CODEN [USA]: IAJPBB ISSN: 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES

http://doi.org/10.5281/zenodo.1002941

Available online at: http://www.iajps.com *Review Article*

TRADESCANTIA ZEBRINA: A PROMISING MEDICINAL PLANT

Gouri Kumar Dash[1]*, Myint Swe[1] and Allan Mathews[2]

[1]Universiti Kuala Lumpur Royal College of Medicine Perak, 30450 Ipoh, Malaysia

[2]Faculty of Pharmacy, Quest International University Perak, 30250 Ipoh, Malaysia

Abstract:

Tradescantia zebrina Heynh. ex Bosse syn. Zebrina pendula Schnizl. (Family- Commelinaceae), commonly known as 'Wandering Jew' is an important medicinal plant with several traditional medicinal uses in many countries around the world. Previous reports on the plant have demonstrated significant pharmacological activities such as anticancer, antioxidant, antibacterial, antitrypanosomal, antiarrythmic and larvicidal activity against Anopheles benarrochi. However, only a few phytoconstituents have been reported by previous researchers. T. zebrina is a valuable source of traditional medicine for treating kidney diseases. The plant needs additional research attention because of its wide ethnomedicinal applications and reports on promising biological activities. The present paper compiles the information available from all possible scientific sources which may help the researchers to explore the possible biological activities of this relatively less known plant.

Keywords: *Tradescantia zebrina, Traditional uses, Phytochemistry, Bioactivity*

Corresponding Author:

Dr. Gouri Kumar Dash,

Professor and Head (Research and Post Graduate Studies),
Faculty of Pharmacy and Health Sciences,
Universiti Kuala Lumpur Royal College of Medicine Perak,
30450 Ipoh, Perak, Malaysia.
Tel: *0060105491614 (Mobile)*
Fax: *00605-2536634*
Email: *gkdash2@gmail.com, gourikumar@unikl.edu.my*

QR code

Please cite this article in press as Gouri Kumar Dash et al, ***Tradescantia Zebrina: A Promising Medicinal Plant,*** *Indo Am. J. P. Sci, 2017; 4(10).*

INTRODUCTION:

The family Commelinaceae comprises of 37 genera and over 600 species of monocotyledonous herbaceous flowering plants [1, 2] including the genus *Tradescantia* that consists of approximately 70 species [3]. *Tradescantia zebrina* Heynh. ex Bosse syn. *Zebrina pendula* Schnizl. (Fig. 1), commonly known as *'Wandering Jew'* is a herbaceous perennial plant with creeping shoots and fleshy leaves. The leaves are purple green in colour with broad, silvery stripes and purple undersides, simple, alternate, ovate with entire margin. Flowers are purple-pink and periodically throughout the year, fruits are ovaland about less than 0.5 inch [4, 5]. The plant is native to the Gulf Coast region of eastern Mexico but naturalized in various parts of the world. It thrives well in a variety of soils and commonly distributed as a weed of waste areas, roadsides and forests in sub-tropical and warmer temperate regions [6, 7].

Fig. 1. *Tradescantia zebrina* Heynh. ex Bosse [7]

METHODS:

Extensive literature survey from all available scientific sources was performed using electronic search engines such as Google and scientific publishing sites such as PubMed, Elsevier etc. Other literature sources included papers published in official websites, international journals, and conference papers.

Taxonomy [8]

Kingdom: Plantae
Subkingdom: Tracheobionta
Super division: Spermatophyta
Division: Magnoliophyta
Class: Liliopsida
Subclass: Commelinidae
Order: Commelinales
Family: Commelinaceae
Genus: Tradescantia L.
Species: *Tradescantia zebrina* Heynh. ex Bosse

TRADITIONAL USES:

