IJPSR (2023), Volume 14, Issue 1 **(Review Article)**

INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES AND RESEARCH

Received on 30 April 2022; received in revised form, 02 June 2022; accepted, 17 June 2022; published 01 January 2023

A BRIEF SCIENTIFIC EVIDENCE OF ETHNOBOTANICAL AND PHARMACOLOGICAL STUDIES OF *SOLANUM INDICUM* LAM.

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Keywords:

Solanum indicum, Antioxidants, Traditional Indian systems, Pharmacognostic research, Antimicrobial activity

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ABSTRACT: Poisonberry is the colloquial name for *Solanum indicum* Linn. It grows to over one meter in height and is thorny and densely branched. It is usually found in India's warmer regions, up to an altitude of 1500 meters. This important medicinal plant treats respiratory infections, skin infections, ulcers, dyspepsia, cough, and stomach discomfort in Ayurveda and Siddha, the Folk and Traditional Indian systems of medicine. The findings of evidence-based tests are compared to the folkloric use of *Solanum indicum* Linn. Despite being a rich source of solanine, one of the plant's most feared poisons, *Solanum indicum* has proved its value as a reservoir of antioxidants with hepatoprotective, anti-tumor, cytostatic, anti-convulsant, anti-ulcerogenic and anti-inflammatory properties. The evaluation examines whether or not proper scientific methods have been followed in developing experimental evidence supporting *Solanum indicum* traditional applications, including *in-vitro*, *in-vivo*, and clinical trials. The study's goal is to compile the most recent information on pharmacognostic research, medicinal purposes, chemical constituents, and other pharmacological effects. Solasodine, Solamargine, Solasonine, Solanine, and Solanidine were among the steroidal alkaloids and glycoalkaloids that researchers obtained. Several researchers have reported some pharmacological activity. Antioxidants, anthelmintics and antimicrobial activity, hepatoprotective, antioxidants, and antimicrobial activity.

INTRODUCTION: Traditional medicine remains the primary means of treating ailments for the vast majority of people in impoverished nations, including India, despite tremendous improvements in contemporary scientific medicine in recent years. The number of individuals who utilize complementary or alternative medicine is quickly growing across the world, including those with access to western treatment. The extent of medicinal plants' potential utility in medicine has broadened as our understanding of metabolic processes and plant impacts on human physiology has increased. We haven't been able to identify the earliest evidence of humans using plants for medical purposes.

Whether intentionally or inadvertently, it appears that man has been tinkering with nature for some time. Most of the accumulated knowledge regarding valuable plants was mostly gathered by ordinary people. When one is aware of the medical uses that thousands of wild plants have grown

QUICK RESPONSE CODE

DOI: 10.13040/IJPSR.0975-8232.14(1).187-97

This article can be accessed online on www.ijpsr.com

DOI link: http://dx.doi.org/10.13040/IJPSR.0975-8232.14(1).187-97

around us, the plant takes on a new meaning, a new value that transcends its aesthetic value, cooling shade, or pleasant perfume [1-2]. Nature has always been a top-notch pharmacy due to its vast array of plants demonstrated to have beneficial therapeutic characteristics. Through hundreds of years of trial and error, traditional cultures have collected a wealth of knowledge about herbal treatments. More significantly, the most important cures were passed down orally from generation to generation[3-4]. The global demand for plant-based products has increased. There is still much to learn in the future, despite substantial research into the use of medicinal plants in traditional medicine, scientific analysis, and identification of active phytochemicals and their effects [5].

Since ancient times, various medicinal plants have been used in India to treat various diseases. Ayurveda, Siddha, and Unani are examples of indigenous medical systems that have existed for millennia. Ayurvedic medications to cure various disorders have already made it to the market [6]. Around 70000 plant species are thought to have been employed for therapeutic reasons. India has almost 2500 medicinal plant species, Sri Lanka has roughly 1400, and Nepal has around 700 [7]. The potato family, which includes 96 genera and over 2300 species, is widely spread in the tropics and subtropics [8], with more than 1700 species belonging to the *Solanum genus* [9].

