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Research Article

Screening Of Anti Diuretic Effect Of *Ailanthus Excelsa* Leaf Extract Against Furosemide Induced Rats

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ABSTRACT

The extracts of the leaves of *Ailanthus excelsa* (Family: Simaroubaceae) is claimed as an antidiuretic by some traditional practitioners. However, the validity of this claim has not been scientifically proven or refuted. The aim of this study was to evaluate the antidiuretic potential of ethanol extracts of leaves of *Ailanthus excelsa* in rats following oral administration. Ethanol extracts were prepared from Soxhlet extraction. Furosemide was used as a diuretic agent to induce diuresis. Vasopressin (ADH) was used as a standard. The results demonstrated the ethanol extracts of leaves of *Ailanthus excelsa* and ADH significantly impaired the total urine output. However, antidiuretic potential of ethanolic extract was similar to that of ADH.

INTRODUCTION

Anti-diuretic activity refers to the ability of a substance to reduce urine production in the body. This can be important in conditions where excessive urine output is a problem, such as diabetes insipidus or dehydration. Substances that exhibit anti-diuretic activity typically work by influencing the reabsorption of water in the kidneys, thereby retaining more fluid in the body. This helps maintain proper hydration levels and electrolyte balance. Anti-diuretic activity is a physiological phenomenon crucial for maintaining fluid balance within the body. It involves the regulation of urine production to prevent excessive loss of water and electrolytes. This process primarily occurs in the kidneys, where substances with anti-diuretic properties influence the reabsorption of water from the urine back into the bloodstream. By reducing the volume of urine produced, anti-diuretic agents help conserve body fluids, ensuring adequate hydration and electrolyte balance. Disorders such as diabetes insipidus, characterized by excessive urination and dehydration, highlight the significance of anti-diuretic mechanisms in maintaining overall health. Medications that enhance anti-diuretic activity, such as vasopressin analogs, are employed in the management of conditions where fluid retention is

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essential. Understanding and harnessing anti-diuretic activity are fundamental in managing various medical conditions and preserving physiological equilibrium. Antidiuretic hormone test also called the vasopressin test, is a test for antidiuretic hormone (ADH), which is released from the pituitary gland and acts on the kidneys to increase their reabsorption of water into the blood. Anti-diuretic hormone release helps to maintain the optimum amount of water in the body, when there is an increase in the concentration of the blood serum (or) a decrease in blood volume, physical stress, surgery and high levels of anxiety can also stimulate ADH. Various factors such as the ethanol consumption reduces ADH production in a temporarily increase in the production of urine. This may also occur in diabetes insipidus, when the pituitary gland produces insufficient ADH, or rarely, when the kidneys fail to respond to ADH.

Ailanthus excelsa, commonly known as tree of heaven, is a large deciduous tree found in India and Sri Lanka.[1] In Tamil, it is also known as Pi-Nari Maram due to its disagreeable odor. The trees are grown along the edges of fields and rivers to mark boundaries and prevent soil erosion

Trees, to 25 m high, bark light greyish-brown, fibrous or glandular, rough. Leaves pair or imparipinnate, alternate, estipulate; rachis 20-80 cm long, stout, swollen at base, pubescent; leaflets 13-29, subopposite; petiolule 20-50 mm long, slender, pubescent; lamina 9-15 x 4-6 cm, very variable in shape.

The tree has several uses in medicine as the gum and the bitter, aromatic leaves are reported to have medicinal properties. The bark is a febrifuge and can be used as a treatment against asthma, bronchitis and dysentery. The leaves and bark are also in good repute as a tonic that is used after labor. The juice of the leaves and fresh bark is used as a remedy for after-pains.

MATERIALS AND METHODS:

Drugs and Chemicals: Furosemide (diuretic), vasopressin (anti-diuretic) Saline and ethanol extract of leaf of ailanthus excelsa

Animals: Male Albino rats (150-175 g) of Wistar strain were used for the study. Before and during the experiment rats were housed in polypropylene cages lined with husk in standard environmental conditions (temperature 25±2o C, relative humidity 55±10 % and 12:12 light: dark cycle. The rats were fed on a standard pellet diet adlibium and had free access to water. The experiments were performed after approval of the protocol by the Institutional Animal Ethics committee (IAEC) and were carried out in accordance with the current guidelines for the care of laboratory animals.

