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Anti Alzheimer Activity Of Fraction Of Solanum Xanthocarpum Fruit Extract

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Abstract: Alzheimer's disease is a neurological condition that typically affects people who are old and is characterized by the slow loss of neurons to the brain. The hippocampus area of the brain is the location of senile plaques. These plaques include deposits of beta-amyloidal protein, which has been associated with the most common form of dementia. The use of herbs has significantly contributed to the improvement of health all over the world. Even though much progress has been made in the field of contemporary medicine over the course of the last several years, plants continue to play an important part in the field of healthcare. Using mice that have been given Alzheimer's disease (AD), the purpose of the present experiment is to evaluate Solanum xanthocarpum (SX) in natural environments. In traditional medicine, Solanum xanthocarpum, which belongs to the family Solanumaceae, has been used for the treatment of a wide variety of infectious and degenerative disorders. In order to investigate the potential anti-Alzheimer's disease properties of solanum xanthocarpum, the present research employs both in vitro and in vivo analysis techniques.

Introduction: The primary cause of dementia, Alzheimer's disease is rapidly becoming one of the most costly, fatal, and burdensome illnesses of our century. Alzheimer's disease is also the leading cause of dementia. Alzheimer's disease (AD) is a neurological condition that worsens with time and is the most common cause of dementia when it affects people who are old [1]. The elderly are more likely to have functional incapacity as a result of Alzheimer's disease. Progressive memory loss and functional impairment are two of the most common symptoms of Alzheimer's disease (AD). ADHD has repercussions not just for the person but also for their family and society as a whole [2]. According to the Global Burden of Disease categorization system, Alzheimer's disease was ranked as the fourth most common cause of death among premature individuals in 2016, and it was ranked as the sixth most burdensome illness. Delusions, misperceptions, mood problems, and behavioral disruptions are some of the behavioral and psychological symptoms of dementia (BPSD) that patients with Alzheimer's disease (AD) experience [3]. As a result of the presentation of BPSD, the strain placed on caregivers is increased. The amount of informal care that patients with Alzheimer's disease or other forms of dementia need each month is around 170 hours, which is a twofold increase compared to those who do not have dementia. As a result of the enormous care load that Alzheimer's disease (AD) imposes, families and society as a whole are subjected to physical, psychological, and financial repercussions [4]. Alzheimer disease is defined by neurodegeneration that occurs gradually and gradually progresses, which is caused by the loss of neuronal cells. Several recognized risk factors are related with Alzheimer's disease, which is a complex disorder. The most important aspect is age, with increasing age being the major contributor to the problem. It is well acknowledged that cardiovascular disorders (CVD) are substantial risk factors for Alzheimer's disease [5]. Both the chance of getting Alzheimer's disease and the risk of dementia brought on by strokes or vascular dementia are increased as a result of their presence. CVD is becoming more widely acknowledged as a modifiable risk factor for Alzheimer's disease. A severe head injury, depression, cardiovascular and cerebrovascular illness, a greater parental age at birth, smoking, a family history of dementia, and elevated homocysteine