Medicinal plants have long been used to manufacture herbal remedies. Herbal medications can be made from any component of the medicinal plant, including the leaves, stems, flowers, roots, bark, seed, and so on. According to the World Health Organization, about 80% of the world's population still uses herbal medications such as teas, decocts, or extracts prepared using solvents such as water, milk, or alcohol to treat various ailments [10-11]. *Solanum indicum Lam* In the Ayurvedic system of medicine, it is known as Badi Bhatkataiya (Hindi) and 'Brihati' (Sanskrit). It is used as a solo medicament or in combination with other treatments. Bronchitis, asthma, dry cough, rhinitis, dysuria, leucoderma, sexual problems, sleeplessness, heart weakness, and pruritis all benefit from the seeds, roots, leaves, and berries [12-13]. It's a prickle-covered perennial with a lot of branches. The plant thrives predominantly in the country's warmer regions, up to an altitude of 1500 meters [14]. In Ayurveda, *S. indicum* is a component of a very popular formulation known as Dashmula, recommended for post-natal care to avoid secondary complications. Acharya Charaka placed the plant into Kanthya (group of herbs used in throat disorders), Hikkanigrahana (group of herbs used in treating hiccups), Shothahara (anti-inflammatory group of herbs), Angamarda Prashamana (Pain relieving group of herbs) mahakashayas [15] while Acharya Susuruta placed the plant into Laghupanchmula and Vidharigandhadi group [16]. It is a perennial under shrub with numerous branches with prickles on the leaves' tips. The plant may be found mostly in warmer regions of the country, up to a height of 1500 metres above sea level [17-22].

The plant is densely branched, widely distributed, and exceedingly thorny under shrub that grows to a height of 0.3-1m. Its leaves are simple, big and oval, sub-entire, sinuate, or lobed, sparsely prickly on both sides, with a cordate base that is frequently uneven in size. The flowers are blue and born in axillary cymes that are stellately hairy, and the peduncles are also stellately hairy. The plant, according to Acharya Charaka, belongs to the Kanthya (group of herbs used in treating throat disorders), Hikkanigrahana (group of herbs used in treating hiccups), Shothahara (anti-inflammatory group of herbs), and Angamarda Prashamana (pain-relieving group of herbs) mahakashyas, whereas the plant, according to Acharya Sushruta, belongs to the Laghupanchmula [23-24].

Vernacular Names: In India, it is known by its various vernacular names, the most commonly used ones are Vanabharata, Kateli (Urdu), Badikateri Heggulla, (Kannad), (Hindi), Kirugullia, Cheru Vazhuthina, Putirichunda (Malyalam), Kandiarivaddi, (Punjab) Tella Mulaka (Telgu) [14].

Taxonomy Taxonomical classification of *S. indicum* is as follows:

Kingdom	Plantae
Division	Magnoliophyta
Phylum	Tracheophyta
Class	Magnoliospida
Order	Solanales
Genus	Solanum
Species	indicum

Botanical Description:

Distribution: Tropical India, Sri Lanka, Malaya, China, and the Philippines, among other regions, are endemic to this species. It may be found in a range of habitats throughout India's tropical regions, including waste fields, roadside ditches, and other sites, with elevations ranging from sea level to roughly 1500 meters above sea level [25].

Morphological Characters *S. indicum*: It's a 0.3 to 1.5 meter tall understory shrub. The stems are densely branching, thorny, and covered with compressed, thick, frequently re-curved prickles. The leaves are oval, measuring 3.5 to 15 centimeters long by 2.5 to 8 centimeters broad, with lobed or pinnatifid edges, blunt or pointy tips, pointed bases, and stellately woolly underneath. Blue flowers appear in extra-axillary racemes. The fruit is golden and spherical, with a diameter of around 1.5 cm. Root well developed, long, ribbed, woody, cylindrical, pale yellowish-brown, 1-2.5 cm in diameter, several secondary roots and their branches present, surface rough owing to longitudinal striations and root scars, fracture, short and splintery; no discernible fragrance and taste [26] The numerous parts of the plant are depicted in **Fig. 1.**

FIG. 1: EXOMORPHIC FEATURES OF *SOLANUM INDICUM* LINN

Traditional Applications: The root and the fruit have an intense, bitter flavour. They are warming, digestive, astringent to the intestines, anthelmintic, eliminate foulness from the mouth, advantageous in cardiac difficulties, useful in leucoderma, fever, asthma, discomfort bronchitis, vomiting, and itching, according to Ayurvedic schools of medicine. They can also help with a range of other issues. The roots can help with odontalgia, dyspepsia, flatulence, colic, verminosis, diarrhoea, leprosy, strangury, cough, asthma, fever, skin illnesses, respiratory and cardiac disorders, ulcers, and toxic affections, among other things. The root is useful in both difficult parturition and toothache therapy. It's also used to treat fevers, worm infections, and colic. It is used to treat coughs and catarrhal illnesses and is considered an expectorant. It is suggested to be used if you have dysuria or inchuria [27-29, 14].

