Journal for Research in Applied Sciences and Biotechnology

www.jrasb.com

ISSN: 2583-4053

Volume-2 Issue-5 || October 2023 || PP. 40-43

https://doi.org/10.55544/jrasb.2.5.7

Potential Phytochemicals and Pharmacological Aspect of *Ficus deltoidea* Plant

Sharbat Khan Nafees[1], Zahidullah Zaheen[2] and Mohammad Aziz Khan[3]

[1]Department of Biology, Faculty of Education, Shaikh Zayed University, Khost AFGHANISTAN.

[2]Department of Biology, Faculty of Education, Shaikh Zayed University, Khost AFGHANISTAN.

[3]Department of Biology, Faculty of Education, Paktika University, AFGHANISTAN.

[1]Corresponding Author: sbkhannafees@gmail.com

https://orcid.org/0009-0007-1169-7287

www.jrasb.com || Vol. 2 No. 5 (2023): October Issue

Received: 24-09-2023	**Revised:** 12-10-2023	**Accepted:** 22-10-2023

ABSTRACT

***Ficus deltoidea* is a potential plant used for several purposes. This plant traditionally used for various treatment in the different parts of the globe. *Ficus deltoidea* has diversed morphology and mostly found in south Asian countries. Due to its great potential, recently it is getting famous as more attention given in exploring herbs as an alternative for medicine. The active phytochemicals of *F. deltoidea* have been studied for antioxidant, anti-diabetic, anti-inflammatory, antinociceptive, anti-ulcerogenic and wound healing activities. This review article will focus on to elaborate the active phytochemicals and pharmacological properties of *F. deltoidea* plant.**

Keywords- *Ficus deltoidea*, phytochemicals, pharmacological properties, medicinal value.

I. INTRODUCTION

Medicinal plants and herbs are used as a source of medicine amongst the different cultures from thousands of years ago. In recent years the utilization of medicinal plants is significantly increased due to its effectiveness. Traditional herbal medicine gives a great impact to the public health care and has increased the advancement of medicine around the globe (Wachtel-Galor and Benzie, 2011). The therapeutic efficiency of plants is because of their secondary metabolites termed as "phytochemical" such as phenols, flavonoids, alkaloids, terpenoids, saponin, steroids, glycosides, tannin and volatile oils. These compounds have pharmacologically active ingredients which play a crucial role in the development of new drugs (Ahmad Khan & Ahmad, 2019).

F. deltoidea plant is broadly distributed in South Asian countries (Farsi et al., 2014). This plant mostly found in tropical and subtropical areas. It belongs to the Moraceae family that consists of 40 genera and more than 1000 species. The plants of this family have many features like male or female small petalless flowers, opposite leaves and having milky latex (Jamal et al., 2017). The leaves of *F. deltoidea* varieties demonstrate heterophylly and the subspecies are mostly identified through leaf structure (Fatihah et al., 2014). The aim of this review is to provide a basic information on phytochemical and pharmacological value of *F. deltoidea* plant.

1.1. Methodology

The pharmacological and phytochemical data of *F. deltoidea* plant was collected by different database search such as Google Scholar, Scopus, PubMed, Web of Science, and Science Direct. A total of 29 research paper

Journal for Research in Applied Sciences and Biotechnology

www.jrasb.com

ISSN: 2583-4053

Volume-2 Issue-5 || October 2023 || PP. 40-43

https://doi.org/10.55544/jrasb.2.5.7

and review article was used to extract the relevant information and data regarding *F. deltoidea* plant.

