Review Article

Kalika Journal of Multidisciplinary Studies

[A Peer-Reviewed]

ISSN No.: 2822-180x (Print), ISSN No.: 2961-1733 (Online)

Published by Kalika Multiple Campus, Pokhara, Tribhuvan University, Pokhara, Nepal

Vol. VI, December 2024, pp. 145-167

DOI:

Medicinal Plants as A Natural Immunity Booster Against Covid 19: A Review

***Deepak Gautam[1,2], Krishika Regmi[1], Shital Shrestha[1], Pawan Karki[3]**

ABSTRACT

Medicinal plants have long been valued for their therapeutic properties, especially in boosting immune function. This review explores the role of medicinal plants in enhancing immunity during the COVID-19 pandemic, with an emphasis on plants known for their bioactive compounds and health benefits. A thorough search of online databases resulted in the identification of 115 published articles from 2020 to 2024, which led to the selection of 50 plants commonly used for immune support. Plants include Garlic, Ashwagandha, Neem, Turmeric, Guduchi, Holy Basil, Amla, Aloe Vera, Black Cardamom, Cinnamon, Pomegranate, Guava, Moringa, Black Cumin, Lemon, Lemongrass, Papaya, Green Tea and others. These plants contain bioactive compounds such as flavonoids, alkaloids, and terpenoids, which are believed to possess immune-boosting, anti-inflammatory, and antiviral properties. Garlic, Turmeric, and Ashwagandha are particularly noted for combating oxidative stress and supporting immune function, while Gurjo, Neem, and Amla are valued for their detoxifying and anti-inflammatory effects. These plants, traditionally used during viral infections like the flu and COVID-19, represent a fusion of ancient cultural wisdom and modern scientific research.Future research should focus on clinical validation and pharmacological studies to better understand the efficacy of these plants in immune modulation.

Keywords: *Alkaloids, anti-inflammatory, antiviral, flavonoids, terpenoids.*

[1]Tribhuvan University, Institute of Forestry, Pokhara Campus, Pokhara, Nepal

[2]Tribhuvan University, Kalika Multiple Campus, Kajipokhari, Pokhara-14, Nepal

[3] Program officer, RECOFTC, Nepal

**Corresponding author Email: dgautam@iofpc.edu.np*

INTRODUCTION

Global health has been greatly impacted by the COVID-19 epidemic, which has presented serious difficulties for healthcare systems, particularly in rural areas. The virus spread quickly, putting a strain on the healthcare system and highlighting the urgent need for efficient preventative and treatment plans. In this situation, the community's response to the epidemic relied heavily on traditional medical practices, especially the usage of medicinal herbs. During this health crisis, Nepal a country renowned for its rich biodiversity and long history of employing herbal medicine saw a rise in the use of these natural medicines (Chaudhary et al., 2024; Ghimire et al., 2021). Since ancient times, medicinal plants have played a crucial role in Nepal's healthcare system. Numerous of these plants have antiviral, anti-inflammatory, and immune-stimulating qualities that make them effective tools in the fight against respiratory infections, such as COVID-19. For example, Tulsi, often known as holy basil (*Ocimum sanctum*), is well known for its immunomodulatory properties and has been used traditionally to improve respiratory health (Bhadra & Sethi, 2020). Similar to this, Gurjo (*Tinospora cordifolia*), a well-known adaptogen, was favored by Nepalese communities during the pandemic since it has been shown to boost the immune system and lower fever (Subedi et al., 2022; Joshi et al., 2021).

In the initial phases of the pandemic, when medical facilities were finding it difficult to handle the growing number of COVID-19 cases, many Nepalese people found that using medicinal herbs was an affordable and culturally appropriate alternative. Realizing the potential advantages of combining traditional and modern medical treatments, the Nepalese government and a number of health organizations encouraged the use of traditional remedies (WHO, 2020; Pham et al., 2021). By utilizing local knowledge of therapeutic plants, this all-encompassing strategy attempted to empower communities in addition to mitigating COVID-19 symptoms.