Ethnomedical Uses: This herb is used as a heart tonic, an astringent, a carminative, and an immunomodulator in traditional Chinese medicine, as well as in clinical medicine to treat weakness, nausea, and bronchospasm [30]. Fruits of *S. indicum* are said to stimulate and strengthen the heart, as well as relieve edoema. It is also useful for treating dysuria and urinary calculi [31]. Crushed leaves mixed with water are ingested in Bangladesh's Dhamrai Sub-district in the Dhaka District to alleviate hypertension and are also applied topically to bite wounds [32]. To cure debility, Bangladesh's Santal Tribe, who dwell in Thakurgaon District, mix the bark from the root of *S. indicum* with the bark of *Alstonia scholaris* [33].

The tribal people of Irulas in the Hasanur Hills, an area of the Southern Western Ghats, prepare the unripe fruits and eat them with their meals to get rid of tapeworms. The fruits of *S. indicum* are prepared as a vegetable by boiling them in water and draining the excess water by Oraon tribal communities in Jharkhand's Latehar district, who have a significant amount of traditional knowledge of edible weeds from crop fields and edible wild plants from forests and hills. Blood purifiers have been found in fruits and plants that have been cooked in curries or roasted [34]. Leaves can also be used to treat chronic sinusitis, migraine, asthma, and headache [35-36].

Root powder of *S. indicum* coupled with *S. surattense* is given with curd for two weeks to cure kidney stones and urinary tract infection [37]. *S. indicum* is used to treat gas and intestinal colic symptoms and asthma. In Rajasthan folk and traditional medicine, the root of *S. indicum* is used for aphrodisiac properties [38]. In the Ariyalur District in Tamil Nadu, unripe fruits of the *S. indicum* shrub are cooked and eaten with meals to

remove tapeworms. Pickles are made from these fruits and they're also good for treating digestive problems [39]. *S. indicum* is used as a vegetable (green salad) in Arunachal Pradesh to treat intestinal parasitic worms, including round and tapeworms. Its leaves are commonly used as growth supplements in fermentation starting cultures containing brewer's yeast. Round and tape worms and other intestinal parasitic worms are treated with *S. indicum* [40]. In Assam and Thailand, the fruits of the *S. indicum* tree are consumed [41]. In Thailand, *S. indicum* is used medicinally as a vegetable and as a significant ingredient in anticarcinogen preparations [42]. *S. indicum* L. is a traditional medicine used in Taiwan to cure toothaches, ascites, edoema, and wound infection, among other diseases. The fruit is used to cure leukoderma, pruritus, and bronchitis, and the leaves' juice is used with fresh ginger juice to relieve nausea and vomiting [43]. This plant, which grows in southern China, has been used as an analgesic in Chinese traditional medicine for toothaches, rhinitis, and breast cancer discomfort. It's also used to treat wounds and speeds up healing **Table 1** [44].

TABLE 1: TRADITIONAL USES OF *SOLANUM INDICUM LINN.*

S. no.	Plant parts	Uses mention in Literature	Ref
1	Fruits/Berries	Fruit juice beneficial in alopesia. Dried powder given to children to expel worms among tribes of Orissa. In cases of loss of appetite, bitter stomachic	45, 45
2	Leaves	Juice of leaves with ginger stops vomiting. Rubbed with sugar, used as an external application to relieve itch	46, 47
3	Roots	Prescribed in cases of dysuria & inchuria. Pounded roots used for nasal ulcers Facilitates child-birth. Employed in difficult parturition	48-49 45, 45, 46
4	Whole Plant	Antipyretic Beneficial in catarrhal affections, asthma, dry coughs, cardiac troubles, dropsy, relieves toothache, worm complaints, antidiarrheal & antiulcerogenic	50-54