levels are some of the other possible risk factors for Alzheimer's disease [6]. There are a number of variables that have been found that have the ability to prevent the development of Alzheimer's disease. Higher education, the use of estrogen in women, anti-inflammatory medications, leisure activities such as reading or playing musical instruments, keeping a nutritious diet, and conducting aerobic exercise on a regular basis are some of the factors that contribute to this phenomenon [7]. The pathological manifestation of Alzheimer's disease is defined by the buildup of aberrant neuritic plaques and neurofibrillary tangles in the brain. When these pathogenic alterations occur, they are followed by a loss of neurons, namely cholinergic neurons in the neocortex and the basal forebrain. The illness known as Alzheimer's disease is one that rapidly worsens over time. One of the most common comorbidities among individuals with Alzheimer's disease is depression, which makes the management of their illness even more difficult. Changes in mood, sleep difficulties, social disengagement, and trouble focusing are some of the common symptoms of depression that are known to occur in people with Alzheimer's disease [8]. In the latter stages of Alzheimer's disease, agitation and delirium, including sundowning, are often seen symptoms that provide difficulties for both patients and the caregivers who are caring for them. Managing these symptoms is very necessary in order to guarantee the safety and comfort of those who have Alzheimer's disease. Furthermore, the use of antipsychotic drugs for the purpose of treating these disorders has been linked to an elevated death rate in addition to other unfavorable consequences. Senior citizens who have Alzheimer's disease are more likely to have physical complications, such as fever and infections, especially those that affect the respiratory and urinary systems [9]. They may get aspiration pneumonia as a result of difficulty swallowing, which would further complicate their existing health condition. The Solanum xanthocarpum Schrad. & Wendl plant, which belongs to the family Solanumaceae, is a perennial herb that may be found growing wild in several regions of India. You may hear it referred to as Kantakari or Bhatkatiya in the vernacular. A calyx that is expanded surrounds the fruit, which is a berry that is either yellow or has white green stripes. Although fruits may be consumed, the indigenous people of Manipur, India, utilize them as a kind of traditional medicine to cure a variety of illnesses. Unripe fruits of S. xanthocarpum (Sx) that have been cooked and used as a vegetable by the Irula tribes of the Hasanur Hills in Tamil Nadu, India, have a long history of consumption. Fruits and seeds are the primary sources of nutrition for the Kattunaikka, Paniya, and Kuruma tribes who live in the Wayanad area of Kerala [10]. When it comes to the treatment of a wide variety of disorders that are prevalent in different regions of India, traditional healers believe fruits to be a very beneficial herbal substance. It is widely known that Sx is used for medical purposes in Ayurveda. Using experimental mice, the objective of this research is to investigate whether or not the fruit extract of Solanum xanthocarpum has any potentially anti-amyloid effects.

Matrial and methods:

Preparation of animals: The animals were randomly selected, marked to permit individual identification, and kept in their cages for at least 5 days prior to dosing to allow for acclimatization to the laboratory conditions. As with other sequential test designs, care was taken to ensure that animals were available in the appropriate size and age range for the entire study. Animals were fasted prior to dosing. The food but not water was withheld the previous afternoon (16- 18 hours). Following the period of fasting, the animals were weighed. The fasted body weight of each animal was determined and the dose was calculated according to the body weight of animals considering that each one would receive a 2000 mg/kg body weight limit dose. Animals were observed individually at least once during the first 30 minutes after dosing, periodically during the first 24 hours (with special attention given during the first 4 hours), and daily thereafter, for a total of 14 days. The duration of observation is determined by the toxic reactions and time of onset and length of recovery period, and may thus be extended when considered necessary. The times at which signs of toxicity appear and disappear are important, especially if there is a tendency for toxic signs to be delayed. All observations were systematically recorded with individual records being maintained for each animal. Observations included changes in skin and fur, eyes and mucous membranes, and also respiratory, circulatory, autonomic and central nervous systems, and somatomotor activity and behaviour pattern. Attention was also directed to observations of tremors, convulsions,

salivation, diarrhoea, lethargy, sleep and coma [11].

Extraction and isolation of the compounds from Solanum xanthocarpum: Methanol extract (200g) was partitioned between ethyl acetate and water. The ethyl acetate soluble portion was concentrated by evaporation and fractionated by silica gel column chromatography (Merck 200 mesh) with n-hexane– ethyl acetate mixtures of increasing polarity as eluent to yield three fractions. Fraction 1 elute with (n-hexane: ethyl acetate 80: 20), Fraction 2 (n-hexane: ethyl acetate 40: 60), and Fraction 3 (n-hexane: ethyl acetate 10: 90). Fraction 1was rechromatographed on a silica gel column chromatography eluting with n-hexane–EtOAc (50: 50) to yield compound 1. Fraction 2 was rechromatographed on silica gel using n-hexane–EtOAc (1: 2) to yield two subfractions; sub-fractions 1 and 2. Subfraction 2 was showed single spot on TLC and yield compound 2. The structures of the isolated compounds were confirmed by 1 H NMR and mass spectra.

Anti-alzheimer Activity

Experimental protocol for Anti-alzheimer Activity: The extracts and standard drugs were suspended in distilled water using tween 20 as suspending agent for experimental purpose. Suspension of distilled water and tween 20 was used as solvent throughout the study protocols. The solvent, test samples and standard drugs were administered by oral route based on dose and corresponding body weight of the animals by using feeding needle. The animals either sex were dividing into groups for extracts for biological evaluation of Anti-alzheimer activity. Each group consists of six animals. The following dosage regimens with respective groups were given for extracts and fractions throughout the study [12].