The pharmacological characteristics of the many medicinal plants utilized in Nepal have been the subject of numerous investigations. For instance, studies have demonstrated the antiviral and anti-inflammatory qualities of chemicals contained in turmeric (*Curcuma longa*), which may be helpful in the treatment of COVID-19 symptoms (Das, 2022). Furthermore, it has been reported that the widely used plant neem (*Azadirachta indica*) possesses immune modulatory properties and the ability to prevent the growth of viruses (Oli & Gautam, 2022). Notwithstanding the extensive application of these botanicals, a notable lacuna exists in the clinical research endorsing their effectiveness and safety in managing COVID-19. The purpose of this review article is to give a general summary of the medicinal plants that the Nepalese

people used during the COVID-19 epidemic, looking at their pharmacological characteristics, traditional applications, and roles.

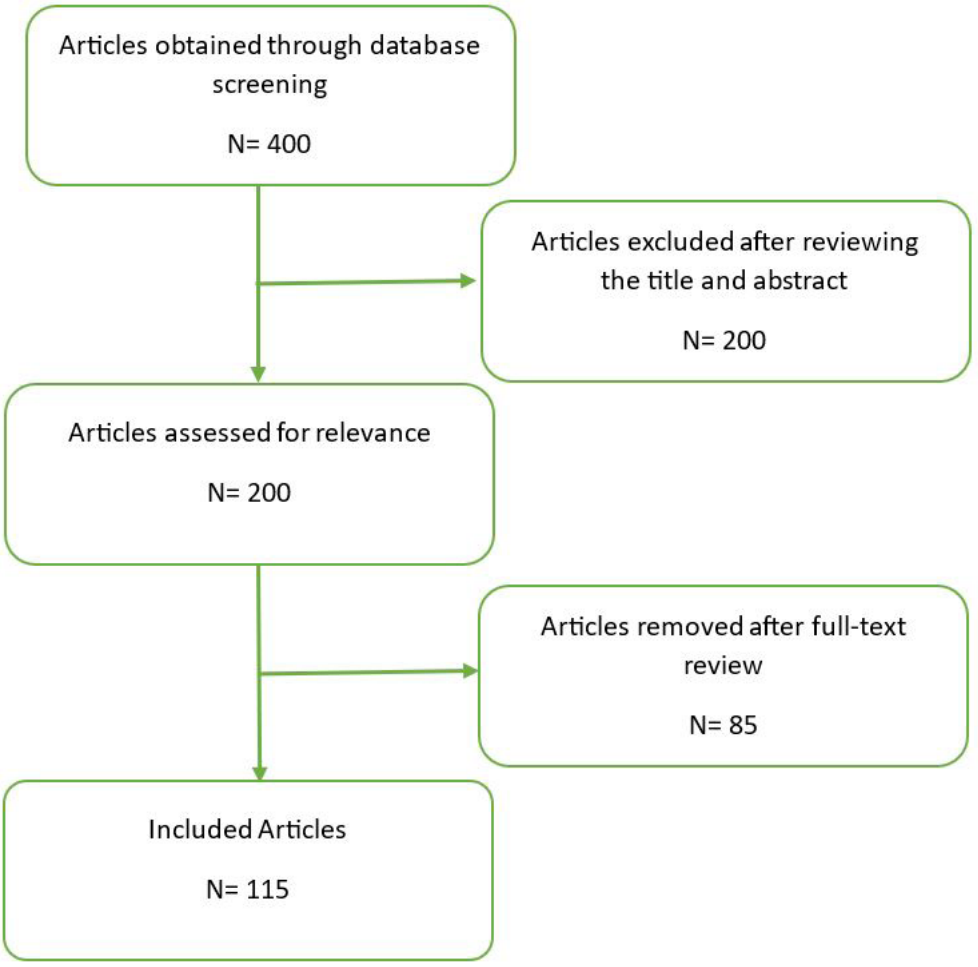
DATA AND METHODS

This study utilized a structured literature review to investigate the role of medicinal plants as natural immune enhancers during the COVID-19 pandemic. Data were collected from primary databases, including Google Scholar, Science Direct, and PubMed, using search terms like "Immunomodulatory properties of medicinal plants," "Immune-boosting medicinal plants," and "Use of medicinal plants to prevent COVID-19." Articles published from 2020 to 2024 were selected to ensure the inclusion of the most recent and relevant findings. A total of 500 articles were initially downloaded, and each was screened based on specific inclusion criteria, prioritizing studies that focused on antiviral, immunomodulatory, and anti-inflammatory properties of plants used in Nepalese communities.