Phytochemicals: Phytoconstituents of various types Different parts of the plant were found to include steroidal saponins, steroidal glycosides, sesquiterpenoids, sesquiterpenoids, hydroxyl-coumarins, phenolic compounds, coumarins, coumarinolignoids alkaloids, saponin, fatty acid, glycerides of the oil, polysaccharide, and triterpenes. Fruit has a total alkaloid concentration ranging from 0.2 to 1.8 percent (dry weight basis); Jammu and Kashmir plants produce fruits with a high alkaloid content (total alkaloid 1.8 percent) [55]. The isolated phytochemicals are listed in **Table 2.**

TABLE 2: ISOLATED PHYTOCONSTITUENTS FROM *S. INDICUM*

Plant parts	Class of phytochemical presents	Constituents	References
Fresh Fruits	Steroidal saponins	Indio sides A	56
"	Steroidal saponins	Indiosides B	57
"	Steroidal saponins	Indiosides C	56
"	Steroidal saponins	Indiosides D	56
"	Steroidal saponins	Indiosides E	56
"	Steroidal glycoside	Indiosides F	56
"	Steroidal glycoside	Protodioscin	56
"	Steroidal glycoside	Carp sterol	56
"	Steroidal glycoside	Isoanguivine	56
"	Steroidal glycoside	Solanidine	56
"	Steroidal glycoside	Solasodine	56
	Steroidal glycoside	Solamargine	56
Root	Sesquiterpenoids Sesquiterpenoids	Solavetivone	58
"	Hydroxycoumarins	Solafuranone	58
"	Phenolic compounds	Scopoletin	58
"	Phenolic compounds	N-p-trans-Coumaroyltyramine	58
"	Coumarins	N-Trans-Feruloyltyramine7-Hydroxy-6,8-	58
"		Dimethoxy-3- (40-Hydroxy-30 Methoxyphenyl)- Coumarin	59
Seed	Coumarins	Isofraxidin	59
"	Coumarins	Fraxetin	59
"	Coumarinolignoids alkaloids	Indicumin A	59

“	Coumarinolignoids alkaloids	Indicumin B	59
“	Coumarinolignoids alkaloids	Indicumin C	59
“	Coumarinolignoids alkaloids	Indicumin D	59
“	Coumarins	Indicumin E	59
“	Bicoumarins	Arteminorin A	59
Seed	Glycerides of the Oil	Trilinolein	60
“	Glycerides of the Oil	Oleodilinolin	60
“	Glycerides of the Oil	Dioleolinolin	60
“	Glycerides of the Oil	Palmitodilinolin	60
“	Glycerides of the Oil	Stearodilinolin	60
“	Glycerides of the Oil	Arachidodilinolin	60
“	Glycerides of the Oil	Palmitooleolinolin	60
“	Glycerides of the Oil	Stearooleolinolin	60
“	Glycerides of the Oil	Arachidooleolinolin	60
“	Glycerides of the Oil	Palmitodiolein	60
“	Glycerides of the Oil	Stearodiolein	60
“	Glycerides of the Oil	Arachidiolein	60
Whole Plant	Fatty acid	Palmitic acid	61
	Fatty acid	Stearic acid	61
	Fatty acid	Arachidic acid	61
	Fatty acid	Oleic acid	61
	Fatty acid	Linoleic acid	61
Miscellaneous	Polysachharide	Maltose	61
	Polysachharide	Melibiose	61
	Polysachharide	Sucrose	61
	Polysachharide	Raffinose	62
	Triterpenes	β-Sitosterol	63
	Triterpenes	Daucosterol	64

Phytopharmacological Attributes:

Antioxidant Activity: In order to test the antioxidant activity of an ethanolic extract of berries from *S. indicum*, researchers used an in vitro DPPH (1, 1-Diphenyl-2-Picryl hydrazyl radical) radical scavenging approach. The extract demonstrates the maximum degree of inhibition (70.0070.841 percent) at a concentration of 200 g/Ml [65].