Table 1: Experimental protocol for Anti-alzheimer Activity of fruits of Solanum Xanthocarpum

Normal Control	received 1% tween solution (5ml/kg)
Negative control (SC)	Scopolamine
Positive Control	Standard drugs (Piracetam 100 mg/kg) vary according to model
MESX 100	Methanol extract of Solanum Xanthocarpum (MESX 100 mg/kg)
MESX 200	Methanol extract of Solanum Xanthocarpum (MESX 200 mg/kg)
AESX 100	Aqueous extract of Solanum Xanthocarpum (AESX 100 mg/kg)
AESX 200	Aqueous extract of Solanum Xanthocarpum (AESX 200 mg/kg)
Compound 1	Isolated compound 1 (10 mg/kg)
Compound 2	Isolated compound 2 (10 mg/kg)

The treated animals were under observation for behavioural changes if any, at 30 minutes interval in the first hour and at one hour intervals for next 4 h for the following parameters

General behavioral methods: Evaluation of general behavioural profile was performed by the method of Dixit and Varma (1976). Chlorpromazine (5mg/kg body weight) as standard drug. The treated animals were under observation for behavioural changes if any, at 30 minutes interval in the first hour and at one hour intervals for next 4 h for the following parameters.

Morris Water Maze Test: The apparatus consisted of a circular pool (45 cm in height and 100 cm in diameter) with a featureless inner surface. The pool was filled with opaque water (maintained at 22 ± 2 °C) to a height of 30 cm and was divided into four quadrants of equal area which were marked as I, II, III and IV. There was a platform (29 cm × 6 cm) placed one centimeter below the level of water at the center of one of the four quadrants (the target quadrant). The position of the platform was unaltered throughout the duration of the experiment. The test was commenced on day 10th of the treatment period when the rats were allowed to swim for 120 s without the platform in order to acclimatize. During the next four consecutive days, each animal received four learning trials of 120 s with an intertrial interval of 60 s. For each learning trial the rat was placed in the water facing the pool wall diagonally opposite to the quadrant in which the platform was kept. The time taken by the animal to locate the submerged platform was recorded as the escape latency time for each trial. If any of the animals were unable to locate the platform within 120 s, they were directed to the platform and allowed to rest there for 60s and in this case the escape latency time was recorded as 120 s. These sessions were recorded as the hidden platform trials or acquisition test. On day 15 (24 h after the final learning trial), the platform was removed from the pool and they were subjected to a probe trial session to assess memory retention. Each rat was placed into the water diagonally opposite the target quadrant, and for 60 s it was allowed to swim and find the quadrant in which the platform was previously placed. The time spent by the animal in the target quadrant was recorded [13].

Novel Object Recognition Test: Object recognition was performed in a simple box, with or without a transparent wall. The procedure consists of three different phases: a habituation phase, an acquisition phase and a retention phase. On the first day (habituation Phase), rats were individually subjected to a single familiarization session of 10 min. They were introduced to the empty area to become familiar with the apparatus. On the 2nd day (acquisition phase), animals were subjected to a single 10-min session, during which floor- fixed two objects (A and B) were placed in a symmetric position in the central line of the area,10cm from each and 8 cm from the nearest wall (each object occupies approximately 5 cm space by its size). The two objects, made of the same material with a similar colour and smell, were different in shape but identical in size. Rats were allowed to explore the objects in the open field. The exploration time on each object was shown (as seconds) to indicate the exploring activity of rats. On the 3rd day (retention phase), rats were allowed to explore the open field in the presence of two objects: the familiar object A and a novel object C in different shapes but in similar colour and size (A and C). A recognition index (for retention session), calculated for each mouse, were expressed as the ratio Recognition index (RI) = Time exploring novel object/ (Time exploring novel object + Time exploring familiar object) × 100% [14].

Biochemical Test

Preparation of brain samples: After the assessment of learning and memory paradigm in scopolamine-induced amnesia, subjects from each group were autopsied using carbon dioxide; The brains were quickly removed and stored in ice-cold saline. The frontal cortex, hippocampus, and septum (and other areas of interest) were quickly dissected in a cold petri dish on crushed ice. Tissues were weighed and homogenized in 0.1M phosphate buffer (pH 8). Rat brain homogenate samples were collected in different test tubes for analysis of acetylcholinesterase, catalase, MDA, and nitric oxide. Supernatural is used for enzymatic studies 20. Estimation of acetylcholinesterase enzyme levels in the brain: A 0.4 ml aliquot of the homogenate was added to a cuvette containing 2.6 ml phosphate buffer (0.1M, pH 8) and 100 µl DTNB. The content of the flask was mixed well with bubbling air and the absorbance was measured in a spectrophotometer at 412 nm. When the absorbance reaches a stable value, it is recorded as the baseline reading. 20 µl of the substrate is acetylthiocholine added and the change in absorbance recorded. Therefore, the change in absorbance per minute is determined.

