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UNLOCKING THE HEALING POWER OF DHAMASA BOOTI (FAGONIA SPP.): A COMPREHENSIVE REVIEW OF PHYTOCHEMISTRY, PHARMACOLOGICAL ACTIVITIES, AND THERAPEUTIC POTENTIAL

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Abstract

Fagonia species, also called Dhamasa Booti, are herbs widely applied in South Asian and Middle Eastern folk medicine as a remedy in controlling fever, liver related issues, inflammation, diabetes, infections and tumor-like growths. These plants have a high level of bioactive compounds such as flavonoids, triterpenoids, saponins, alkaloids and phenolic acids which make them possess a wide span of pharmacological activity. The preclinical research has shown strong antioxidant, anti-inflammatory, hepatoprotective, antimicrobial, antidiaetic, anticancer, and immunomodulatory activities, which can substantiate most of the traditional applications. Along with therapeutic potential, Fagonia species are sources of vital nutrients, including vitamins, minerals, and dietary fibers that can improve the overall health condition and can work synergistically with phytochemicals to promote the functionality of the organism. However, with good in vitro and in vivo data, clinical validation has been less than convincing and issues like standardization of extracts, optimization of dosage and long-term safety evaluation must be tackled. This is a critical review of the existing knowledge on the phytochemistry, pharmacological activities, nutritional value, and safety profile of Fagonia species, which presents the gap in knowledge and future research directions. The overall analysis highlights the potential of Fagonia as both therapeutic and functional food, and the necessity to conduct systematic clinical trials and mechanistic research, and convert the traditional information to evidence-based medical and nutritional use.

INTRODUCTION

The medicinal plants do remain a very important part of global healthcare especially in the developing nations where underdeveloped systems of traditional medicine are well embedded with the local cultures (Astutik et al., 2019). According to the estimation on primary healthcare by the World Health Organization (WHO), approximately 80% of the world population uses plant-based medicines (WHO, 2019). Besides their cultural significance, medicinal plants are also being appreciated as sources of new bioactive compounds to aid in drug discovery. Modern medicine has a continuing interest in the presence of plant-derived or indirectly-plant-derived pharmaceuticals: this is estimated to comprise about 26-30% of the modern pharmaco-sphere (Newman & Cragg, 2020).

These medicinal plants include Fagonia species which are used locally in the area as Dhamasa Booti and are receiving growing scientific attention because of their extensive ethnomedicinal uses and the growing pharmacological supporting evidence (Ali & Khan, 2021). Fagonia is a genus in the family of Zygophyllaceae and contains around 3040 species that are found in the arid parts of Asia, Africa, and Mediterranean (Beier et al., 2003). Such plants are highly adapted to desert ecosystems which are typified by harsh temperatures and lack of water. It is known that such environmental stress conditions trigger the production of secondary metabolites most of which have strong antioxidant and protective biological properties (Sulieman, 2023).

Fagonia cretica L. and Fagonia indica Burm.f. are the most widely used plants in the traditional systems, including Unani and Ayurveda, in South Asia (Nayila et al., 2024). In the past, the plant has been used to treat fever, blood cleansing, liver diseases, skin infections, asthma, and tumors (Khan et al., 2017). Chronic inflammatory diseases and metabolic diseases are usually treated using decoctions of aerial parts to treat traditional healers. Its presumed detoxifying and antioxidant action is demonstrated by the reputation of the plant as a purifier of blood in Unani medicine (**Akbar, 2020**). In the last ten years, scientific evidence which is increasingly becoming available, began to confirm a large portion of these traditional assertions. Antioxidant, anti-inflammatory, hepatoprotective, antimicrobial, antidiabetic, and anticancer effects of Fagonia extracts have been shown during preclinical research (Azam et al., 2018; Mohamed et al., 2024; Sulieman, 2023). Nevertheless, clinical assessment is limited with respect to systematic evaluation. Thus, this review summarizes the current results on phytochemistry, pharmacological, safety profile, and clinical opportunities of Dhamasa Booti, as well as the gaps in the research and future perspectives.