According to the results of another study, IC_{50} values for ethanolic and aqueous extracts of berries were calculated using the DPPH Scavenging Assay and the -carotene/linoleate model system. In both experiments, the ethanolic extract was shown to be substantially more effective (IC_{50} 37.221.3) in the alpha-carotene test, while aqueous extract was found to be much more effective (IC_{50} 21.830.84) in the DPPH assay. This suggests that the fruit may serve as a useful source of natural antioxidants in the diet [66].

When fruit's antioxidant capacity is investigated using the FRAP test and the Folin-Ciocalteau assay, N'Dri *et al.*, 2010 discovered that the antioxidant potential rises as the fruit ripens [67]. This might be due to the fact that the content of -carotene in red berries rose by 60 and 20 times when compared to green and yellow berries, respectively. The quantity of ascorbic acid discovered in green and yellow berries was found to be equal, while it was found to be lower in red berries. The overall polyphenol content of the fruit did not vary as it matured. Still, the concentrations of caffeoylquinic acids, caffeic acid, flavonol glycosides, and naringenin changed, while the quantities of p-coumaric acid and feruloylquinic acids remained constant. According to the findings of this study [68], the ethanolic extract of *S. indicum* berries significantly decreased the formation of peroxides in a linoleic acid emulsion system in a dose-dependent manner. The capacity of aqueous and ethanolic extracts of *S. indicum* leaves to scavenge DPPH has also been demonstrated.[69]

Anthelmintic Activity: A Caenorhabditis elegans bioassay was used to test the anthelminthic activity of butanol and aqueous fractions of methanolic extract of *S. indicum* fruits. The proportion of dead nematodes was evaluated after 24 hours of incubation. The fractions eluted from DEAE cellulose showed anthelmintic activity in four separate peaks, according to the results of the C.

elegans experiment. At concentrations of 0.1, 0.28, 0.48 and 0.85 M NaCl, those peaks were eluted, respectively. The greatest mean death percentages reported at each peak were 53, 59, 37, and 61 percent, respectively, compared to the negative control. According to the study, SI fruit appears to include at least four anthelmintic compounds [70].

Antibacterial Activity: An ethanolic extract of *S. indicum* leaves was reported to have antibacterial action against *Corynebacterium diphtheriae*, Pseudomonas spp., and Salmonella typhimorium [71]. Antibacterial activity was demonstrated against *Staphylococcus aureus*, Bacillus cereus, and Escherichia coli, with pseudomonas extracts demonstrating antibacterial activity in chloroform, acetone, and ethanol extracts. Antimicrobial characteristics are also present in the fruits of *S. indicum*. Aqueous and ethanolic extracts were reported resistant to *Listeria innocua*, *S. aureus*, *E. coli*, and *P. aeruginosa* strains. In terms of activity, the ethanolic extract surpassed the aqueous extract. In a concentration-dependent manner, the aqueous part of the ethanolic extract of *S. indicum* berries inhibited *P. aeruginosa*, *P. fluorescens*, and *P. syringae* bacteria. The aqueous fraction examined included flavonoids, carotenoids, and saponins [71].

Antimicrobial Activity: Extracts (produced using water, petroleum ether, chloroform, and ethanol) of dried fruits of *Solanum indicum* (collected in Madurai, Tamil Nadu, and India) were shown to have antibacterial activity against both Gram-positive and Gram-negative bacteria when compared to chloramphenicol.

When evaluated using the disc diffusion method, the chloroform and methanolic extracts exhibited substantial efficacy against *Bacillus subtilis*, *Escherichia coli*, *Staphylococcus aureus* and *Klebsiella pneumoniae*. To test the antibacterial potentials of *Solanum indicum* against microorganisms, researchers employed ethanol, methanol, acetone, petroleum ether, and water to extract several bioactive components from fresh leaves using both hot and cold techniques. Fresh *Solanum indicum* leaves mixed with ethanol and methanol had significant antibacterial action against Bacillus spp., *Corynebacterium diphtheriae*, *Streptococcus spp*., *Pseudomonas spp*., and *Salmonella typhimorium* [72].

Anti-Inflammatory Activity: *Solanum indicum* L. is used to treat inflammation, toothache, ascites, edoema, and wound infection in Taiwanese traditional medicine. The alkaloidal glycoside solanine is plentiful in the plant. A 43-year-old man developed polyuria and polydipsia after eating seven doses of *Solanum indicum* L. concentrated solution over two weeks. A water deprivation test and a low serum anti-diuretic hormone level confirmed the diagnosis of central diabetes insipidus. As a result, large dosages of *Solanum indicum* L. have been linked to central diabetes insipidus [73].