Catalase Method (CAT): Catalase activity was measured by the method of Aebi H., adding 0.1 ml of supernatant in a cuvette containing 1.9 ml of 50 mM phosphate buffer (pH 7.0). The reaction was started by adding 1.0 mL of freshly prepared 30 mM H2O2. The dissociation rate of H2O2 was measured spectrophotometrically from the change in

absorbance at 240 nm. Catalase activity was expressed as units/mg of protein. The reaction takes place immediately after the addition of H2O2. The solution is mixed well and the first absorbance (A1) is read after 15 seconds (t1) and the second absorbance (A2) after 30 seconds (t2). Absorbance was read at a wavelength of 240 nm [15].

Determination of malondialdehyde (MDA): MDA was measured according to the method of Ohkawa et al. 1 ml. suspensions are obtained from tissue homogenates in tubes. 0.5 ml. trichloroacetic acid (TCA) was added, followed by 0.5 ml. 8% reagent thiobarbituric acid (TBA). The tube was covered with aluminum foil and placed in a water bath for 30 minutes. At 80ºC. After 30 minutes, the tube was removed and placed in cold water for 30 minutes. The tube was centrifuged at 3000 rpm for 15 minutes. The absorbance of the supernatant was recorded at 540 nm against the respective blank solutions (1 ml of distilled water, 0.5 ml of 30% TCA and 0.5 ml of 0.8% TBA) at room temperature. MDA values are expressed as n mol MDA/mg protein.

Determination of nitric oxide (NO): The production of nitric oxide is assessed by the accumulation of nitrate in the environment determined by a colorimetric assay with Griess reagent (1:1 solution of 5% H3PO4 and 1% sulfonamide). % naphthalamine diam dihydrochloric acid in water). The same volume of supernatant and Griess reagent was mixed and this mixture was incubated in the dark at room temperature for 10 min. Absorbance was measured at 540 nm using a spectrophotometer. The concentration of nitrite in the supernatant was calculated from the standard curve of sodium nitrite [16].

Results and discussion:

Extraction and isolation of the compounds from Solanum xanthocarpum

Methanol extract (200g) was partitioned between ethyl acetate and water. The ethyl acetate soluble portion was concentrated by evaporation and fractionated by silica gel column chromatography (Merck 200 mesh) with n-hexane–ethyl acetate mixtures of increasing polarity as eluent to yield three fractions. Fraction 1 elute with (n-hexane: ethyl acetate 80: 20), Fraction 2 (n-hexane: ethyl acetate 40: 60), and Fraction 3 (n-hexane: ethyl acetate 10: 90). Fraction 1was rechromatographed on a silica gel column chromatography eluting with n-hexane–EtOAc (50: 50) to yield compound 1 (tiliroside).

Fraction 2 was rechromatographed on silica gel using n-hexane–EtOAc (1: 2) to yield two subfractions; sub-fractions 1 and 2. Subfraction 2 was showed single spot on TLC and yield compound 2 (3,5,7,4'-tretra-O-methyl-kaempferol).

Acute oral toxicity study: Limit test at 2000 mg/kg body weight was selected to perform acute toxicity of methanolic extract of extract of Solanum Xanthocarpum fruit on mice. In LD50 studies, it was found that the animals were safe up to a maximum dose of 2000 mg/kg body weight. There were no changes in normal behavior pattern and no signs and symptoms of toxicity and mortality were observed. The LD50 of methanolic extract of Solanum Xanthocarpum fruit as per OECD guidelines falls under class four values with no signs of acute toxicity at 2000 mg/kg. The pharmacological evaluations were carried out at doses of 100 and 200 mg/kg body weights.

General behavioral study: The methanolic extracts affected spontaneous activity, sound and touch responses at a dose of above 200mg/kg and produced moderate of slight depression relating to awareness and alertness. However, the standard drug chlorpromazine hydrochloride caused very strong depression of all these responses compared with ethanolic extract. The results indicate that the ethanolic extract influences general behavioural profiles, as evidence in the spontaneous activity touch sound and pain responses.