The review systematically categorized studies based on the efficacy of these plants in enhancing immunity and combating viral infections. Key bioactive compounds and their associated health benefits were identified, linking them to the plants' potential role in preventing COVID-19. The analysis resulted in the final selection of 115 articles, which included 50 medicinal plants known for their immune-supporting effects. The entire process, including article selection and analysis, is depicted in Figure 1, following the PRISMA flowchart. This method provided a comprehensive and culturally relevant understanding of the contribution of medicinal plants to public health during the pandemic, particularly in the context of Nepal.

Figure 1

PRISMA flow chat for the study of medicinal plants as a natural immunity booster against COVID 19



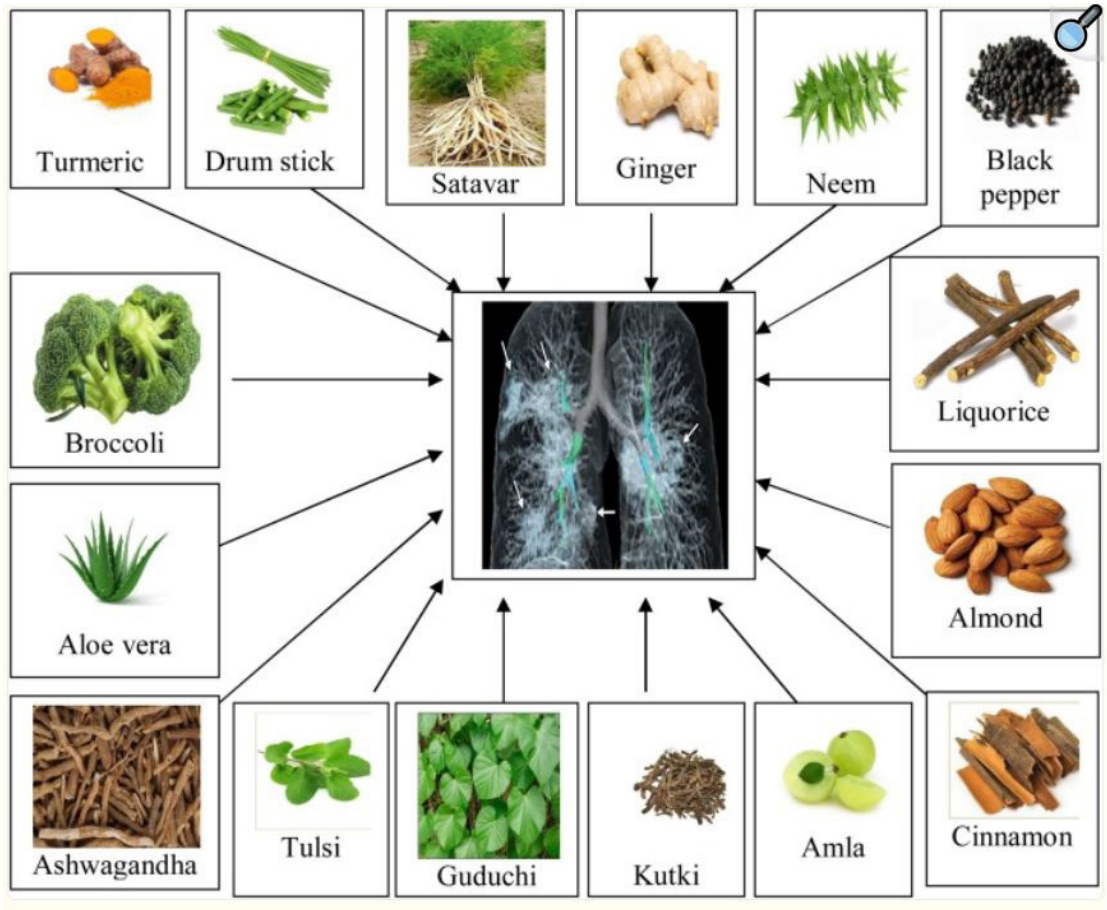
RESULTS AND DISCUSSIONS

Nepal is rich in medicinal plants. During the COVID-19 epidemic in Nepal, medicinal herbs greatly aided public health by increasing immunity and relieving respiratory problems. Tulsi (*Ocimum sanctum*) was widely utilized for its antiviral and immune modulatory properties, while Gurjo (*Tinospora cordifolia*) was used as an adaptogen to improve immunity and lower fever (Bhadra & Sethi, 2020; Subedi et al., 2022; Joshi et al., 2021). Turmeric (*Curcuma longa*)