1.2. Phytochemical Study of F. deltoidea

It has been confirmed that a large number of different plant phytochemicals have substantial biological activity and can be used as a therapeutic agent in multiple diseases (Süntar and Yakıncı, 2020). Several chemical compounds have been extracted and characterised from various parts of *F. deltoidea*, especially from leaves and fruits (Amiera *et al.*, 2014). A Moretenol compound is extracted and recognise from the methanolic extract of *F. deltoidea* leaves by utilising chromatography and nuclear magnetic resonance (NMR) techniques (Lip *et al.*, 2009). The existence of flavonoids compounds (naringenin, quercetin, and rutin) was verified during the screening of *F. deltoidea* sample through HPLC and LS-MC based techniques. In the same context, research conducted by Omar *et al.* (2011) on flavonoid compounds of aqueous extract of *F. deltoidea* and characterised more than 25 compounds using HPLC-MS-based techniques. The antibacterial compound lupeol ($C_{30}H_{50}O$) was isolated from the leaf extract of *F. deltoidea* (Suryati *et al.* 2011). The two important bioflavonoids, namely vitexin and isovitexin was isolated from *F. deltoidea* leaves extract (Choo *et al.* 2012).

Figure 1.1: *Ficus deltoidea* Plant

II. PHARMACOLOGICAL EFFECTS OF F. DELTOIDEA

2.1. Anti-Diabetic Activity of F. deltoidea

Many scientific approaches and studies have been done and proven the anti-diabetic activity of the *F. deltoidea* plant (Adam *et al.*, 2012). The oral administration of aqueous extract of *F. deltoidea* leaves efficiently reduced the total cholesterol and low density lipoprotein (LDL) in pre-diabetes (21-65 aged) adults (Kalman *et al.*, 2013). A variety of phytochemicals called vitexin and isovitexin has been obtained from *F. deltoidea* leaf extract that restored the levels of blood glucose in streptozotocin-induced diabetic rats, and inhibited α-glucosidase activity *in vivo* Choo *et al.*, 2012). The hot aqueous extract of *F. deltoidea* leaves have been studied *in vitro* on the BRIN BD II cells. The findings of the study reveal that it can stimulates insulin secretion efficiently from the pancreatic beta-cells and increases glucose influx into adipocytes (Adam *et al.*, 2012).

An *in vivo* study crude extract of *F. deltoidea* was administrated orally to euglycaemic and diabetic induced rats. The results of the study suggest that the crude extract predominantly exhibit a blood glucose-lowering effect in both euglycaemic and diabetic induced rats (Ilyanie *et al.*, 2011). To the same extent a considerable amount of *F. deltoidea* methanolic extract and vitexin was administrated orally to streptozotocin-induced diabetic rodents for six weeks. The findings suggest that *F. deltoidea* and vitexin enhances the activity of antioxidant enzymes in the pancreas and promote the restoration of Langerhans islets (Nurdiana *et al.*, 2017).

2.2. Anti-Inflammatory Activity of F. deltoidea

Natural and herbal remedies have been used to reduce the pain and inflammation for hundred and thousand years ago (Maroon *et al.*, 2010). Few studies have argued that *F. deltoidea* extract has potent anti-inflammatory components. A comprehensive study was carried out on methanolic, and aqueous leaves extract of *F. deltoidea* three subspecies for anti-inflammatory activity assessment (Abdullah *et al.*, 2009). The finding demonstrates anti-inflammatory activity in all three varieties of *F. deltoidea.* The methanolic extract shows the powerful anti-inflammatory activity of the TPA model (Abdullah *et al.*, 2009; Abrahim *et al.*, 2018). In contrast, the aqueous extract of *F. deltoidea* leaves has been examined *in vivo* to assess anti-inflammatory activity in adult male Sprague–Dawley rat against acute, chronic, and pain associated inflammation. The carrageenan-induced paw oedema test, cotton pellet-induced Granuloma test, and formalin test was performed. The interpreted data demonstrates that the leaves extract of *F. deltoidea* reduces the inflammatory activity against acute and chronic inflammatory reactions and pain-associated inflammatory responses (Zakaria *et al.*, 2012).

2.3. Antioxidant Activity of F. deltoidea

Antioxidants are molecules that prevent or reduce the oxidation process by scavenging free radicals (Lobo *et al.*, 2010). Plant phenolic substances and their derivatives are a potent natural antioxidant and related to the antioxidant activity (Jeeva *et al.*, 2015). The study was carried out on *F. deltoidea* leaves extract to determine the enzymatic and non-enzymatic antioxidant activities. The findings of the analysis explore the existence of non-enzymatic antioxidants like polyphenol, phenolic acid, and flavonoid and enzymatic antioxidants such as ascorbate, oxidase, peroxidase, catalase and, ascorbate peroxidase in *F. deltoidea* leaves extract (Yaacob and Baharuldin,2018). The two subspecies of *F. deltoidea* were comparatively studied to determine the antioxidant activity. The study indicated that the aqueous extract of both subspecies exhibits high antioxidant activity as compared with the fractions (Misbah *et al.*, 2013).