Table 2: Effect of of *Solanum Xanthocarpum* extract on general behavioural profiles

Group	Spontaneous activity	Alertness	Awareness	Sound response	Touch response	Pain response
Normal Control	-	-	-	-	-	-
Positive Control Chlorpromazine (5 mg/kg)	++++	+++	+++	++++	++++	++++

MESX 100	++	+	+	+	++	+
MESX 200	+++	++	+++	++	+++	++
AESX 100	+	-	-	+	++	+
AESX 200	++	+	+	+	++	+
Compound 1	++++	+++	+++	++++	++++	++++
Compound 2	++++	+++	+++	++++	++++	++++

Depression levels:- no effect, + slight, ++ moderate, +++ strong, ++++ very strong.

The result indicated that the methanolic extract of Solanum Xanthocarpum influence the general behavioral profiles, as evidenced in the spontaneous activity, righting reflex, pinna reflex, grip strength and pain responses.

The result indicated that the isolated compouds from extract of Solanum Xanthocarpum also influence the general behavioral profiles, as evidenced in the spontaneous activity, righting reflex, pinna reflex, grip strength and pain responses. Reduction of awareness and depressant action may be due to the action of the extract on CNS. Reduction of pinna reflex may be due to blocking synapses of the afferent pathway[20].

Morris water maze test: The effect of Solanum Xanthocarpum extract on scopolamine induced memory impairment was investigated. The Morris water maze behavioral test was utilized to assess the escape latencies (EL) and time spent in the target quadrant (TSTQ) expressed in seconds. There were significant differences in the escape latencies amongst the groups during the course of 5 days. There was also a significant difference in the EL between mice in the MESX 200 mg/kg group and scopolamine (SC) group.

Table 3: Effect of *Solanum Xanthocarpum* extract on the escape latency and Time spent target quadrant of scopolamine-treated mice in the Morris water maze test.

Group	Escape latencies (second)	Time spent target quadrant (second)
Normal Control	20	60
SC	50	20
SC + Piracetam (100 mg/kg)	30	40
SC + MESX 100	40	31
SC + MESX 200	34	35
SC + AESX 100	48	22
SC + AESX 200	46	25
SC + Compound 1	30	39
SC + Compound 2	31	29

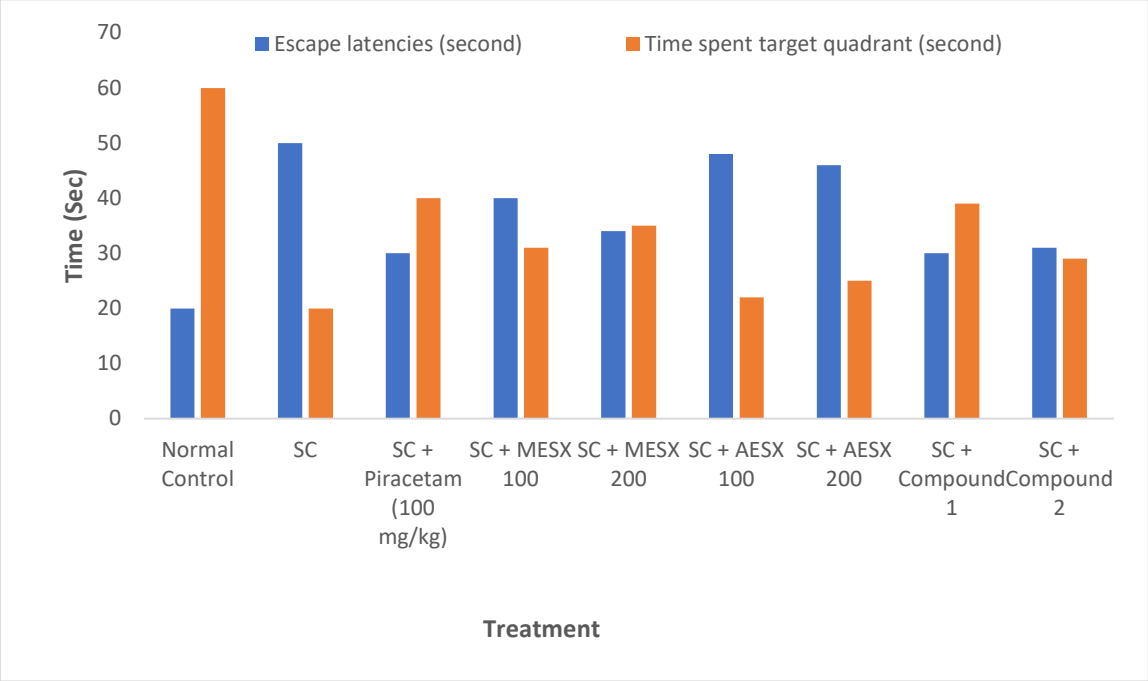

Figure 1: Graphical representation of Effect of *Solanum Xanthocarpum* extract on the escape latency and Time spent target quadrant of scopolamine-treated mice in the Morris water maze test

