

Phytochemical Analysis and Neuroprotective Effects of Ethanolic Leaf Extract of *Talinum triangulare* in Swiss Albino Mice

Shweta Singh¹ and Dr. Hemant Kumar Janardhanrao Dhongade²

²Professor, ¹Department of Pharmacy Sunrise University, Alwar, Rajasthan

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ABSTRACT

Background: *Talinum triangulare*, a leafy vegetable with reputed medicinal properties, has been traditionally used in folk medicine. This research sought to look into the phytochemical constituents and “neuroprotective effects” of the ethanolic leaf extract of *Talinum triangulare* in Swiss albino mice.

Methods: The conventional qualitative testing methods were used to assess the to distinguish makeup of the sample. Swiss albino mice were orally administered with different doses of the extract, and the relative cerebrum weight, malondialdehyde (MDA) levels, and catalase activity in the cerebrum were measured.

Results: The abundance of phenols that are was determined by phytochemical tests, coumarins, saponins, betacyanins, glycosides, flavonoids, alkaloids, and triterpenoids in the extract. Average cerebrum thickness increased dose-dependently when the extract of marijuana was administered and a reduction in MDA levels, indicating decreased oxidative stress. Catalase activity in the cerebrum also increased in a “dose-dependent manner”.

Conclusion: The ethanolic leaf extract of *Talinum triangulare* exhibits phytochemical richness and demonstrates neuroprotective effects in Swiss albino mice, possibly through its antioxidant and anti-inflammatory properties. These findings support its traditional use and suggest its potential as a natural neuroprotective agent.

Keywords: *Talinum triangulare*, ethanolic extract, phytochemicals, neuroprotection, oxidative stress, Swiss albino mice.

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INTRODUCTION

Talinum triangulare, commonly known as waterleaf, is a leafy vegetable extensively consumed in tropical regions, prized not only for its culinary value but also for its perceived medicinal properties deeply rooted in traditional folklore [1]. Within traditional medicine systems, *Talinum triangulare* has been utilized to treat various ailments, indicating its potential therapeutic significance. However, despite its widespread use, scientific validation of its pharmacological properties, particularly its neuroprotective effects, remains limited [2].

Neurodegenerative diseases, characterized by progressive degeneration of neurons, present a significant public health challenge globally. Numerous brain disorders are linked to a condition called “oxidative stress”, which is caused by a contradiction between the “generation of reactive oxygen substances (ROS)” and protective antioxidants. Consequently, the exploration of natural compounds with antioxidant and neuroprotective properties has garnered considerable interest as potential therapeutic agents for mitigating neuronal damage and combating neurodegenerative diseases [3]. The increasing interest in natural products and traditional medicines has

led to the exploration of various plants for their therapeutic potential. *Talinum triangulare*, commonly known as waterleaf, is a leafy vegetable widely consumed in tropical regions and reputed for its diverse medicinal properties. Despite its popularity in traditional medicine, scientific validation of its bioactive compounds and therapeutic effects remains limited [4].

In this context, the present study aims to investigate the “phytochemical constituents” and neuroprotective effects of the ethanolic leaf extract of *Talinum triangulare* in Swiss albino mice. Phytochemical analysis will elucidate the chemical composition of the extract, providing insights into its potential bioactive compounds. Furthermore, assessment of its neuroprotective effects will involve evaluating its impact on oxidative stress markers and relative cerebrum weight in an animal model, shedding light on its potential therapeutic utility in neurodegenerative conditions.

By systematically examining the phytochemical profile and neuroprotective properties of *Talinum triangulare*, this study seeks assist with bridging the conceptual disconnect between conventional wisdom and contemporary knowledge regarding science, offering valuable insights

*Author for Correspondence: Shweta Singh

into its pharmacological potential. Ultimately, elucidating the therapeutic effects of *Talinum triangulare* could contribute to the development of novel interventions for neurodegenerative diseases, addressing a pressing need for effective treatment options in clinical practice.

RESEARCH METHODOLOGY

Plant Material and Extraction:

Fresh leaves of *Talinum triangulare* were collected and authenticated. The leaves were shade-dried, pulverized, and subjected to ethanol extraction using a Soxhlet apparatus. After that, the extracted ethanol was filtered underneath slight pressure and kept in reserve for additional study.

Phytochemical Analysis:

“The ethanolic leaf extract of *Talinum triangulare*” was screened for phytochemical constituents using standard qualitative methods. Tests were conducted to detect the presence of phenols, coumarins, saponins, tannins, anthraquinones, anthocyanins, betacyanins, glycosides, phlorotannins, “oils and resin, proteins, quinones, flavonoids (with alkaline reagent and FeCl₃), alkaloids, sterols, vitamin C, sterols and phytosterols, triterpenoids, and terpenoids.”

Experimental Animals:

Swiss albino mice were obtained from a certified animal house and acclimatized to laboratory conditions. The

reptiles had unlimited access to food and water and were kept in typical cages.

Animal Treatment:

Clusters of mice had been established and orally administered with different doses of the ethanolic leaf extract of *Talinum triangulare* for a specified duration. Control groups received appropriate vehicle solutions.

Measurement of Relative Cerebrum Weight:

The creatures were slaughtered at the conclusion of the surgical phase, and the minds were removed and counted. It was determined and reported as percentages what the cerebrum's height was in relation to the entire mass of the entire human body.

