecture with normal Portal Triad (PT), Central Vein (CV), Blood Vessels (BV) and Ductules (D).

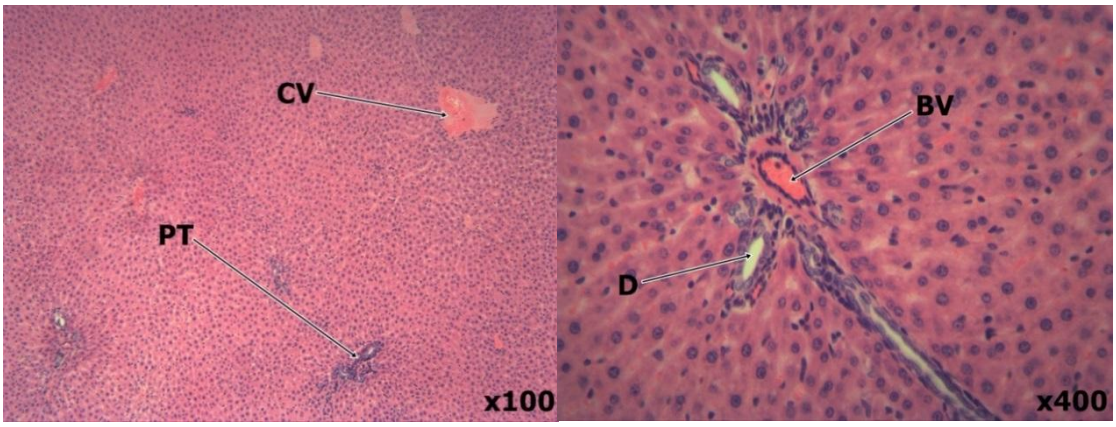

Plate 4: Photomicrograph section of the liver of group D animals showing restoration of the liver architecture with normal Portal Triad (PT), Central Vein (CV), Blood Vessels (BV) and Ductules (D).

IV. Discussion

Potassium bromate has been found to induce multiple organ toxicity in humans and experimental animals as well as the potential of inducing cancer, deafness, pains, redness of the eye and skin [7,17].

Tridaxprocumbens showed ameliorating effect against potassium bromate induced hepatotoxicity by the restoration of its cytoarchitecture to normal. This could be due to the presence of the phytochemical compounds which have antioxidant properties that protect the animals against the toxic effect of potassium bromate. Antioxidants protect cells from damages caused by free radicals. This study is consistent with previous research carried out by Adeluwoye*et al.*[18] in which the antioxidant effect of *Tridaxprocumbens* was demonstrated.

V. Conclusion

From this study, it can be deduced that the ethanolic extract of *Tridaxprocumbens* has hepatoprotective properties. This suggests that extract of the leaf of *Tridaxprocumbens* administered to individuals exposed to potassium bromate poisoning could provide some protection against potassium bromate toxicity and perhaps ameliorate the effects of potassium bromate toxicity on the liver.

Conflict Of Interest

We declare that we have no conflict of interest

Acknowledgement

Nil

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Opara Julia K."The effect of ethanolic extract of Tridaxprocumbens on potassium bromate induced hepatotoxicity in adult wistar rats."IOSR Journal of Pharmacy and Biological Sciences (IOSR-JPBS) 13.6 (2018): 62-66.