2. Botanical Description and Taxonomy

Fagonia species are shrubs that are small, highly-branched, spiny, and most of them measure 20-60 cm in height. They are morphologically defined by trifoliate leaves, sharp stipular spines, and isolated pink to purple flowers. The fruits are tiny capsules with a number of seeds that survive in dry climates (Beier et al., 2003). The plant grows in sands and rocky soils and is mostly common in the desert and semi-desert areas. Biological significance of Fagonia species to withstand severe environmental stress conditions is consistent (**Sultan et al., 2024**). The high concentrations of phenolic compounds and flavonoids are common in plants that are exposed to droughts and ultraviolet radiation, which serve as antioxidants. The potential causes of these phytochemicals associated with the stress might be partly related to the high therapeutic value of the plant (Forni et al., 2019).

Taxonomic classification:

- Kingdom: Plantae
- Order: Zygophyllales
- Family: Zygophyllaceae
- Genus: *Fagonia*

The botanical identification should be done correctly because the phytochemical composition could differ among species and geographical locations. It can cause inconsistencies in the therapeutic effect and research inconsistencies due to being misidentified.

3. Ethnomedicinal Uses

Dhamasa Booti is defined in Unani medicine as a cooling, detoxifying, and anti-inflammatory medicinal compound that is used to treat chronic fevers, liver dysfunction, and inflammation problems (Khan et al., 2017). It is often used in the polyherbals that are intended to clean the blood and improve the liver functions. The plant is used in Ayurvedic practice in the context of pitta related disorders, skin diseases as well as digestive disturbances (Ashalatha, 2025). Preparations made using aerial parts as decoctions and powders are usually used. Surveys on ethnobotanical usage in Pakistan and India indicate its use in Diabetes, Asthma,Urinary tract

infections, Cancer-like growths and Blood purification (Khan et al., 2017; Mahmood et al., 2016). It is also prescribed by traditional practitioners to treat typhoid fever and as an overall immunomodulator. Although its use is widespread, its dosage and mode of preparation are also highly differentiated by geographical area. There are those communities which use aqueous decoctions, others use ethanolic extracts or powdered formulations. The standardization and scientific validation is important because of this variability.

4. Phytochemical Composition

Phytochemical analyses using HPLC, LC-MS, and GC-MS techniques have identified diverse bioactive compounds responsible for the pharmacological properties of *Fagonia* species (Sulieman, 2023).

4.1 Flavonoids

Major constituents that lead to antioxidant activity include flavonoid, e.g., quercetin, kaempferol, and rutin. These compounds have a high free radical scavenging ability in which they contribute hydrogen atoms or electrons to inactivate reactive oxygen species (ROS). Flavonoids also regulate intracellular mechanisms of signaling that deal with inflammation and apoptosis (Sulieman, 2023).

4.2 Triterpenoids and Saponins

Fagonia species have been found to contain terpenoid oleanolic acid and ursolic acid (Alamami et al., 2022). Such compounds have been reported to have anti-inflammatory, hepatoprotective and anticancer properties. The saponins present in the plant can possibly play a role in the change of membrane permeability and immunostimulatory activity (Shen et al., 2023).

4.3 Phenolic Compounds

Phenolic acids play a major role in antioxidant activity of the plant. Their chelating property and lipid peroxidation prevention increases the protection of cells against oxidative stress (Sulieman, 2023).

5. Nutritional Impacts

Besides pharmacological effects, Fagonia species are claimed to have bioactive nutrients that can be beneficial to the general health. Nutritional studies of Fagonia indica and Fagonia cretica have shown that they have macronutrients, micronutrients, and bioactive compounds, which are important to human health (Sulieman, 2023; Khan et al., 2017).

5.1 Macronutrients

Fagonia aerial sections have moderate quantities of carbohydrates, proteins, and dietary fibers. These are macronutrients which may be of a low nutritional content especially when used as a rural diet where the plant is used as decoctions or as powdered food stuff. Dietary fibers can play a role in the gastrointestinal system and help with better glucose metabolism (Mahmood et al., 2016).

5.2 Micronutrients

The Fagonia species are also good sources of some of the most important minerals like calcium, potassium, magnesium and iron (El Zayat, 2020). These minerals are important in the maintenance of bones, enzymes, cardiovascular performance and oxygen transportation. Early research indicates that the regular use can be used to alleviate micronutrient shortages in areas where the plant is included in the local diets (Sulieman, 2023).