and ginger (*Zingiber officinale*) were popular due to their anti-inflammatory characteristics, which help with inflammation and immunological function (Zhou et al.,2022; Memarzia et al., 2021; Munekata et al., 2021). Selvaraj et al. (2019) also used Aloe Vera for its anti-oxidant and therapeutic properties. As like in Nepal, in India also many people used herbal medicinal plants such as Tulsi, Aloevera, Turmic, Neem, Ginger etc. to combat COVID-19. Indian ayurvedic doctors suggest a few essential herbs (Figure 2) that give the body a strong immune system (Das, 2022). The list of the common plants consumed by Nepalese community during the COVID-19 Pandemic is listed in Table 1. However, there is a significant dearth of clinical studies showing their efficacy against COVID-19, emphasizing the need for additional research to validate these traditional therapies.

Figure 2

Medicinal plants as immunomodulator against COVID-19 infection (Source: Das, 2022)



Medicinal plants like Garlic, Ashwagandha, Neem, Turmeric, Guduchi, Holy Basil, Amla, Aloe Vera, and others contain bioactive compounds such as flavonoids, alkaloids, and terpenoids with immune-boosting, anti-inflammatory, and antiviral properties. Garlic, Turmeric, and Ashwagandha are especially noted for combating oxidative stress and supporting immune function. Guduchi, Neem, and Amla are valued for their detoxifying and anti-inflammatory effects. The details are given in Table 1.

Table 1

Lists of the major Medicinal Plants Consumed by the Nepalese Community During the COVID-19 Pandemic

Scientific Name	Family	English Name	Nepali Name	Parts Used	Key Chemical Constituents	Immune-supportive Benefits	Citations
Achyranthes aspera L.	Amaranthaceae	Prickly Chaff Flower	Datiun	Whole plant, Roots	Alkaloids, Saponins, Tannins, Flavonoids	Anti-inflammatory, Antioxidant, Antimicrobial, Immunomodulatory, Pain relief	(Abhang, 2024; Ha et al., 2024; Lin et al., 2024; Jain et al., 2024)
Aconitum heterophyllum Wall. ex Royle	Ranunculaceae	Indian Aconite	Atis	Roots	Alkaloids (Aconitine), Saponins	Immunomodulatory, Anti-inflammatory, Analgesic, Antioxidant	(Chauhan et al., 2024; Gururani et al., 2024; Malhotra et al., 2021)
Allium sativum L.	Amaryllidaceae	Garlic	Lasun	Bulbs	Allicin, Sulfur compounds	Antiviral, Immunomodulatory, Antibacterial	(Enejiyon et al., 2020; El-Saber Batiha et al., 2020)
Allium cepa L.	Amaryllidaceae	Onion	Pyaj	Bulbs	Quercetin, Sulfur compounds	Immune-boosting, Antioxidant	(Boru et al., 2024; Marefati et al., 2021)
Amomum subulatum Roxb.	Zingiberaceae	Black Cardamom	Alaichi	Seeds, Pods	Cineole,Limonene,Terpineol,Quercetin, Flavonoids, Phenolic Compounds	Antioxidant, Anti-inflammatory, Antimicrobial, Respiratory health Immune-boosting	(Drishya et al., 2023;Drishya et al., 2022)