ISSN: 2583-4053

Volume-2 Issue-5 || October 2023 || PP. 40-43

https://doi.org/10.55544/jrasb.2.5.7

The aqueous extract of three varieties of *F. deltoidea* was investigated for antioxidant activity. The author figured out that high radical scavenging activity was found in *F. kunstleri* subspecies. Similarly, the subspecies *F. kunstleri* was enriched in total phenolic and flavonoid content, followed by *F. deltoidea and F. angustifolia* (Soib *et al.*, 2015). The crude extract and ethyl acetate fraction of *F. deltoidea* leaves were examined for TPC, TFC, and antioxidant activity. The result suggests that *F. deltoidea* crude extract and fractions have a good source of antioxidant having a significant amount of phenolic and flavonoid content (Abrahim *et al.*, 2018).

2.3. Wound-Healing Activity of F. deltoidea

The *in vivo* study has been conducted on a group of Sprague drawly rats to determine the wound healing activity of aqueous extract of *F. deltoidea* leaves aqueous extract. Aseptically a uniform cut of 2 cm in diameter was introduced to all rodents on the upper backside of the neck and assessed for several days.The wound was dressed twice every day with a skinny layer of placebo having 5 % and 10 % *F. deltoidea* aqueous extract. The findings revealed that wounds treated with aqueous extract of *F. deltoidea* show considerable signs of dermal healing as compared to wounds treated with sterile deionized water and blank placebo (Abdulla *et al.*, 2010). The human fibroblast cells were treated with aqueous extract of *F. deltoidea* leaves via *in vitro* study. The outcome indicates that *F. deltoidea* leaves aqueous extract enhances the migration of fibroblast cells and played a crucial role in treating the damaged tissue (Mustaffa et al., 2015).

The *F. deltoidea* plant extract was examined for ulcer healing during *in vivo* study. The study was performed on ethanol-induced gastric ulcer rats. The histological observation reveals that the stomach of rats treated with *F. deltoidea* extract show reduced ulcer surface, inhibition of leukocyte infiltration and lack of oedema in the submucosal area. These findings suggest that the components of *F. deltoidea* has a cytoprotective effect and keep safe the gastric mucosa from damage (Fatimah *et al.*, 2009). In the same way, Ahmad and Amin (2017), examined the anti-oral ulcer activity of *F. deltoidea* leaf extract on experimental rats. The result of the study demonstrates that *F. deltoidea* aqueous extract significantly enhance the reduction of ulcer size and promote the percentage of inhibitory region.

The above mention literature regarding the pharmaceutical activities of *F. deltoidea* extract shows that the corresponding plant has a plenty of potential and efficient phytochemicals which can be used as antioxidant, anti-inflammatory, anti-diabetic and anti-ulcerogenic agent. The upper mention studies demonstrated that the crude extract of this plant was used experimentally against different *in vivo* models and *in vitro* cell culture. Besides their promising affect as a pharmaceutical agent, still needs further studies to explore more to their phytochemicals and pharmaceutical activities.

III. CONCLUSION

Ficus deltoidea is a remarkable medicinal plant, traditionally used for several purposes effectively. The previous studies proven the presence of numerous potent phytochemicals such as phenolic, flavonoids and alkaloids to its pharmacological properties. Further studies need to identify the potent bioactive compounds of *F. deltoidea* by utilising advanced technology such as s high-performance liquid chromatography (HPLC), liquid chromatography-mass spectrometry (LC-MS/MS) and nuclear magnetic resonance (NMR), and fourier transform infrared spectroscopy (FTIR).

ACKNOWLEDGMENTS

The authors would like to express special thanks to the Shaikh Zayed University, and Department of Biology for their support.