The effect of *Solanum Xanthocarpum* extract (100 and 100 mg/kg) on scopolamine-induced spatial memory impairment was evaluated by means of the Morris water maze test. The escape latency (s) of the control group decreased significantly over the 4 trial days. In contrast, the escape latency in the scopolamine-treated group was unchanged after day 1. This indicated that scopolamine induced memory impairment. The *Solanum Xanthocarpum* extract (100 and 100 mg/kg) treated groups showed significantly decreased escape latencies (s) on day 4 ($p < 0.05$). There was significant difference between the 100 and 100 mg/kg. Isolated compound 1 and 2 significantly decreased escape latency to a level similar to standard drug donepezil on day 4. The donepezil-treated group also exhibited significantly decreased escape latency (s) after 4 days.

Table 4: Effect of *Solanum Xanthocarpum* extract on Mean swimming distance of scopolamine-treated mice in the Morris water maze test.

Group	Mean swimming distance (cm)
Normal Control	270
SC	2000
SC + Piracetam (100 mg/kg)	900
SC + MESX 100	1400
SC + MESX 200	1200
SC + AESX 100	1800

SC + AESX 200	1700
SC + Compound 1	1035
SC + Compound 2	1010

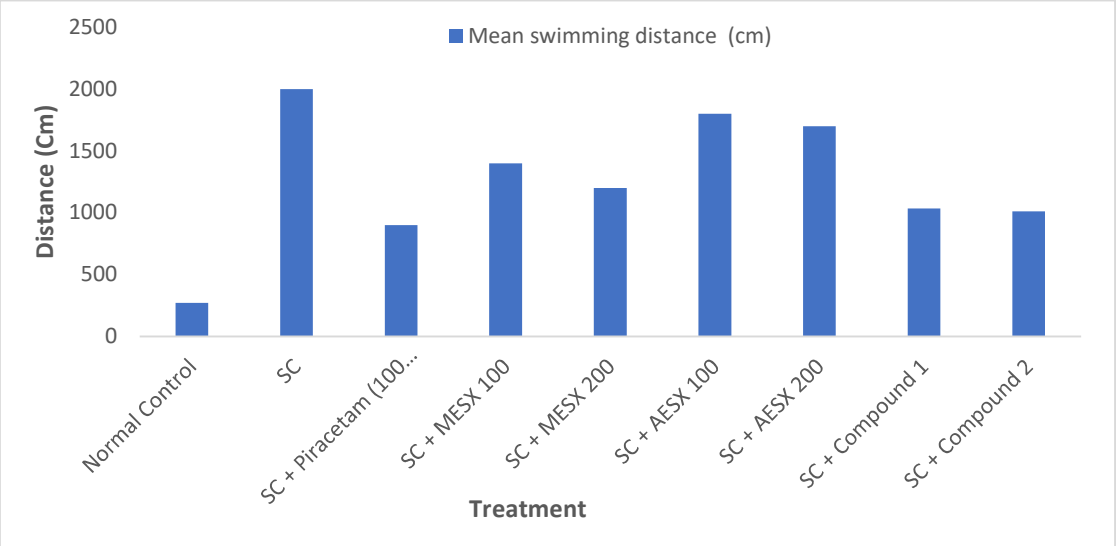

Figure 2: Effect of *Solanum Xanthocarpum* extract on Mean swimming distance of scopolamine-treated mice in the Morris water maze test.

The mean swimming distance to reach the platform on day 4 was exhibited. The *Solanum Xanthocarpum* extract- and isolated copmpounds-treated group exhibited a significantly decreased swimming distance compared to the scopolamine-treated group ($p < 0.05$). The mean swim speed of mice in all groups during 4 days was not significantly different, suggesting that the treatments did not affect the locomotor activity of mice.