Scientific Name	Family	English Name	Nepali Name	Parts Used	Key Chemical Constituents	Immune-supportive Benefits	Citations
Aloe vera (L.) Burm. f.	Asphodelaceae	Aloe vera	Ghiu kumari	Gel, Leaves	Vitamins, Anthraquinones	Immunomodulatory, Antiviral	(Miah et al., 2024; Kaur & Bains 2023)
Artemisia indica Willd	Asteraceae	Sweet wormwood	Titepati	Leaves	Artemisinin	Immunomodulatory, Antiviral	(Cui et al., 2024; Dogra et al., 2023)
Artocarpus heterophyllus Lam.	Moraceae	Jackfruit	Rukh Katahar	Fruit, Seeds, Wood	Flavonoids, Tannins, Carotenoids, Polysaccharides	Antioxidant, Immune-boosting, Anticancer, Anti-inflammatory, Digestive aid	(Li et al., 2024; Cheng et al., 2024; Gupta at al., 2023)
Azadirachta indica A. Juss.	Meliaceae	Neem	Neem	Leaves, Bark	Azadirachtin, Nimbin	Immunomodulatory, Antibacterial, Antiviral	(Oli & Gautam, 2022; Islas et al., 2020)
Asparagus racemosus Willd.	Asparagaceae	Shatavari	Kurilo	Roots	Steroids, flavonoids,	Immunomodulatory, antidiabetic, antioxidant	(Akhtar et al., 2024; Paniagua-Zambrana et al., 2024)
Berberis asiatica Roxb. ex DC.	Berberidaceae	Indian barberry	Chutro	Bark, Roots	Berberine	Antimicrobial, Immunomodulatory	(Rawat et al., 2024; Yazdanpanah et al., 2024)
Bergenia ciliata (Haw.) Sternb.	Saxifragaceae	Winter begonia	Paakhanbhed	Rhizome, Leaves	Bergenin, Tannins, Flavonoids, Glycosides	Anti-inflammatory, Diuretic, Immunomodulatory, Antioxidant, Kidney health	(Kushwaha, & Singh, 2024; Sapkota et al., 2022)
Camellia sinensis (L.) Kuntze	Theaceae	Green tea	Chiya	Leaves	Catechins, Polyphenols	Antioxidant, Immune-boosting	(Chandra et al., 2024; Li et al., 2024; Malabadi et al., 2024))
Carica papaya L.	Caricaceae	Papaya	Mewa	Fruit, Leaves, Seeds	Papain, Flavonoids, Carotenoids, Vitamin C	Immune-boosting, Antioxidant, Anti-inflammatory, Digestive aid	(Babalola et al., 2024; Maryam et al., 2024)

Scientific Name	Family	English Name	Nepali Name	Parts Used	Key Chemical Constituents	Immune-supportive Benefits	Citations
Cinnamomum verum J.Presl	Lauraceae	Cinnamon	Dalchini	Bark	Cinnamaldehyde, Eugenol	Antiviral, Antioxidant, Immune-supportive	Elachouri et al., 2024; Pagliari et al., 2023
Citrus limon (L.) Burm. f.	Rutaceae	Lemon	Kagati	Fruit, Peel, Juice	Vitamin C, Flavonoids, Citric acid, Limonoids	Immune-boosting, Antioxidant, Antibacterial, Anti-inflammatory, Digestive aid	Abdo et al., 2024; Nassarawa et al., 2024)
Cymbopogon citratus (DC.) Stapf	Gramineae	Lemon grass	Kagate ghass	Leaves	flavonoids, essential oils, phenolic compounds and other phytochemical constituents	anti-obesity, anti-bacterial, anti-fungal, anti-nociceptive, anti-oxidants anti-diarrheal, and anti-inflammatory properties	(Fouelefack et al., 2024; Hasan-Al-Sharif et al., 2023)
Coriandrum sativum L.	Apiaceae	Coriander	Dhaniya	Seeds, Leaves	Linalool, Polyphenols, Flavonoids	Antioxidant, Immunomodulatory, Antimicrobial	Meradi et al., 2022; Ahmed et al., 2020;
Cordyceps sinensis (Berk.) Sacc.	Ophiocordycipitaceae	Cordyceps	Yarshagumba	Fruit body, Mycelium	Polysaccharides, Cordycepin (3'-deoxyadenosine), Adenosine, Ergosterol	Immune booster, anti-fatigue, antioxidant, anti-inflammatory, anti-cancer, enhances athletic performance	(Chen et al., 2024;Krishna et al., 2024; Li et al., 2024)
Cuminum cyminum L.	Apiaceae	Cumin	Jeera	Seeds	Cuminaldehyde, Limonene, Thymol, Terpenes	Antioxidant, Antimicrobial, Anti-inflammatory, Immune-boosting, Digestive aid	Meena et al., 2024; Singh et al., 2021
Curcuma longa L.	Zingiberaceae	Turmeric	Besar	Rhizome	Curcumin	Anti-inflammatory, Immunomodulatory	(Kim et al., 2024; Munekata et al., 2021
Curcuma caesia Roxb.	Zingiberaceae	Black Turmeric	Kaalo haledo	Rhizomes	Curcumin, Essential oils, Starch, Tannins	Anti-inflammatory, Antioxidant, Anticancer, Analgesic, Immune-boosting	Darina et al., 2024; Juariah et al., 2024