5.3 Vitamins and Antioxidant Nutrients

Vitamin C, carotenoids and polyphenolic compounds have been identified in Fagonia species by phytochemical and nutritional research (Iftikhar et al., 2022). The antioxidants are also famously vitamin C and carotenoids, which complement the presence of phenolic and flavonoid in the neutralization of free radicals and immune functioning of the plant (Azam et al., 2018).

5.4 Synergistic Nutritional and Therapeutic Effects

The synergistic effects of the combination of micronutrients, vitamins, and bioactive

phytochemicals could be more beneficial to the therapeutic effect of the plant (Chen et al., 2022). As an illustration, the combination of antioxidant vitamins and polyphenols can potentially lower the level of oxidative stress, liver functionality, and metabolic wellbeing. This aspect of nutrition offers a mechanistic explanation of the ancient notion that Dhamasa Booti cleanses the blood and keeps one healthy in general (Iqbal, 2022). All in all, the main value of Fagonia is in its pharmacological functions, however, its nutritional value is an addition to its integrative quality of action as food and medicine, especially in communities that turn to it as a traditional herbal medicine (Malavika et all., 2021).

6. Pharmacological Activities

6.1 Antioxidant Activity

Oxidative stress is the key to the progress of chronic illnesses such as cancer, diabetes, and cardiovascular disorders. Fagonia indica methanolic extracts exhibit high levels of DPPH and ABTS radical scavenging activity, which means that they have a high level of antioxidant potential (Sulieman, 2023). Fagonia extracts of drugs raised antioxidant enzyme levels, including superoxide dismutase (SOD), catalase, and glutathione peroxidase, and decreased lipid peroxidation indicators, including malondialdehyde, in experimental animal models (Azam et al., 2018). These results confirm classical assertions of detoxification and purification of the blood.

6.2 Anti-inflammatory Activity

Many chronic disorders are caused by inflammation. Mohamed et al. (2024) established that the extracts of Fagonia cretica had a strong effect of reducing pro-inflammatory cytokines such as TNF-alpha, IL-6, and COX-2 in a test tube. Molecular docking investigations also implied the inhibition of the NF-KB signalling pathways, a key regulator of inflammation. This could inhibit chronic inflammatory injury and play a protective role in arthritis, liver injury and metabolic disease.

6.3 Hepatoprotective Effects

Carbon tetrachloride CCl4 causes hepatic injury, and through this, it was revealed that Fagonia indica extract decreased serum ALT and AST levels and hepatocyte injury (Azam et al., 2018). Hepatoprotection was correlated with reduced oxidative stress and toll-like receptor expression in a mechanistic way. These are especially important in the context of liver diseases that affect the whole world (Zhang et al., 2020).

6.4 Anticancer Activity

Recent in vitro research demonstrates cytotoxic effects of Fagonia cretica on the breast and liver cancer cell lines (Mohamed et al., 2024). It has been indicated that apoptosis induction occurs by caspase activation and mitochondrial pathway modulation (Lam et al., 2016). The findings are, however, preclinical and have to be clinically validated.

6.5 Antimicrobial Activity

Fagonia indica extracts are anti-bacterial against Staphylococcus aureus and Escherichia coli (Sulieman, 2023). The phenolic compounds can interfere with the enzymatic systems and break down the microbial cell membrane. It is used in the treatment of infections and wounds, with the support provided by this activity (Ecevit et al., 2022).

6.6 Antidiabetic Activity

Evidence of the research trial is provided by experimental diabetic models showing that Fagonia extracts lower the level of fasting blood glucose and enhance insulin sensitivity (Mahmood et al., 2016). This could be pancreatic protection mediated by antioxidants.

6.7 Immunomodulatory Activity

There is a hypothesis that Fagonia regulates the synthesis of cytokines and stimulates macrophages (Lam et al., 2016). This is probably the reason why it has been used traditionally in chronic infections and inflammatory diseases.

7. Toxicological Profile

The toxicity studies indicate that acute toxicity at therapeutic doses is relatively low (Mahmood et al., 2016). Nevertheless, there is still a lack of extensive chronic toxicity research. The lack of standardized extracts poses some questions regarding inconsistency of safety and efficacy. The possible herb-drug interactions, particularly with the antidiabetic and hepatoprotective drugs, should be examined. It is important to first set up therapeutic windows and safe dosage ranges prior to clinical integration (Gamil et al., 2025).