REFERENCES

[1] Abdulla, M. A., Ahmed, K. A.-A., Abu-Luhoom, F. M., and Muhanid, M. (2010). 'Role of Ficus deltoidea extract in the enhancement of wound healing in experimental rats'. Biomedical Research, 21(3), 241-245.

[2] Abdullah, Z., Hussain, K., Ismail, Z., and Ali, R. M. (2009). 'Anti-inflammatory activity of standardised extracts of leaves of three varieties of Ficus deltoidea'. International Journal of Pharmaceutical and Clinical Research, 1(3), 100-105.

[3] Abrahim, N. N., Abdul-Rahman, P. S., and Aminudin, N. (2018). 'The antioxidant activities, cytotoxic properties, and identification of water-soluble compounds of Ficus deltoidea leaves'. PeerJ, 6, 1-20.

[4] Adam, Z., Khamis, S., Ismail, A., and Hamid, M. (2012). 'Ficus deltoidea: A potential alternative medicine for diabetes mellitus'. Evidence-Based Complementary and Alternative Medicine, 2012, 1-12.

[5] Ahmad Khan, M. S., and Ahmad, I. (2019). Chapter 1 - Herbal Medicine: Current Trends and Future Prospects. In M. S. Ahmad Khan, I. Ahmad and D. Chattopadhyay (Eds.), New Look to Phytomedicine (pp. 3-13): Academic Press.

[6] Ahmad, V. N., and Amin, I. M. (2017). 'Anti-oral ulcer activity of Ficus deltoidea leaves extract on animal model'. Pertanika J Sci Technol, 25(S), 41-52.

[7] Amiera, Z., Nihayah, M., Wahida, I. F., and Rajab, N. (2014). 'Phytochemical characteristic and uterotonic effect of aqueous extract of'. Pak J Biol Sci, 17(9), 1046-1051.

[8] Choo, C., Sulong, N., Man, F., and Wong, T. (2012). 'Vitexin and isovitexin from the leaves of Ficus deltoidea with in-vivo α-glucosidase inhibition'. Journal of ethnopharmacology, 142(3), 776-781.

[9] Farsi, E., Ahmad, M., Hor, S. Y., Ahamed, M. B. K., Yam, M. F., and Asmawi, M. Z. (2014). 'Standardized extract of Ficus deltoidea stimulates insulin secretion and

ISSN: 2583-4053

Volume-2 Issue-5 || October 2023 || PP. 40-43

https://doi.org/10.55544/jrasb.2.5.7

blocks hepatic glucose production by regulating the expression of glucosemetabolic genes in streptozitocin-induced diabetic rats'. BMC complementary and alternative medicine, 14(1), 1-13.

[10] Fatihah, H. N. N., Nashriyah, M., Zaimah, A. R. N., Khairil, M., and Ali, A. M. (2014). 'Leaf morphology and anatomy of 7 varieties of Ficus deltoidea (Moraceae)'. Turkish Journal of Botany, 38(4), 677-685.

[11] Fatimah, Z., Mahmood, A., Hapipah, M., Suzita, M., and Salmah, I. (2009). 'Antiulcerogenic activity of aqueous extract of Ficus deltoidea against ethanolinduced gastric mucosal injury in rats'. Research Journal of Medical Sciences, 3(2), 42-46.

[12] Ilyanie, Y., Wong, T. W., and Choo, C. Y. (2011). 'Evaluation of hypoglycemic activity and toxicity profiles of the leaves of Ficus deltoidea in rodents'. Journal of Complementary and Integrative Medicine, 8(1), 1-16

[13] Jamal, M., Afifah, N., Ahmad, K., and Nafiah, M. A. (2017). 'Phytochemical studies of ficus deltoidea var kunstleri'. Asian Journal of Chemistry, 29(7), 1451-1454.

[14] Jeeva, J. S., Sunitha, J., Ananthalakshmi, R., Rajkumari, S., Ramesh, M., and Krishnan, R. (2015). 'Enzymatic antioxidants and its role in oral diseases'. Journal of pharmacy & bioallied sciences, 7(Suppl 2), 331-333.

