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ASSESSMENT OF TRIDAX PROCUMBENS L. HYDROALCOHOLIC EXTRACT AND ITS CHITOSAN NANOPARTICLES ON STREPTOZOTOCIN INDUCED DIABETIC NEUROPATHY IN SWISS ALBINO MICE

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ABSTRACT:

Diabetic neuropathy is one of the most common complications of diabetes mellitus, impacting a large number of individuals with the disease. Epidemiological studies underscore the significant global burden of diabetic neuropathy, with prevalence influenced by factors such as diabetes duration, glycemic control, and population characteristics. When compared to duloxetine, a standard treatment for diabetic neuropathy, N-HETP has shown comparable or even superior efficacy, indicating its potential as an alternative or adjunct therapy. The use of chitosan nanoparticles loaded with N-HETP further demonstrates the viability of nanoparticle-based drug delivery for enhancing therapeutic effectiveness. This study emphasizes the potential of N-HETP, a novel formulation containing chitosan nanoparticles loaded with Hydroalcoholic Extract of Tridax Procumbens L, in alleviating Streptozotocin induced diabetic neuropathy in Wistar albino mice. Through various tests and analyses, N-HETP significantly reduced hyperglycemia and pain sensitivity while improving motor coordination compared to untreated diabetic mice. Additionally, it boosted antioxidant enzyme activities and preserved glutathione levels, thereby reducing oxidative stress and neuropathic damage associated with diabetes.

Keywords: Tridax Procumbens L, medicinal plant, Diabetic neuropathy, Nanoparticles.

INTRODUCTION:

Diabetes is a chronic disease that occurs when the pancreas does not produce enough insulin, a hormone that regulates blood glucose, or when the body cannot effectively use the insulin it produces. Elevated blood glucose levels, a common consequence of uncontrolled diabetes, can lead to serious damage to the heart, blood vessels, eyes, kidneys, and nerves over time. Over 400 million people worldwide are affected by diabetes. The four types of diabetes mellitus are Type 1 diabetes (formerly known as insulin-dependent, juvenile, or childhood-onset diabetes), Type 2 diabetes (previously called non-insulin-dependent or adult-onset diabetes), Gestational diabetes (GDM), which is a temporary condition during pregnancy with long-term risk of developing Type 2 diabetes, and MODY (Maturity Onset Diabetes of the Young).

Diabetic neuropathy is a complication of diabetes characterized by nerve damage due to prolonged high blood sugar levels or hyperglycemia. It can affect various parts of the body, including the legs, feet, bladder, heart, gastrointestinal system, and reproductive system. Diabetic neuropathy typically develops slowly over months as sustained high blood sugar levels damage the nerves. Symptoms include pain, numbness, tingling, or prickling sensations, usually starting in the feet and potentially progressing to the hands. In advanced stages, abnormal sensations may extend to the arms, legs, and trunk.

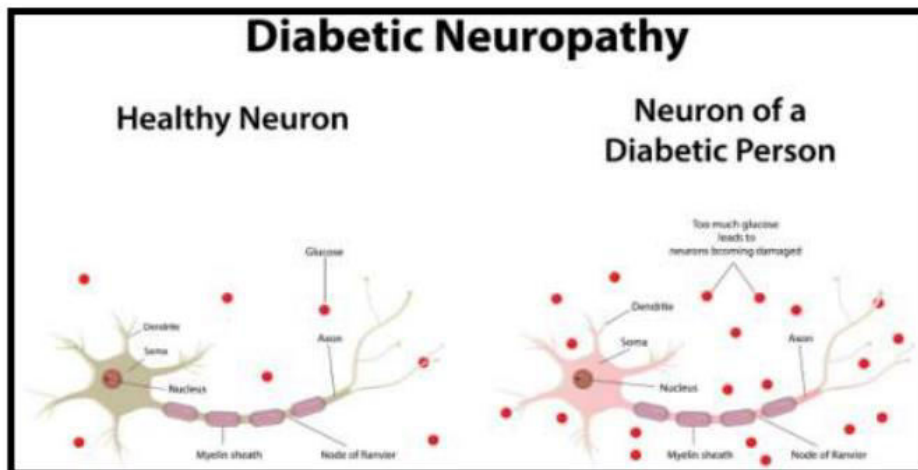


Fig. 1. Diabetic Neuropathy

PLANT PROFILE:

2.1 *Tridax procumbens* L.:

Tridax procumbens, commonly known as coat buttons or tridax daisy, is a species of flowering plant in the daisy family. It is widely recognized as a pervasive weed and pest plant. Traditionally, *Tridax procumbens* has been used in Ayurvedic medicine for promoting hair growth, treating liver disorders, and managing diabetes, and it is sometimes used as a substitute for *Bhringraj*. The current study aims to evaluate the efficacy of *Tridax procumbens* in promoting hair growth.