PREPARATION OF PLANT EXTRACT:

The fresh leaves were washed with distilled water, shade dried and the leaves were completely powdered with the use of grinder. The air dried and powdered plant materials were extracted with Soxhlet apparatus. Then the extract was collected, evaporate the solvent by heating and stored at room temperature. Then the collected samples have undergone TLC technique to identify the different phytochemicals present in it.

PRELIMINARY PHYTOCHEMICAL SCREENING:

Phytochemical analysis phytochemical test was done to find out the presence of bioactive chemical constituents such as alkaloids, flavonoids,

glycosides, terpenoids, saponins, phenols and tannins compounds by the following procedure

1.Test for Alkaloids

a. Hagner's test: Add a few mL filtrates with 1-2mL Hagner's reagents. The positive results give a creamy white precipitate.

b. Dragendroff's test: Few mL filtrates are added with 1-2mL Dragendroff's reagents. Presence of alkaloids is indicated by a reddish-brown precipitate.

2.Test for Terpenoids

a. 2mL chloroform is added to 5mL plant extract which was evaporated in a water bath. Afterwards, 3mL conc.H2SO4 is added while it is boiled in a water bath. The formation of gray colored solution indicates the presence of Terpenoids.

3.Test for Saponins

Froth test: 0.5gm plant extract is added in 2mL water and shaken vigorously. A persistent foam is observed for 10 minutes in presence of Saponins.

4.Test for Phenols

a. Lead acetate test: The plant extract is dissolved in 5mL distilled water after which 3mL of 10⁄ lead acetate solution is added to the solution. Presence of phenolic compounds are observed by the formation of white precipitate.

5.Test for Tannins

a. Braymer's test: 1mL filtrate is dissolved in 3mL distilled water and 3 drops 10⁄ Ferric Chloride solution is added in the solution. A blue green color solution is formed to indicate the positive response for the test of tannins.

6.Test for Carbohydrates

a. Molisch test: In 2mL filtrate, 2 drops of alcoholic α-naphthol and 1mL conc..H2SO4 (along the sides of test tube). The presence of carbohydrates is indicated by a violet ring at the separation of the liquid.

7.Test for Glycosides

a. 10% NaOH Test: 1mL dil.H2SO4 is added to 0.2mL extract and the solution is boiled for 15min, and allowed to cool. It is neutralized with 10% NaOH and 0.2mL Fehling's solution A & B. A brick red precipitate is formed which indicates the presence of Glycosides.

PHARMACOLOGICAL STUDY ON ANTI DIURETIC ACTIVITY:

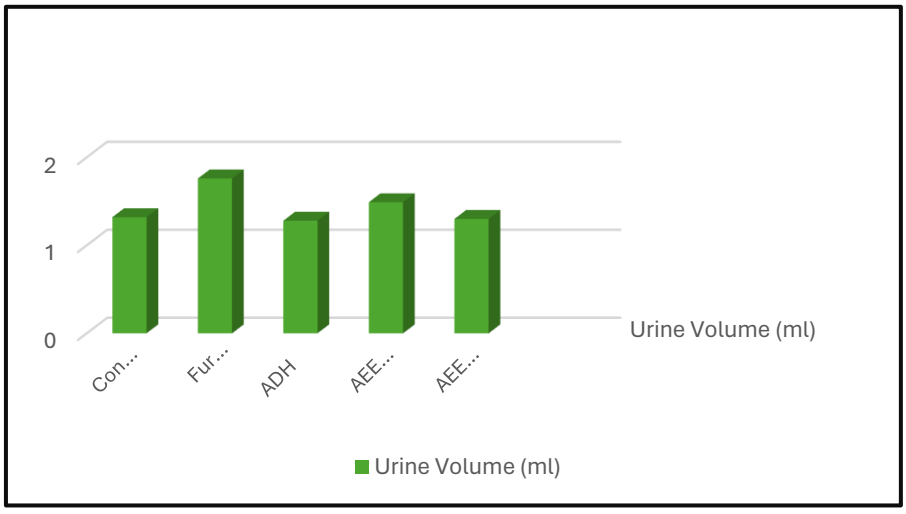
Thirty rats were deprived of water for 18 h. The rats were then orally administered with 15 mL of saline (NaCl, 0.9 % w/v) to impose uniform water load. After 45 min, urinary bladder of each rat was emptied by gentle compression of the pelvic area and by pulling of the tail. The rats were then randomly divided into Five groups (assigned group numbers, I – V). According to the following manner, Group I (n=6) Served as control, Group-II (n = 6) 13 mg/kg furosemide, Group-III (n = 6) 0.13 ml/rat antidiuretic hormone (ADH), Group-IV (n = 6) 250 mg/kg EE, Group-V (n=6) 500 mg/kg EE. Test group administered through oral route and standard group is administered through intraperitoneal with their respective doses. Urine output was measured hourly over 5 hours from the point of administration of saline to the rats.

RESULTS:

The present study establishes the antidiuretic activity of ethanolic leaf extract of *Ailanthus excelsa* in rats. The results of different anti-diuretic parameters are shown in Table. Furosemide followed by vasopressin treated animals significantly decreased the urinary output. Ethanol extract treated animals significantly Decreased the urinary output. The Antidiuretic responses of the extract was highly Significant in comparison with the control animals. Ethanol extract, the excretion of urine volume decrease was Approximately similar to that of standard antidiuretic, Vasopressin. Ethanol extract of *Ailanthus excelsa* at 250 mg shows the mild anti-diuretic activity, at 500 mg dose shows potent anti-diuretic activity when compared with 250 mg of ethanol extract.

Table: ADH-Anti-diuretic hormone, EEA: Ethanol extract of *Ailanthus excelsa*

Group	Urine volume(±ml)	Percentage excreted urine
Control	1.32± 0.22	7.38±0.53
Furosemide 13mg/kg	1.76±0.26	11.42±1.11
ADH 0.13ml/rat	1.28±0.24	7.39±0.48
EEA 250mg/kg	1.49±0.29	10.23±1.08
EEA 500mg/kg	1.30±0.27	7.49±0.48



DISCUSSION:

According to ethnopharmacological survey carried out in the plant *Ailanthus excelsa*, they have healthful properties including antidiabetic, antifertility, antifungal, antimalarial, leishmanicidal, antitumor and cytotoxity, hepatoprotective, antiasthma tic, bronchodilator, gastro protective and antisecretory effects. The role of vasopressin as the principal factor regulating renal water handling is supported by experience with ADH receptor antagonists. However, that experience also indicates the emerging significance of autocoids, and other synergistic factors, to affect ADH receptor/effector mechanisms and to modulate renal ADH responses. The anti-diuretic effects of ethanol extract were indicated by decrease in both water excretion and excretion of sodium and potassium. The active principles responsible for the anti-diuretic effects of the ethanol extract of this plant have not yet been elucidated but preliminary phytochemical analysis of the extracts revealed the presence of compounds such as phenolics and flavonoids. These compounds could act separately or synergistically to cause the anti-diuretic effect. On the above results, it can be suggested that the ethanol extract produces anti-diuretic effect with decrease in electrolyte concentration in urine. Further studies are necessary to identify and isolate the active constituents responsible for the anti-diuretic activity. These findings may provide a lead for further investigations of the overall pharmacological actions of *Ailanthus excelsa* in more appropriate model.

CONCLUSION:

In conclusion, from the above results, it can be suggested that the ethanol extract of leaves of ailanthus excelsa is an effective anti-diuretic activity, which supports the claim that the plant can be used anti-diuretic. The present study also provides basis for the traditional use of *Ailanthus excelsa i*n treatment of diabetes insipidus.

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