Scientific Name	Family	English Name	Nepali Name	Parts Used	Key Chemical Constituents	Immune-supportive Benefits	Citations
Dactylorhiza hatagirea (D. Don) Soo	Orchidaceae	Marsh orchid	Panchaule	Tuber, roots	Alkaloids, terpenoids, flavonoids, phenolics, and saponins	Anti-inflammatory, Antioxidant, Immunomodulatory, Analgesic, Anti-fatigue	(Kiziltas et al., 2024; Shrivastava et al., 2023)
Datura stramonium L	Solanaceae	Jimson weed	Dhaturo	Leaves, Seeds	Atropine, Scopolamine	Respiratory health, Immune-supportive	Chouhan et al, 2024;Njoya et al., 2024
Dioscorea deltoidea Wall. ex Griseb.	Dioscoreaceae	Chinese Yam	Tarul	Root	Diosgenin, Steroids, Alkaloids, Saponins	Anti-inflammatory, Antioxidant, Immunomodulatory, Anticancer	Naseem et al., 2024; Wang et al., 2023;
Elettaria cardamomum (L.) Maton	Zingiberaceae	Green Cardamom	Sukmel	Seeds, Pods	Essential oils, Terpenes, Flavonoids, Cardamomol	Digestive aid, Anti-inflammatory, Antioxidant, Antimicrobial, Immune-boosting	Mekky et al., 2023; Pavarino et al., 2023;
Glycyrrhiza glabra L.	Fabaceae	Licorice	Jethimadhu	Roots	Glycyrrhizin	Immunomodulatory, Antiviral, Anti-inflammatory	(Michel & Olszewska, 2024; Olszewska et al., 2021)
Justicia adhatoda L.	Acanthaceae	Malabar nut	Asuro	Leaves, Roots	Vasicine	Respiratory health, Immunomodulatory	(Andleeb et al., 2024; Nasir et al., 2024)
Mentha piperita L.	Lamiaceae	Mint	Pudina	Leaves	Menthol, Flavonoids	Digestive aid, Immune-supportive	(Jahan et al., 2024; Sharma & Gautam, 2022)
Morus alba L	Moraceae	White Mulberry	Kimbu	Leaves, Fruit, Bark	Flavonoids, Alkaloids, Anthocyanins, Resveratrol	Antioxidant, Anti-diabetic, Anti-inflammatory, Cholesterol-lowering, Immune-boosting	(Chang et al., 2021; Umeyama et al., 2021)
Moringa oleifera Lam.	Moringaceae	Moringa	Sitalchini	Leaves, Seeds	Vitamins A, C, Polyphenols	Antioxidant, Immune-boosting, Nutrient-dense	(Xi et al., 2023; Xiao et al., 2020)

Scientific Name	Family	English Name	Nepali Name	Parts Used	Key Chemical Constituents	Immune-supportive Benefits	Citations
Nardostachys grandiflora Wall. ex DC	Valerianaceae	Spikenard	Jatamansi	Rhizomes, Roots	Nardosin, Sesquiterpene, Flavonoids, Alkaloids	Antioxidant, Anti-inflammatory, Stress-reliever, Immunomodulatory	(Krishnan et al., 2024; Panara et al., 2020)
Nigella sativa L.	Ranunculaceae	Black cumin	Kaalo Jeera	Seeds	Thymoquinone	Immunomodulatory, Antioxidant, Anti-inflammatory	(Kulyar et al., 2021; Salem et al., 2021)
Ocimum sanctum L.	Lamiaceae	Holy basil	Tulasi	Leaves	Eugenol, Rosmarinic acid	Antioxidant, Immunomodulatory, Anti-inflammatory	(Savita et al., 2021; Bhadra et al., 2020)
Phyllanthus emblica L.	Phyllanthaceae	Indian gooseberry	Amala	Fruit	Vitamin C, Flavonoids	Antioxidant, Immune-boosting	Hu,et al., 2024; Van Doan et al., 2022;
Picrorhiza kurroa Royle ex Benth.	Scrophulariaceae	Kutki	Kutki	Rhizomes, Roots	Picroside, Kutkoside, Iridoid glycosides	Liver protection, Immunomodulatory, Antioxidant, Anti-inflammatory, Antimicrobial	(Kaur et al., 2023; Almeleebia et al., 2022)
Piper longum L.	Piperaceae	Long Pepper	Pipla	Fruit, Root	Piperine, Alkaloids, Essential oils	Anti-inflammatory, Antioxidant, Antimicrobial, Immune-boosting, Digestive aid	Phan et al., 2024; Subramaniam et al., 2021)
Piper nigrum L.	Piperaceae	Black Pepper	Marich	Fruits (Peppercorns)	Piperine, Essential oils, Alkaloids, Terpenes	Antioxidant, Anti-inflammatory, Antimicrobial, Digestive aid, Immune-boosting	Lasso et al., 2024; Phan et a., 2024
Punica granatum L.	Lythraceae	Pomegranate	Anaar	Fruit, Seeds, Peel	Punicalagins, Tannins, Flavonoids, Vitamin C	Antioxidant, Anti-inflammatory, Cardiovascular health, Anticancer, Immune-boosting	(Cordiano et al., 2024; de O. Trovão et al., 2023)
Psidium guajava L.	Myrtaceae	Guava	Ambaa	Fruit, Leaves	Vitamin C, Flavonoids, Carotenoids, Tannins	Antioxidant, Immune-boosting, Anti-inflammatory, Digestive aid, Anti-diabetic	(Kalyani, 2024; Heppy et al., 2023)