Oral doses of an extract of the root of *Solanum indicum* were given 60 minutes before the injection of carrageenin in one set of tests. The negative control carrageenin group had a 78 percent increase in paw volume, whereas the normal phenylbutazone group saw a 35 percent raise. When compared to the negative control group, paw volumes were lower in the *Solanum indicum* extract group at all doses but higher in the phenylbutazone group. A fruit extract of *Solanum indicum* (Indian gooseberry) was employed in another experiment. When all doses of *Solanum indicum* fruit extract were provided [74], there was no change in paw volume between the negative control group and the conventional phenylbutazone group [74].

Antiplasmodial Activity: The antiplasmodial potential of ethanolic fruit extract against the chloroquine-resistant Plasmodium falciparum FcB1 strain was determined in vitro when it was tested. The compound's cytotoxicity was assessed using human MRC-5 (IC_{50} >50g/mL) and rat L-6 (IC_{50} >50g/mL) cell lines. When tested against parasites, plant extracts showed significant anti-malarial activity (IC_{50} = 41.3 7.0 g/Ml) [75].

Hepatoprotective Activity: In male Wistar rats, the hepatoprotective profile of *Solanum indicum* Linn fruit extract, in a 10% suspension stabilized with 1% acacia gum, was assessed by exposing them to a single dose of paracetamol suspended in a 40% sucrose solution and evaluating their reactions. The animals were slain once the experiment was finished, and blood and liver samples were taken for biochemical and histological analysis. Despite the lack of evidence

of a hepatoprotective benefit, when *S. indicum* medication was delivered, liver enzymes, which reflect the extent of liver damage, were reduced by 18% as compared to the paracetamol control group [76].

Anticancer Activity: Several Indiosides (A to E) isolated from *S. indicum* have been demonstrated to have a dose-dependent inhibitory effect on Bel-7402 cell growth and the capacity to cause cell death via the mitochondrial pathway. Solavetivone-1, a chemical discovered in S. indicum, has been reported to be cytotoxicity to OVCAR-3 cells [77].

Laxative Action: In male Wistar albino rats, the laxative activities of a crude methanolic extract of *S. indicum* fruits were examined. Weighing the faeces matter after 8 and 16 hours of therapy with the medication was used to measure the medicine's laxative effect. The extract had a significant laxative effect, which was dose-dependent. The MeOH extract treated groups (250 and 500 mg/kg p.o.) exhibited substantially higher feacal output (133.32 1.136 mg and 149.01 1.835 mg, respectively) after 8 hours of treatment. The test drug increased faeces output after 8-16 hours at both the conc. (258.8 32.045mg) and supplementary dosages (293.66 2.219mg).[78]

Cardiotonic Activity: Using the heart of a frog, the cardiotonic activity of a methanolic extract of the fruits of *S. indicum* (5 and 10 mg/mL) was examined. According to the findings, the extract has a substantial cardiotonic effect that is dose-dependent. When MeOH extract is present at a concentration of 5 mg/ml, the force of contraction increases somewhat, but the heart rate does not alter much. When tested, extract at a concentration of 10 mg/mL generates a significant increase in contraction force and a moderate increase in heart rate. Despite having a broad therapeutic index, the plant extract has not been demonstrated to produce cardiac toxicity at higher doses of up to 5 gm/mL [79].

CNS Action: An extract of the herb *Solanum indicum* dissolved in petroleum ether was used by the researchers. According to the researchers, the extract included alkaloids having psychoactive characteristics. When albino mice were given an IP dose of 40mg/kg body weight, the researchers wanted to see if any changes in their overall behaviour. After being administered an extract of *Solanum indicum*, which caused them to become drowsy, the animals had drooping heads and remained quiet for one hour. Aside from that, when exposed to external stimuli, the mice showed no symptoms of being startled [80]. Another research looked at the effects of Abana, an Ayurvedic herbomineral preparation, on mice's memory and cholinesterase activity in the brain.