The plant is highly valued in various traditional systems of medicine. The plant is commonly known as ShuiGui Cao (Water Turtle Grass) by the Chinese where the plant is highly recommended for patients suffering from kidney disease to improve their kidney function. About 200 g of the whole herb along with 15 pieces of red dates and 12 slices of ginger are boiled in 1.5 liters of water and the decoction is recommended to consume in empty stomach or 2 to 3 hours after food for achieving best results [9]. In Jamaica, the plant is used for treatment of high blood pressure, coughs and tuberculosis. The plant is used to purify the blood, the leaves applied to reduce swellings, hemorrhoids, blood in the stools and taken orally to treat kidney infections. In Mexico, a beverage made of lemon and sweetened decoction of leaves, commonly called '*Matali'*, is used as a cold tonic drink [10]. In Afro-Cuban Santeria, decoction of leaves is drunk to flush gravel out of the kidneys and bladder, break the crisis of colitis, and provoke menstruation [11]. In Guyana, leaves are used as tea for cleansing blood and treating influenza [12]. The plant is also used to treat gastrointestinal disorders [13]. In Malaysia, the decoction of the plant is recommended to be a remedy to improve the kidney function. The plant is also believed to be beneficial in the treatment of poisonous snake bite, leucorrhea, urinary infection, nephritis and inflammation [9].

Table 1: Worldwide ethnomedical uses of *T. zebrina*

Country	Parts used	Preparation	Usage
China	Whole plant	decoction	To improve kidney function
Jamaica	Whole plant	decoction	For treatment of high blood pressure, coughs and tuberculosis
	Leaves	Ground leaves	Applied to reduce swellings, hemorrhoids, blood in the stools and taken orally to treat kidney infections.
Mexico	Leaves	decoction	Used as a cold tonic drink
Afro-Cuban Santeria	Leaves	decoction	To flush gravel out of the kidneys and bladder, break the crisis of colitis, and provoke menstruation
Guyana	Leaves	decoction	Used as tea for cleansing blood and treating influenza
Malaysia	Whole plant	decoction	Used as a remedy to improve the kidney function. treatment of poisonous snake bite, leucorrhea, urinary infection, nephritis and inflammation

PHYTOCHEMISTRY

Reports on the isolated compounds from this plant are scarce. Few phytoconstituents reported by earlier researchers include 3-ecdysone, β-sitosterol, 3β, 5α, 6β-trihydroxy stigmast and succinic acid [14, 15].

BIOACTIVITY

Anticancer activity

A study reported the antitumor activity of β-sitosterol, 3β, 5α, 6β-trihydroxystigmast and succinic acid in ascites-type-180 sarcoma of mice. The compounds revealed significant inhibition of tumor growth [14].

The anticancer activity of *T. zebrina* and *T. fluminensis* was reported [16]. The assays were preformed to measure the doubling time and clonogenic survival of SCC-13y (squamous cell carcinoma), HFF-1 (human foreskin fibroblasts), and A549 (lung adenocarcinoma) cells. Results of the study showed that cancer cell proliferation was decreased with the addition of *T. zebrina* treatment confirming the general inhibitory effects of the test extract on cancerous and non-cancerous cells.

The aqueous and a methanol extracts of *T. zebrina* were screened for possible anticancer activity against two cancer cell lines namely, A-549 lung carcinoma cells and SCC-13y malignant keratinocyte cells [17]. The counting of cells was done over a five day period in order to determine the inhibition of cell growth.Results of the study revealed decreased cell growth in both the cell lines.Further, the extracts were also treated on a non-cancerous cell line of HFF-1 human foreskin fibroblasts cells to determine the relative toxicity of the extracts. The study showed inhibitive effects of *T. zebrina* extracts on both cancerous and non-cancerous cells.

Antioxidant activity

As per study performed by Tan *et al*. [18] they investigated antioxidant capacity of the methanol extract of the leaves of *T. zebrina* using different methodological approaches. The antioxidant activity was studied by determining the total phenolic content, total flavonoid content, total tannin content, DPPH free radical scavenging, ferric reducing power and ferrous ion chelating assays.The results revealed significant antioxidant activity of the extract.

In another study, Cheah *et al*. [19] reported the antioxidant activity of the methanol extract of the leaves of *T. zebrina*. The antioxidant activity was studied by determining the total phenolic content, total flavonoid content, and DPPH free radical scavenging assays. The results also supported previous studies and revealed significant antioxidant activity of the extract.