Fig 2. *Tridax Procumbens* L




	KINGDOM : Plantae-plants DIVISION : Magnoliophyta-flowering plant CLASS : Magnoliopsida-dicotyledons
	ORDER : Asterales FAMILY : Asteraceae-Aster family GENUS : Tridax L.-tridax
	SPIECES : <i>Tridax procumbans lin.</i> ENGLISH : Coat buttons TAMIL : Vettukaya-thalai

Fig 3. Plant Profile of *Tridax procumbens* L

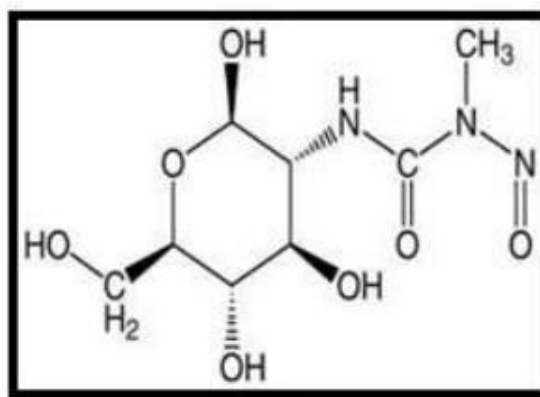


Fig. 4. 8,2-deoxy-2- {[methyl(nitroso)amino]carbonyl}amino--Dglucopyranose (STZ)

RESULTS & DISCUSSION:

4.1 Extraction:

Drug	Aerial Part of <i>Tridaxprocumbens</i> L
Solvent	Hydroalcoholic 90%v/v
Colour	Dark yellowish green
Consistency	Semi solid
Percentage yield	17.5 % w/w

Table. 2. Appearance and Percentage Yield of HETP

4.2 Preliminary Phytochemical Screening: Results of the Preliminary Phytochemical Constituents present in Hydro alcoholic extract of *Tridax procumbens* L

Table 3: Preliminary Phytochemical Screening

S. No.	Constituents	Tridax Procumbens L. Hydroalcoholic Extract
1.	Alkaloids	+
2.	Carbohydrates	-
3.	Protein	-
4.	Terpinoids	+
5.	Phenols	+
6.	Tannins	+
7.	Flavonoids	+
9.	Glycosides	+
10.	Saponins	-

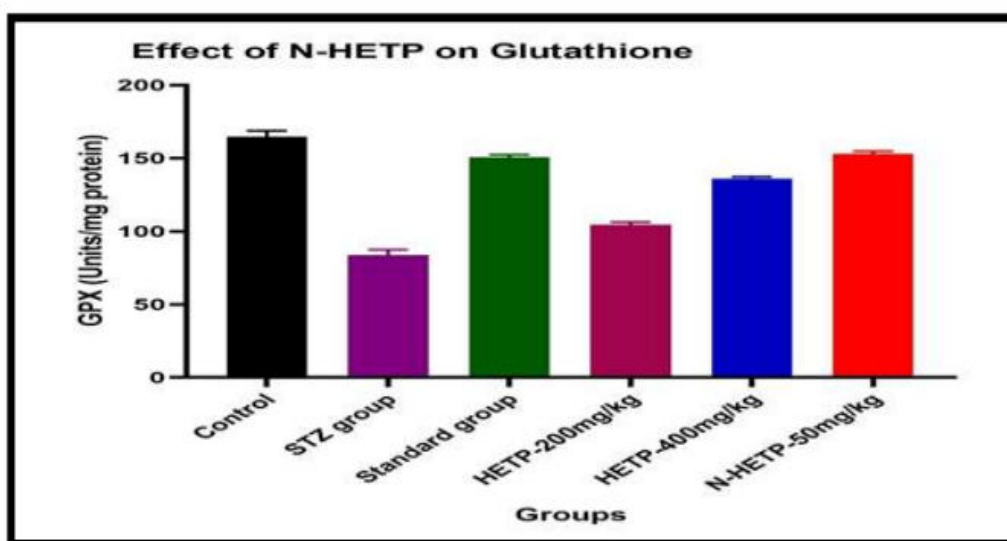


Fig 4. Effect of N- HETP on Glutathione

Conclusion:

The study demonstrates the potential of N-HETP, a novel formulation comprising chitosan nanoparticles loaded with Hydroalcoholic Extract of Tridax Procumbens L., in alleviating streptozotocin-induced diabetic neuropathy in Wistar albino mice. Through various tests and analyses, N-HETP showed significant reductions in hyperglycemia and pain sensitivity, along with improvements in motor coordination compared to untreated diabetic mice. Additionally, it enhanced antioxidant enzyme activities and preserved glutathione levels, mitigating oxidative stress and neuropathic damage associated with diabetes. The results suggest that N-HETP is a promising therapeutic agent, offering targeted delivery of bioactive compounds to effectively manage diabetic neuropathy. Further research is needed to understand its mechanisms and optimize dosing for clinical applications, potentially improving the quality of life for diabetic patients.

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