[15] Kalman, D. S., Schwartz, H. I., Feldman, S., and Krieger, D. R. (2013). 'Efficacy and safety of Elaeis guineensis and Ficus deltoidea leaf extracts in adults with prediabetes'. Nutrition journal, 12(1), 1-7.

[16] Lip, J. M., Hisham, D. N., Zaidi, J. A., Musa, Y., Ahmad, A., Normah, A., & Sharizan, A. (2009). Isolation and identification of moretenol from Ficus deltoidea leaves. *Journal of Tropical Agriculture and Food Science*, *37*(2), 195-201.

[17] Lobo, V., Patil, A., Phatak, A., and Chandra, N. (2010). 'Free radicals, antioxidants and functional foods: Impact on human health'. Pharmacognosy reviews, 4(8), 118-126.

[18] Maroon, J. C., Bost, J. W., and Maroon, A. (2010). 'Natural anti-inflammatory agents for pain relief'. Surgical neurology international, 1(80), 1-10.

[19] Misbah, H., Aziz, A. A., and Aminudin, N. (2013). 'Antidiabetic and antioxidant properties of Ficus deltoidea fruit extracts and fractions'. BMC complementary and alternative medicine, 13(1), 1-12.

[20] Mustaffa, N. A. A. W., Hasham, R., and Sarmidi, M. R. (2015). 'An in vitro study of wound healing activity of Ficus deltoidea leaf extract'. Jurnal Teknologi, 77(3), 67-72.

[21] Nurdiana, S., Goh, Y. M., Ahmad, H., Dom, S. M., Azmi, N. S. a., Zin, N. S. N. M., and Ebrahimi, M. (2017). 'Changes in pancreatic histology, insulin secretion and oxidative status in diabetic rats following treatment with Ficus deltoidea and vitexin'. BMC complementary and alternative medicine, 17(1), 1-17.

[22] Omar, M. H., Mullen, W., and Crozier, A. (2011). 'Identification of proanthocyanidin dimers and trimers, flavone C-glycosides, and antioxidants in Ficus deltoidea, a Malaysian herbal tea'. Journal of agricultural and food chemistry, 59(4), 1363-1369.

[23] Ong, S., Ling, A., Poospooragi, R., and Moosa, S. (2011). 'Production of Flavonoid compounds in cell cultures of Ficus deltoidea as influenced by medium composition'. International Journal of Medicinal and Aromatic Plants, 1(2), 62-74.

[24] Soib, H. H., Ware, I., Yaakob, H., Mukrish, H., and Sarmidi, M. R. (2015). 'Antioxidant and anti-cancer actvity of standardized extracts of three varieties of Ficus deltoidea's leaves'. Jurnal Teknologi (Science & Engineering), 77(3), 19-25.

[25] Süntar, I., and Yakıncı, Ö. F. (2020). Potential risks of phytonutrients associated with high-dose or long-term use. In Phytonutrients in Food (pp. 137-155): Elsevier.

[26] Suryati, S., Nurdin, H., Dachriyanus, D., and Lajis, M. N. H. (2011). 'Structure elucidation of antibacterial compound from Ficus deltoidea Jack leaves'. Indonesian Journal of Chemistry, 11(1), 67-70.

[27] Wachtel-Galor, S., and Benzie, I. F. F. (2011). Herbal Medicine: An Introduction to Its History, Usage, Regulation, Current Trends, and Research Needs (2nd ed.). Boca Raton (FL): CRC Press/Taylor & Francis Copyright © 2011 by Taylor and Francis Group, LLC.

[28] Yaacob, A., and Baharuldin, M. T. H. (2018). 'A Review on Ficus deltoidea Medicinal Properties and Its Potential Use as Ergogenic Aids in Athletes'. Pertanika Journal of Scholarly Research Reviews, 4(2), 18-28.

[29] Zakaria, Z., Hussain, M., Mohamad, A., Abdullah, F., and Sulaiman, M. (2012). 'Anti-inflammatory activity of the aqueous extract of Ficus deltoidea'. Biological research for nsursing, 14(1), 90-97.