The active component in the formulation was *Solanum indicum*, which was utilized to explore the effects of Abana on memory and brain cholinesterase activity. The raised plus maze and passive avoidance apparatus were utilized throughout the investigation as exteroceptive behavioral models for measuring memory. In this study, diazepam and scopolamine were utilized as interceptive behavioral models. According to the findings, abana (50, 100, and 200mg/kg, orally) enhanced memory scores in both young and elderly mice in a dose-dependent way. It was also demonstrated to reverse the amnesia caused by the administration of scopolamine (0.4mg/kg, intraperitoneally) and diazepam (0.4mg/kg, intraperitoneally). Abana was discovered to have an unanticipated effect on brain cholinesterase activity when taken orally for 15 days. It may prove to be a good therapy for Alzheimer's disease in the future, according to the authors [80].

Gastrointestinal Action: The anti-ulcerogenic activities of the methanolic extract of the fruit of *S. indicum* var. distichum were investigated in rats that had ulcers caused by aspirin and ethanol. The extract (750 mg/kg) protects the stomach mucosa from the negative effects of aspirin and ethanol and helps heal ulcers. Its antioxidant capability was most likely responsible for the outcome, as evidenced by the restoration of antioxidant markers such as glutathione, SOD, GR, CAT, and LPO [81].

Anti-hypertensive Activity: In both normotensive and hypertensive (N(W)-nitro-L-arginine methyl ester (LNAME) treated rats, the effects of a standardized ethanolic extract of the *S. indicum* ssp. distichum fruit (containing > 0.15 percent chlorogenic acids) on blood pressure was examined. A four-week extract (30 mg/kg) therapy showed no effect on blood pressure in

normotensive rats. However, after receiving L-NAME, the animal does not develop hypertension [82].

Laxative: A crude methanolic extract of *S. indicum* fruits was evaluated for laxative effects in male Wistar albino rats. The laxative action was determined by weighing the stool matter after 8 and 16 hours of medication administration. The extract has a significant laxative effect in a dose-dependent manner. MeOH extract treated groups (250 and 500 mg/kg p.o.) showed increased feacal output after 8 hours of treatment (133.321.136 and 149.011.835 mg, respectively). The control (258.832.045, 293.662.219mg) and the test drug increased faeces output after 816 hours [83].

CONCLUSION: Plants are used by all members of the human race for healing, survival, medicine, and nourishment in every corner of the world. Medicinal herbs are still useful in this area in both developing and developed countries. They might help researchers find new phytomedicines such steroidal saponins, sesquiterpenoids, hydroxycoumarins, phenolic compounds, coumarins, coumarinolignoids alkaloids, saponin, fatty acids, oil glycerides, and triterpenes. Herbal medicine has fewer adverse effects and can play an essential part in the promotion of sustainable health development; therefore, translational research to examine the medicinal potential of plants related to indigenous knowledge to enhance human health is becoming more widespread. The medicinal potential of plants related to indigenous knowledge to help human health is being investigated through translational research. Antibacterial, antioxidant, anthelmintic, antiplasmodial, hepatoprotective, anticancer, laxative, cardiotonic action, CNS depressive, and antihypertensive activity are only a few of the pharmacological and biological qualities of plants belonging to the genus Solanum. Phytomolecules found in these plants are thought to be responsible for many biological functions. A flurry of research has been conducted to look into the traditional uses of Solanum species and each one has discovered evidence to back up the traditional claims. However, many traditional applications have yet to be evaluated, which is a source of concern. The authors used relevant literature to construct a complete assessment of the ethnobotanical uses, phytochemical profiles, and biological activities of the *S. indicum*. The bioactivities of *S. indicum* and their active phytoconstituents, which have been isolated from various plant sections of Solanum species, have also been shown to have therapeutic potential, indicating that these species of the genus Solanum may have future medicinal applications.

ACKNOWLEDGEMENT: The author acknowledges the support of Dr. APJ Abdul Kalam University in these manuscripts.

CONFLICTS OF INTEREST: The authors report no conflict of interest.

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How to cite this article:
Akaram M and Dubey B: A brief scientific evidence of ethnobotanical and pharmacological studies of *Solanum indicum* lam. Int J Pharm Sci & Res 2023; 14(1): 187-97. doi: 10.13040/IJPSR.0975-8232.14(1).187-97.