Scientific Name	Family	English Name	Nepali Name	Parts Used	Key Chemical Constituents	Immune-supportive Benefits	Citations
Syzygium cumini (L.) Skeels	Myrtaceae	Jamun	Jamun	Fruit, Seeds	Anthocyanins, Flavonoids, Tannins, Glycosides	Antioxidant, Immunomodulatory, Antidiabetic, Antimicrobial Antibacterial	Ali et al., 2024; Faradilla et al., 2024)
Trachyspermum ammi (L.) Sprague	Apiaceae	Ajwain	Jwano	Seeds	Thymol, Carvacrol, Flavonoids, Terpenes	Antimicrobial, Anti-inflammatory, Digestive aid, Immune-boosting, Antioxidant	Siddiquie et al., 2024; Jabeen et al., 2023;
Terminalia chebula Retz.	Combretaceae	Chebulic myrobalan	Harro	Fruit	Tannins, Polyphenols	Immune-boosting, Digestive aid	(Gahatraj et al., 2020; Nigam et al., 2020)
Tinospora cordifolia (Willd.) Miers.	Menispermaceae	Guduchi/ Giloy	Gurjo	Stem, Leaves	Alkaloids, Tannins	Immunomodulatory, Antipyretic, Antioxidant	Subedi et al., 2022; Arunachalam et al., 2022)
Trigonella foenum-graecum L.	Fabaceae	Fenugreek	Methi	Seeds, Leaves	Saponins, Flavonoids, Alkaloids, Fiber	Antidiabetic, Antioxidant, Immune-boosting, Anti-inflammatory, Digestive aid	Shaheen et al., 2024; Fatima et al., 2022)
Urtica dioica L.	Urticaceae	Stinging nettle	Sisnu	Leaves, Roots	Flavonoids, Vitamins	Anti-inflammatory, Immune-supportive	Alimoddin et al., 2024; Dhakal et al., 2024)
Valeriana jatamansi Jones ex Roxb.	Valerianaceae	Indian Valerian	Samayo	Rhizomes, Roots	Valerenic acid, Alkaloids, Flavonoids	Anti-anxiety, Sedative, Antioxidant, Immunomodulatory, Anti-inflammatory	(Tamang et al., 2024; Maurya & Agnihotri, 2024)
Withania somnifera (L.) Dunal	Solanaceae	Ashwagandha	Ashwagandha	Roots	Withanolides	Anti-stress, Immunomodulatory, Adaptogenic	(Gaurav et al., 2023; Verma et al., 2024)

Scientific Name	Family	English Name	Nepali Name	Parts Used	Key Chemical Constituents	Immune-supportive Benefits	Citations
Zingiber officinale Rosc.	Zingiberaceae	Ginger	Aduwa	Rhizome	Gingerols, Shogaols, Zingerone	Antiviral, Anti-inflammatory, Digestive aid	(Adhikari et al., 2023; Van et al., 2021)
Ziziphus jujuba Mill.	Rhamnaceae	Jujube	Baer	Fruit, Seeds, Leaves	Saponins, Flavonoids, Alkaloids, Triterpenes	Immunomodulatory, Antioxidant, Anti-inflammatory, Sedative, Antidiabetic	Batovska et al., 2024; Popstoyanova et al., 2024; Zhu et al., 2024