Acetylcholinesterase inhibitory activity

Cheah *et al*. [19] reported the acetylcholinesterase inhibitory activity of the methanol extract of the leaves of *T. zebrina* by using acetylcholine iodide as substrate. Based on the results obtained, the extract at 100 µg/ml and 10 µg/ml showed significant inhibition on the activity of acetycholinesterase ($p<0.05$) up to 14% and 15.3% respectively with respect to the control group.

Antibacterial activity

As per the antibacterial activity study done by Tan *et al*. [18] on the methanol extract of the leaves of *T. zebrina*, the extract revealed promising antibacterial activities against *Bacillus cereus*, *Bacillus subtilis*, *Micrococcus luteus*, Methicillin-Resistant *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Enterococcus faecalis*, *Aeromonas hydrophila* and *Proteus vulgaris* respectively.

Antitrypanosomal activity

González-Coloma and co-researchers [20] reported the antitrypanosomal activity of *T. zebrina*. The plant was extracted with hexane, chloroform, and 70% ethanol-water and the extracts were tested upon epimastigote forms of Trypanosoma cruzi strain Y. The extracts revealed promising antitrypanosomal activity.

15-lipoxygenase inhibitory activity

The 15-lipoxygenase inhibitory activity of the methanol leaf extracts of *T. zebrina* using spectrophotometric assay by observing the increase in absorbance at 234 nm due to the formation of the product 13-hydroperoxyoctadecadienoic acid was reported by Alaba and Chichioco-Hernandez [21]. The results revealed that the extract can inhibit the 15-lipoxygenase pathway involved in asthmatic attacks.

Antiarrythmic activity

Chunxin *et al*. [15] reported the antiarrythmic activity of 3-ecdysone using aconitine as an inducer of antiarrythmia in animals. The compound revealed significant antiarrythmic activity.

Insecticidal activity

Iannacone and Pérez [22, 23] reported the insecticidal activity of the tea extract of *T. zebrina* against *Anopheles benarrochi*. The results of the study showed promising insecticidal activity with LC_{50} value of 0.86% at 24 h exposure.

CONCLUSION:

Medicinal plant species have always remained as important alternatives to conventional medicines in

developing countries, especially within poor communities that inhabit rural areas and lack access to health as well as the source for identification of active chemicals and formulation into pharmaceutical dosage forms. *T. zebrina* is relatively lesser-known, yet important medicinal plant that is used in several traditional systems of medicine all over the globe. For medicinal uses, *T. zebrina* is primarily collected from wild sources. The plant possess promising antioxidant activity and thus its traditional use in the form of a cold tonic drink a tea *'Matali'* in Mexico is justified. It is therefore worthy of further investigation and promotion as an herbal tea. At present, the plant needs more attention by the researchers.

ACKNOWLEDGMENT

The authors are thankful to Universiti Kuala Lumpur Royal College of Medicine Perak for providing necessary facilities to carry out the research work.

REFERENCES:

1.Edeoga HO, Ogbebor NO. Distribution of calcium oxalate crystals in some Nigerian species of *Aneilema* R. Br. (Commelinaceae). Plant Biosyst 1999; 133(2): 193-198.

2. Faden RB. Commelinaceae. In Flowering Plants—Monocotyledons; Kubitzki, K., Ed.; Springer: Berlin-Heidelberg, Germany; 1998. pp. 109-128.

3.Burns JH, Faden RB, Steppan SJ. (2011). Phylogenetic studies in the Commelinaceae subfamily Commelinoideae inferred from nuclear ribosomal and chloroplast DNA sequences. source. Systc Bot 2011; 36(2): 268-276.

4. Gilman EF. Fact Sheet FPS-620 [document on the Internet]. Institute of Food and Agricultural Sciences, University of Florida, Gainesville, 32611 (Assessed on 29th August 2017). Available on http://edis.ifas.ufl.edu.

5.Faden RB. The author and typification of *Tradescantia zebrina* (Commelinaceae). Kew Bulletin 2008; 63(4): 679-680.

6.Ribeiro DBC, Fabricante JR, Bandeira de Albuquerque M. (2014). Bioinvasion of *Tradescantia zebrina* Heynh. (Commelinaceae) in uplands, State of Paraíba, Brazil. Brazilian J Biol Sci 2014; 1(1): 1-10.

7.Plants Rescue: *Tradescantia zebrina*. 2017. Available at: http://www.plantsrescue.com/tradescantia-zebrina/. [Accessed 29 August 2017].