8. Clinical Evidence and Research Gaps

Nowadays, there are no strong randomized controlled trials. The majority of the evidence is obtained due to:

- In vitro experiments
- Animal models
- Small observational reports

There is an urgent need to conduct clinical validation, pharmacokinetics and dose optimization.

9. Future Directions

Future studies should be aimed at:

1. Randomized controlled clinical trials.
2. Extract Standardization.
3. Active compounds identification.
4. Molecular mechanism investigations.
5. Long-term safety profiling

Evidence-based medicine demands strict scientific validation to be included in it.

10. Conclusion

Dhamasa Booti (Fagonia species) is a medicinal plant that has a long history of traditional use in treating fevers, inflammatory diseases, liver and kidney disorders, diabetes, skin and tumors (Khan et al., 2017; Mahmood et al., 2016). These activities have been substantiated by modern research and have demonstrated antioxidant, anti-inflammatory, hepatoprotective, antimicrobial, antidiabetic, anticancer, and immunomodulatory activity and are mostly due to its abundant phytochemical composition, which comprises flavonoids, triterpenoids, saponins, and phenolic compounds (Azam et al., 2018; Lam et al., 2015; Mohamed et al., 2024; Sulieman, Moreover, Fagonia species have important nutrients (minerals, vitamins, and dietary fibers), which can be used in combination with other products and are likely to have an additional positive impact on health (Mahmood et al., 2016; Sulieman, 2023). In conclusion, despite its potential good preclinical outcomes, there is limited clinical validation, and additional studies are needed to determine the potential of Fagonia species as a therapeutic and nutritional agent (Azam et al., 2018; Mohamed et al., 2024). To convert traditional knowledge into practical evidence-based applications and use the full potential of the medicinal and nutritional properties of the plant, future research based on clinical trials, mechanistic pathways, and standardized formulations is necessary (WHO, 2019; Khan et al., 2017).

References

Azam, F., Sheikh, N., Ali, G., & Tayyeb, A. (2018). *Fagonia indica* repairs hepatic damage through expression regulation of toll-like receptors in a liver injury model. *BioMed Research International, 2018*, Article 7969426. https://doi.org/10.1166/2018/7969426

Beier, B. A., Chase, M. W., & Thulin, M. (2003). Phylogenetic relationships and taxonomic revision of *Fagonia* (Zygophyllaceae) based on molecular data. *Plant Systematics and Evolution, 241*(1–2), 1–28. https://doi.org/10.1007/s00606-003-0028-0

Khan, M. A., Khan, T., & Ahmad, M. (2017). Ethnopharmacological importance of *Fagonia* species: A review of traditional uses and pharmacological properties. *Journal of Ethnopharmacology, 202*, 34–46.

Lam, M., Carmichael, A. R., & Griffiths, H. R. (2016). An aqueous extract of *Fagonia cretica* induces apoptosis in breast cancer cells by oxidative stress-mediated pathways. *Integrative Cancer Therapies, 14*(2), 123–132. https://doi.org/10.1177/1634736414660407

Mahmood, A., Mahmood, A., & Malik, R. N. (2016). Indigenous knowledge of medicinal plants and their use in treating various ailments in arid regions of Pakistan. *Journal of Ethnopharmacology, 181*, 1–14. https://doi.org/10.1016/j.jep.2016.01.016

Mohamed, E. I. A., Elwekeel, A. H., Mohamed, D. E., Zaki, M. A., & El-Naggar, M. E. (2024). Validating anti-inflammatory and cytotoxic properties of *Fagonia cretica* L. through metabolic, in vitro, and in silico profiling. *BMC Complementary Medicine and Therapies, 24*, 411. https://doi.org/10.1186/s12906-024-04684-y

Newman, D. J., & Cragg, G. M. (2020). Natural products as sources of new drugs over the nearly four decades from 1981 to 2019. *Journal of Natural Products, 83*(3), 770–803. https://doi.org/10.1021/acs.jnatprod.9b01286

Sulieman, A. M. E. (2023). Chemical composition, antioxidant, and antibacterial potential of *Fagonia indica*. *Plants, 12*(6), 1364. https://doi.org/10.3390/plants12061364

World Health Organization. (2019). *WHO global report on traditional and complementary medicine 2019*. World Health Organization. https://www.who.int/publications/i/item/9789241616436

Astutik, S., Pretzsch, J., & Ndzifon Kimengsi, J. (2019). Asian medicinal plants' production and utilization potentials: A review. Sustainability, 11(19), 5483.

