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Original Article

Biological active compounds with various medicinal values of Strychnos Nux-vomica – A Pharmacological summary

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ABSTRACT

Strychnos Nux-vomica Linn. is an Loganiaceae family and distributed in India, Srilanka, Southeast Asia and Northern America. Chief alkaloids of *Strychnos nux-vomica* are Strychnine and Brucine. It contains many bioactive compounds used as biopharmaceutical agent in the treatment of inflammation, joint pains , febrifuge, emmenagogue, purgative, stimulant, stomachic, aphrodisiac, antihelmentic, anaemia, asthma, bronchitis, constipation, diabetes, skin diseases, paralysis, nervous disorders , chicken pox fever, eczema, rheumatism, nervous disorders, arthritis, vomiting, digestive disorders, epilepsy, migraine headaches, menopause, anti-inflammatory, analgesic, antidepressant , antitumor, convulsant properties and also used as an antidote for snake poison.

INTRODUCTION

1. Introduction

Strychnos nux-vomica is a herbal plant which is available in India, Srilanka, Southeast Asia and Northern America used for therapeutic ailments [1]. The pantropical Strychnos genus comprises about 200 species and these can be subdivided into three groups of species: ne in Central and South America (at least 73 species) one in Africa (75 species), and one in Asia including Australia and Polynesia (about 44 species). Belonging to the Loganiaceae family, they are found as erect or climbing shrubs, lianas or trees [2,3]. The leaves are used for treating chronic wounds, ulcers and the root bark in treatment of cholera [4]. Ayurveda recommends use of *Strychnos nuxvomica* in purified form since time immemorial in treatment of various diseases [5] and also in folk medicine for alleviating inflammation and joint pains [6]. Different formulations of the plant are used in treatment of metabolic ailments [7]. The seeds of *Strychnos nuxvomica* are used as febrifuge, emmenagogue, purgative, stimulant, stomachic, aphrodisiac, antihelmentic [8] and also in treating anaemia, asthma, bronchitis, constipation, diabetes, skin diseases, paralysis, nervous disorders [9], chicken pox fever [10], eczema [11] and rheumatism [12]. The dried seeds are used as herbal remedies in traditional Chinese medicine for treatment of nervous disorders, arthritis and vomiting [13]. The whole plant is used for treating digestive disorders, epilepsy [14],

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migrane headaches and to treat problems related to menopause [15]. The plant possesses anti-inflammatory [16], analgesic [17], antidepressant [18], antitumour [19] and convulsant properties [20] and also used as an antidote for snake poison [21].

2. Chemical composition

Alkaloids are the highest biological active constituents in *Strychnos nux-vomica.* These Alkaloids are having the pharmaceutical activity and lethal properties controlled by *Strychnos nux-vomica* [22]. Chief alkaloids of *Strychnos nux-vomica* are Strychnine[22,23,24], Brucine, β-colubrine, Icajine [22,23], 16-Hydroxy-α-colubrine [22], Brucine-N-oxide , Strychnine-*N*-oxide [22,23], Vomicine [22,23,24], Novacine , Pseudostrychnine [22,23],Pseudo brucine[22], Isostrychnine, Isobrucine, Isobrucine-N-oxide, Isostrychnine-N-oxide [22,23], 2-Hydroxy-3-methoxystrychnine [22],4-*N*-hydroxymethylstrychnidin-17-acetic acid, 10,11-Dimethoxy-4-*N*-hydroxymethyl strychnidin-17-acetic acid [25].

3. Toxicity

Administration to mice, LD50 values of strychnine and brucine were determined to be 1.10 and 50.10 mg/kg, respectively [26].

4. Biological Activity

4.1 Antimicrobial Properties: The antibacterial screening of the extract was performed by determining the zone of inhibition using standard method [27]. The extract was tested for pathogenic bacterial strains of gram positive and gram-negative organism by disc diffusion method [28]. The microorganisms of gram-positive bacteria were *Staphylococcus aureus, Bacillus subtilis, Streptococcusfaecalis, Staphylococcus albus* and gram-negative bacteria were *Escherichia coli, Pseudomonas aeruginosa, Protieus vulgaris, Klebsiellaaero genes*. Previously, discs were dispensed onto the surface of the inoculated agar plate. Each disc was pressed down firmly to confirm complete contact with the agar surface. The discs were placed on the medium suitably apart and the plates were incubated at 5 °C for 1h to permit good diffusion and then transferred to incubator at 37°C for 24h. After completion of 24h, the plates were inverted and placed in an incubator set to 37 °C for 24h. Which was identified bark ethyl acetate solvent extract of Strychnos Nux-vomica has the antimicrobial activity[29].

4.2 Anticonvulsant activity: In a recent research study, reported that ethanolic extracts of Strychnos nux-vomica seeds reduced spontaneous motor activity and inhibited catalepsy. The seeds processed in milk exhibited marked inhibition of PTZ induced convulsions and maximal potentiation of hypnosis, and were the safest LD50 [30].

4.3 Anti-tumor effects: Major alkaloids present in *Strychnos nux-vomica* are effective against HepG2 cell proliferation. MTT assay was used to examine the growth inhibitory effects of the sealkaloids on human hepatoma cell line (HepG2).Brucine, strychnine and Isostrychnine revealed significant inhibitory effects against HepG2 cell proliferation [31].

4.4 Anti-amnesic activity: In an experimental study, *Strychnos nux-vomica extract* inhibited acetylcholinesterase activity in the hippocampus and frontal cortex. These findings clearly suggest that, loganin possess anti-amnesic activity that may hold significant therapeutic value in alleviating certain memory impairments observed in Alzheimer's disease[32].

4.5 Diabetes: Strychnos nux-vomica leaves were dried, powdered and extracted with chloroform ethyl acetate and methanol in the ratio of 1:10 (w/v) by repeated extraction and condensed by steam batch to obtain concentrated sample [33].This extract was used to screen the in vitro anti-diabetic activity. Extract Concentration 250, 500, 750 and 1000 (mg/ml) were used to find out in vitro anti-diabetic activity and activity were maximum at 1000

(mg/ml), this activity was 34.866 of % of inhibition [34].

4.6 Central Nervous System: Strychnine stimulates in all parts of the Central Nervous system and mainly the anterior horn cells of spinal cord causing greatly increased reflex excitability. Normal inhibition of motor cell stimulationis lost so that any slight stimulus suchnoise, light, or air breeze causes violent generalized muscle spasms. [35].

5. CONCLUSION

Strychnos-nux-vomica has a wide range of therapeutic values, it contains many bioactive compounds used in biopharmaceutical agent for various diseases and disorders. Potentially useful in Antimicrobial, Anticonvulsant, Antitumor activities and diabetes.

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