The Morris water maze test is designed to assess spatial memory and learning function and the passive avoidance test, a fear-motivated avoidance test, was used to evaluate memory retention. Scopolamine, a nonselective and competitive muscarinic cholinergic receptor antagonist, is widely used in mouse-behavior tests of cognition and memory. Scopolamine induces learning and memory impairment by blocking cholinergic signaling. Escape latency of repeated trial tests for 4 days and the time spent in the target quadrant in the probe test were investigated in the Morris water maze test. These results indicated that *Solanum Xanthocarpum* methanol extract and isolated compounds attenuated scopolamine-induced spatial memory impairment and improved long-term memory in the Morris water maze test.

Novel Object recognition test. In the Novel object recognition test, the mice spent more time to explore the objects. In the object recognition test, the mice spent more time to explore the objects in the first trial. In the second trial, when a new object replaced a familiar object, methanolic extract of *Solanum Xanthocarpum,* isolated compounds and piracetam significantly reduced the time to explore the familiar object as compared with the time to explore the new object. Moreover, methanolic extract of *Solanum Xanthocarpum* also showed significant increase in discrimination index. Piracetam (100 mg/kg) used as standard drug.

Table 5: Effect of *Solanum Xanthocarpum* on exploration time in Novel Object recognition test in mice.

Group	**Exploration time (sec)**	
	Familiar object	**New object**
Normal Control	79.21±1.51	88.97±2.05

Piracetam (100 mg/kg)	29.01±1.04	70.98±1.23
MESX 100	40.61±1.23	76.21±1.27
MESX 200	35.37±1.08**	74.34±1.21*
AESX 100	70.73 ±1.03	86.21±1.19
AESX 200	75.48±1.34	82.34±1.64
Compound 1	30.72±0.98**	71.21±0.67*
Compound 2	29.48±1.12**	70.34±0.92*

Values are expressed as mean ± SEM (Number of animals, n=6); significantly different at *P<0.05 when compared with normal control group.

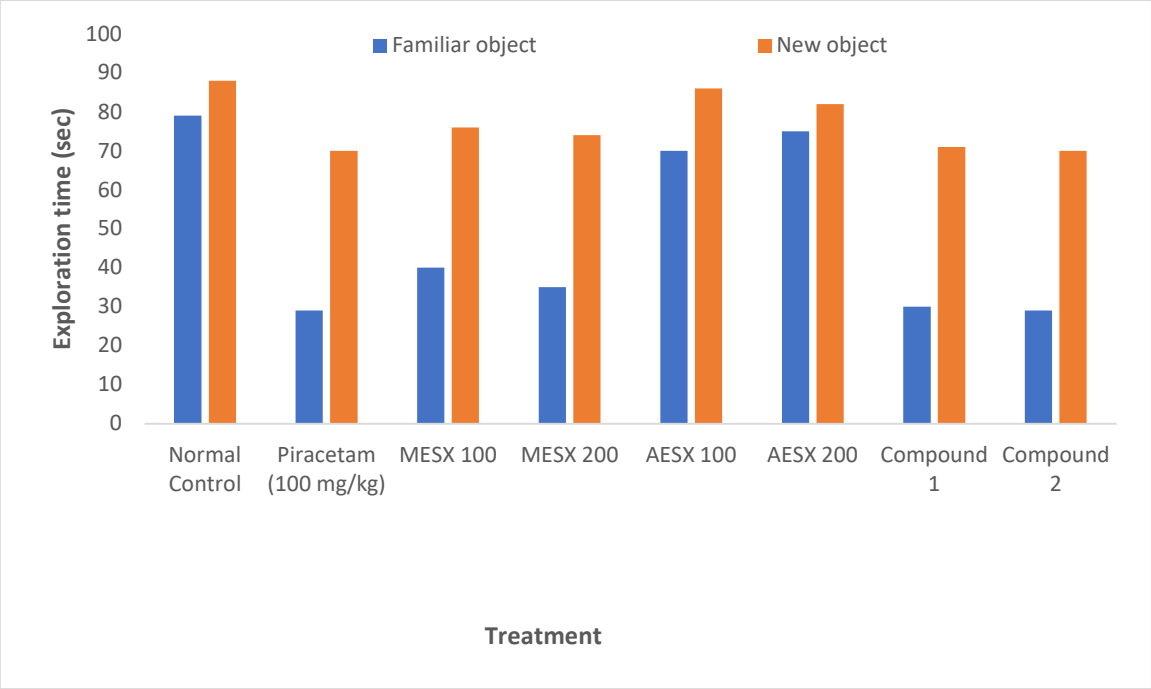

Figure 3: Effect of *Solanum Xanthocarpum* on exploration time in Novel Object recognition test in mice.