Ali, K., & Khan, H. (2021). Fagonia indica; A review on chemical constituents, traditional uses and pharmacological activities. Current Pharmaceutical Design, 27(22), 2648-2660.

Nayila, I., Sharif, S., Lodhi, M. S., Aman, F., Zaheer, S., & Sajid, A. (2024). Unveiling the therapeutic prospective of active phytochemicals from fagonia species and potential role of its green synthesized nanoparticles. Pak. J. Bot, 56(6), 2295-2303.

Akbar, S. (2020). Handbook of 200 medicinal plants: a comprehensive review of their traditional medical uses and scientific justifications.

Sultan, M. A., Ahmad, I., Abbas, T., Shah, A. A., Elansary, H. O., & Sridhara, S. (2024). The impact of Heavy dust pollution reduces biodiversity by altering the metabolism and biochemical characteristics of Fagonia indica.

Ashalatha, B. (2025). Exploring the Role of Medicinal Plants in Ayurveda: A Comprehensive Review. Medicinal plants and Their uses: Basic to Field, 122.

El Zayat, M. (2020). Proximate composition, mineral content and secondary metabolites of three medicinal wild Fagonia species. Food Biology.

Iftikhar, N., Chatha, S. A., Ahmad, T., Ali, Q., Hussain, A. I., & Rathore, H. A. (2022). Fagonia arabica L.: a review of its phytochemistry, pharmacology and traditional uses. Combinatorial Chemistry & High Throughput Screening, 25(7), 1187-1199.

Chen, X., Li, H., Zhang, B., & Deng, Z. (2022). The synergistic and antagonistic antioxidant interactions of dietary phytochemical combinations. Critical reviews in food science and nutrition, 62(20), 5658-5677.

Iqbal, M. (2022). Complementary and Alternative Medicinal Approaches for Enhancing Immunity. CRC Press.

Malavika, P. S., Singh, V., & Kumar, Y. (2021). The chemistry and pharmacology of Fagonia genus: a review. Int. J. Sci. Dev. Res, 6, 332-343.

Zhang, S., Feng, Z., Gao, W., Duan, Y., Fan, G., Geng, X., ... & Peng, C. (2020). Aucubin attenuates liver ischemia-reperfusion injury by inhibiting the HMGB1/TLR-4/NF-κB signaling pathway, oxidative stress, and apoptosis. Frontiers in pharmacology, 11, 544124.

Ecevit, K., Barros, A. A., Silva, J. M., & Reis, R. L. (2022). Preventing microbial infections with natural phenolic compounds. Future Pharmacology, 2(4), 460-498.

Gamil, N. M., Elsayed, H. A., Hamed, R. M., Salah, E. T., Ahmed, A. M., Mostafa, H. A., ... & Abou-Hussein, D. (2025). Insights from herb interactions studies: a foundational report for integrative medicine. Future Journal of Pharmaceutical Sciences, 11(1), 46.

Forni, C., Facchiano, F., Bartoli, M., Pieretti, S., Facchiano, A., D'Arcangelo, D., ... & Jadeja, R. N. (2019). Beneficial role of phytochemicals on oxidative stress and age-related diseases. BioMed research international, 2019(1), 8748253.

Shen, L., Luo, H., Fan, L., Tian, X., Tang, A., Wu, X., ... & Su, Z. (2023). Potential immunoregulatory mechanism of plant saponins: a review. Molecules, 29(1), 113.

Alamami, A., Elshibani, F., Elremali, N., Daboub, A., Zaed, S. B., & Bumadian, M. (2022). The species of genus fagonia in Libya:(A comprehensive review). Journal of Pharmacognosy and Phytochemistry, 11(5), 28-37.