Assessment of Oxidative Stress Markers:

The levels of malondialdehyde (MDA) and catalase activity in the cerebrum were determined using standard biochemical assays. MDA levels were measured spectrophotometrically, while catalase activity was assessed based on the decomposition of hydrogen peroxide.

Statistical Analysis:

Acceptable statistical techniques were used to evaluate the data, such as one-way analysis of variation (ANOVA) and post-hoc testing. The level of statistical significance was set at, and the results were presented as the average minus the standard error of the average (SEM) p < 0.05.

RESULTS

Table 1: *Talinum triangulare* foliage extract's phytochemical ingredients

The phytochemicals	ETT
Coumarins, or Phenol	+
Tannin Saponin, the	+
The anthraquinone	+
The anthocyanin	-
Betacyanin	-
Glycosides	-
Phlorotannin	+
Reel oils and proteins	+
Quinones	-
The alkaline reagent flavonoids	+
Flavonoids (Fe-Cl ₃)	+
Alkaloids, also	+
sterols that	+
vitamin C level	+
Phytosterols and Sterols	+
Triterpenoids such	-
Terpenoids, which	+
The phytochemicals	-
Coumarins, or Phenol	+
Tannin Saponin, the	-

“+”: Present, -: Absent, ETT: Ethanolic extract of *T. triangulare*”

“The ethanolic leaf extract of *Talinum triangulare* (ETT)” contains a variety of phytochemicals, including “phenol, coumarins, saponin, betacyanin, glycosides, oils and resin, proteins, quinones, flavonoids (both alkaline reagent and

FeCl₃), alkaloids, vitamin C, and triterpenoids”. However, it does not contain tannin, anthraquinone, anthocyanin, phlorotannin, sterols, sterols and phytosterols, or terpenoids.

Table 2: “Relative Weights of the Cerebrum to the Absolute Body Weight (%)”

Group	Dose (mg/kg)	Relative Weight (%)
A	0	0.55
B	20	0.58
C	30	0.69
D	40	0.78

Increasing doses of the ETT extract are associated with a higher relative weight of the cerebrum in Swiss albino mice. The relative cerebrum weights were recorded as 0.55% for the control group (0 mg/kg), 0.58% for the 20 mg/kg group, 0.69% for the 30 mg/kg group, and 0.78% for the 40 mg/kg group.

Table 3: “Activities of MDA and Catalase in the Cerebrum of Swiss Albino Mice (mean \pm SEM)”

“Measured Parameter”	“Group A”	“Group B”	“Group C”	“Group D”
“MDA (mol/mg protein)”	“0.66 \pm 0.00”	“0.59 \pm 0.02**”	“0.53 \pm 0.05**”	“0.49 \pm 0.04**”
“Catalase (U/mg protein)”	“106 \pm 0.00”	“113 \pm 2.23**”	“115 \pm 2.31**”	“119 \pm 2.25**”

The ETT extract demonstrates a dose-dependent reduction in malondialdehyde (MDA) levels and an increase in catalase activity in the cerebrum of Swiss albino mice. MDA levels (mol/mg protein) decreased from 0.66 in the control group to 0.59, 0.53, and 0.49 in the “20 mg/kg, 30 mg/kg, and 40 mg/kg groups”, respectively. Concurrently, catalase activity (U/mg protein) increased from 106 in the control group to 113, 115, and 119 in the respective treatment groups, with all changes being substantially considerable in relation to the untreated group ($p < 0.05$).

DISCUSSION

Phytochemical Composition:

The phytochemical analysis indicated the existence of various bioactive compounds in the ethanolic leaf extract of *Talinum triangulare*, including phenols, coumarins, saponins, betacyanins, glycosides, flavonoids, alkaloids, and triterpenoids. These compounds are famous for having beneficial, an anti-inflammatory, and antibacterial properties, which may help explain the extract's reported health advantages [6].

Neuroprotective Effects:

The findings indicate that the ethanolic extracted from *Talinum triangular* leaves exerts neuroprotective effects in Swiss albino mice. The increase in relative cerebrum weight with higher doses of the extract suggests a potential enhancement of brain health and development. Additionally, the extract demonstrated a dose-dependent reduction in malondialdehyde (MDA) levels and an increase in catalase activity in the cerebrum, indicating attenuation of oxidative stress-induced damage [5].

Several previous studies support the neuroprotective and antioxidant activities of *Talinum triangulare* and its constituents. For instance, a study by Anderson, (2014)[7] reported the antioxidant and neuroprotective effects of flavonoids isolated from *Talinum triangulare* in an animal model of cerebral ischemia. Similarly, Li et al. (2016)[5] demonstrated the anti-inflammatory and analgesic properties of saponins extracted from *Talinum triangulare* in rodent models.

Despite the promising findings, this study has certain limitations. The use of animal models may not fully

represent the complex pathophysiology of neurodegenerative diseases in humans. Additionally, It is necessary to do further study to clarify the precise processes underpinning the neuroprotective effects of *Talinum triangulare* and its individual constituents. Clinical trials involving human subjects are needed to validate the efficacy and safety of the extract for therapeutic use.

CONCLUSION

In conclusion, the ethanolic leaf extract of *Talinum triangulare* exhibits phytochemical richness and demonstrates neuroprotective effects in Swiss albino mice, possibly through its antioxidant and anti-inflammatory properties. These findings support the traditional use of *Talinum triangulare* in folk medicine and highlight its Possibility of Use as a Resource of natural neuroprotective agents. Further research is warranted to explore its therapeutic potential in the prevention and management of neurodegenerative disorders.

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