Table 6: Effect of *Solanum Xanthocarpum* on discrimination index in Novel Object recognition test in mice.

Group	**Discrimination index**
Normal Control	0.21±0.02
Piracetam (100 mg/kg)	0.73±0.39*
MESX 100	0.51±0.54*
MESX 200	0.68±0.69*
AESX 100	0.33 ±0.12
AESX 200	0.38±0.14

Compound 1	0.72±0.12**
Compound 2	0.73±0.69**

Values are expressed as mean ± SEM (Number of animals, n=6); significantly different at *P<0.05 when compared with normal control group.

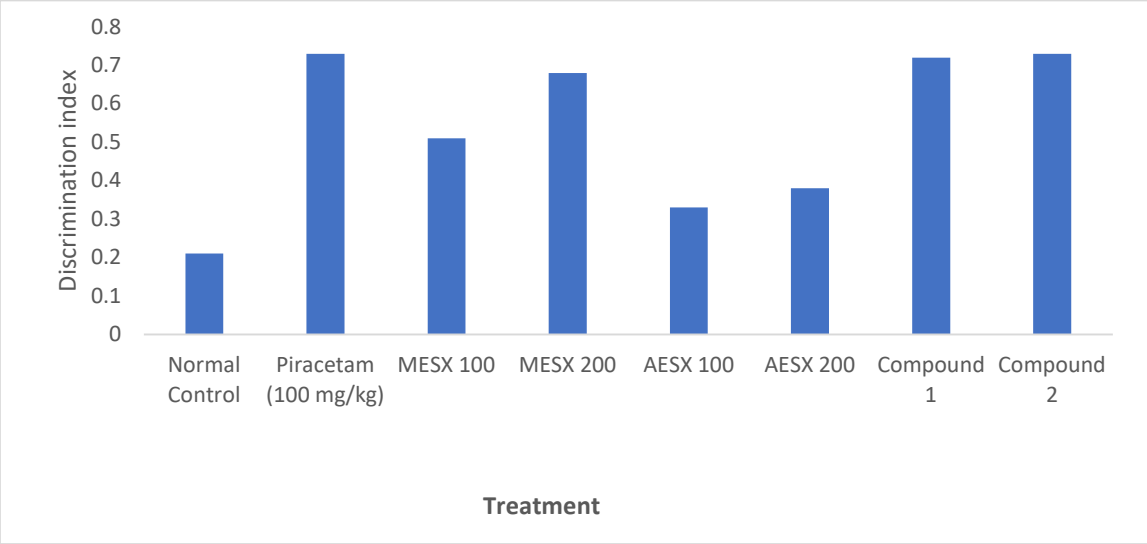

Figure 4: Effect of *Solanum Xanthocarpum* on discrimination index in Novel Object recognition test in mice.

The Novel Object Recognition Test test assessed short-term and long-term memory function. It consisted of a sample and test phase. The discrimination index (DI) was calculated for each trial of the test phase to assess the preference for the novel object. The NOR test assessed short-term and long-term memory function. It consisted of a sample and test phase. The discrimination index (DI) was calculated for each trial of the test phase to assess the preference for the novel object. The DI for the short-term phase. During the short-term phase, there was no significant difference in the DI amongst the groups. The DI for the MESX 200mg/kg group was higher than the AESX 200 mg/kg group during the short-term memory task, although this was not significant. During the short-term memory test, the DI was above 50% for all groups except for the AESX treated group. The same was observed for the long-term memory test. During the long-term memory test Piracetam treated group showed a significantly higher DI.

Summary and conclusion:

The result indicated that the isolated compouds from extract of Solanum Xanthocarpum also influence the general behavioral profiles, as evidenced in the spontaneous activity, righting reflex, pinna reflex, grip strength and pain responses. Reduction of awareness and depressant action may be due to the action of the extract on CNS. Reduction of pinna reflex may be due to blocking synapses of the afferent pathway. The present study revealed that the phytoconstituents present in *S. xanthocarpum* fruit possess considerable anti-Alzheimer's potential. Therefore, they prevent ROS mediated lipid damage. The study validated the use of *S. xanthocarpum* fruit by tribal communities in traditional medicine. Isolation and characterization of specific chemical moieties having potential biologic activities may provide an effective anti-alzheimer's activity.

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