8.USDA Natural Resources Conservation Service. 2017. *Tradescantia zebrina* hort. ex Bosse inchplant. Available at: https://plants.usda.gov/core/profile?symbol=trze [Accessed 29 August 2017].

9.Traditional herbs: *Zebrinae Pendula* Herba: Traditional herbal for kidney treatment. Available at: http://ecogreenplanet.blogspot.my/2011/07/zebrinae-pendula-herba-traditional.html. [Accessed 29 August 2017].

10.Philippines Medicinal Plants: Sebrina. Available at: http://www.stuartxchange.org/Sebrina.html [Accessed 29 August 2017].

11.Brandon G. (1991). The uses of plants in healing in an Afro-Cuban religion, Santeria. J Black Studies 1991; 22(1):55-76.

12.Medicinal Plants of the Guianas (Guyana, Surinam, French Guiana). Available at: http://botany.si.edu/bdg/medicinal/Medicinal_plants_master.pdf [Accessed 29 August 2017].

13.Amaral FMM, Ribeiro MNS, Barbosa-Filho JM, Reis AS, Nascimento FRF, Macedo RO. Plants and chemical constituents with giardicidal activity. Brazilian J Pharmacog 2006; 16: 696-720.

14.Xiaoqi F, Xingjie L. Study on antineoplastic components of *Zebrina pendula* Schniz. Chinese Traditional Patent Medicine 1992; 02. Available at: http://en.cnki.com.cn/Journal_en/E-E057-ZCYA-1992-02.htm [Accessed 29 August 2017].

15.Chunxin Y, Xingjie L, Jianming X, Yuqin D. Studies on the isolation and identification of 3-ecdysone from *Zebrina pendula* Schnizl and its antiarrhythmic effect. Nat Product Res Dev 1996; 8(3): 17-19.

16.Ashley B, Benjamin L, Samantha L, Calli W, Danielle M, Lexi B. (2012). Effect of aqueous and methanol extracts of *Tradescantia zebrina* and *fluminensis* on human cells [document on the Internet]. University of Wisconsin-Stout Research Services (Assessed on 29th August 2017). Available online at http://digital.library.wisc.edu/1793/65547

17.Moehring DM. The Anti-proliferative properties of *Tradescantia zebrina*. The FASEB J 2013; 27(1): Supplement793.2.

18.Tan JBL, Yap WJ, Tan SY, Lim YY, Lee SM. Antioxidant content, antioxidant activity, and antibacterial activity of five plants from the Commelinaceae family. Antioxidants 2014; 3(4): 758-769.

19.Cheah SY, Magdalene CY, Eldwin Lim CZ, Wong MH, Amir S, Daniel S, Liow YC, Ketnipha S, Karenjit K, Gabriel GA, Chin JH. (2017).*In-vitro* antioxidant and acetylcholinesterase inhibitory activities of *Tradescantia zebrina.* Res J Pharm Biol Chem Sci 2017; 8(1): 82-87.

20.González-Coloma A, Reina M, Sáenz C, Lacret R, Ruiz-Mesia L, Arán VJ, Sanz J, Martinez-Diaz RA. Antileishmanial, antitrypanosomal, and cytotoxic screening of ethnopharmacologically selected

Peruvian plants. Parasitol Res 2012; 110(4): 1381-1392.
21.Alaba CSM, Chichioco-Hernandez CL. 15-Lipoxygenase inhibition of *Commelina benghalensis, Tradescantia fluminensis, Tradescantia zebrina.* Asian Pac J Trop Biomed 2014; 4: 184-188.
22.Iannacone J, Pérez D. Insecticidal effect of *Paullinia clavigera* var. bullata Simpson (Sapindaceae) and *Tradescantia zebrina* Hort ex Bosse (Commelinaceae) in the control of *Anopheles benarrochi* Gabaldon, Cova García & López 1941, main vector of malaria in Ucayali, Peru. Ecol Aplicada 2004; 3: 64-72.
23.Ghosh A, Chowdhury N, Chandra G. Plant extracts as potential mosquito larvicides. Indian J Med Res 2012; 135(5): 581-598.