CONCLUSION

In conclusion, medicinal plants have demonstrated significant therapeutic potential, particularly in enhancing immune function and combating infections. Their bioactive compounds, including Saponins, Flavonoids, Alkaloids, Triterpenes, allicin, curcumin, and withanolides, contribute to their antiviral, anti-inflammatory, and immunomodulatory effects. These plants have been an integral part of traditional medicine in Nepal, and their widespread use during the COVID-19 pandemic highlights their relevance in supporting public health. While the traditional knowledge surrounding these plants is promising, further clinical research is essential to confirm their efficacy, safety, and optimal applications. Integrating these plants into modern healthcare strategies could provide a valuable complementary approach to disease prevention and treatment. Promoting sustainable cultivation and responsible harvesting will also be crucial in ensuring their availability for future generations, ultimately contributing to global health and well-being.

REFERENCES

Abdo, S. E., El-Nahas, A. F., Abdellatif, R. E., Mohamed, R., Helal, M. A., Azzam, M. M., ... & El-Kassas, S. (2024). Combined dietary spirulina platensis and citrus limon essential oil enhances the growth, immunity, antioxidant capacity and Intestinal health of Nile Tilapia. *Veterinary Sciences*, *11*(10), 474.

Abhang, P. (2024). Phytochemical screening, antioxidant, and antimicrobial properties of leaf extracts from Achyranthes aspera plant. *Bulletin of Pure and Applied Sciences-Zoology*, 204-216.

Adhikari, R., Bhattarai, K., & Sharma, K. R. (2023). Phytochemical analysis and biological

Activities of Zingiber officinale grown in different geographical regions of Nepal. *Amrit Research Journal*, *4*(1), 1-10.

Ahmed, S. A., Reda, R. M., & ElHady, M. (2020). Immunomodulation by Coriandrum sativum seeds (Coriander) and its ameliorative effect on lead induced immunotoxicity in Nile tilapia (Oreochromis niloticus L.). *Aquaculture Research*, *51*(3), 1077-1088.

Akhtar, S., Gupta, A. K., Naik, B., Kumar, V., Ranjan, R., Jha, A. K., ... & Rustagi, S. (2024). Exploring pharmacological properties and food applications of Asparagus racemosus (Shatavari). *Food Chemistry Advances*, *4*, 100689.

Ali, J., Hussain, A., Siddique, M., ur Rehman, I., & Zeb, A. (2024). Proximate composition, minerals analysis and antibacterial potential of Syzygium cumini L. leaves, flower and bark extracts against foodborne pathogens. *International Journal of Engineering, Science and Technology*, *16*(3), 21-29.

Alimoddin, M., Jayakumari, S., Fatima, B., Hasan, N., Ali, S., Sami, F., ... & Ansari, M. T. (2024). Pharmacological applications of Urtica dioica: A comprehensive review of its traditional use and modern scientific evidence. *Journal of Herbal Medicine*, 100935.

Almeleebia, T. M., Alsayari, A., & Wahab, S. (2022). Pharmacological and clinical efficacy of Picrorhiza kurroa and its secondary metabolites: a comprehensive review. *Molecules*, *27*(23), 8316.

Andleeb, R., Zafar, N., Ijaz, M. U., Ahmed, S., Yeni, D. K., Mazhar, A., ... & Alam, M. (2024). In-vitro, in-vivo and in-silico exploration of different extracts of Justica adhatoda against Newcastle viral disease. *Journal of King Saud University-Science*, *36*(5), 103163.

Arunachalam, K., Yang, X., & San, T. T. (2022). Tinospora cordifolia (Willd.) Miers: Protection mechanisms and strategies against oxidative stress-related diseases. *Journal of Ethnopharmacology*, *283*, 114540.

Babalola, B. A., Akinwande, A. I., Otunba, A. A., Adebami, G. E., Babalola, O., & Nwufo, C. (2024). Therapeutic benefits of Carica papaya: A review on its pharmacological activities and characterization of papain. *Arabian Journal of Chemistry*, *17*(1), 105369.

Batovska, D., Gerasimova, A., & Nikolova, K. (2024). Exploring the Therapeutic Potential of Jujube (Ziziphus jujuba Mill.) extracts in cosmetics: A review of bioactive properties for skin and hair wellness. *Cosmetics*, *11*(5), 181.

Bhadra, P., & Sethi, L. (2020). A review paper on the Tulsi plant (Ocimum sanctum). *Indian Journal of Natural Sciences*, *10*(60), 20854-20860.

Chang, B. Y., Koo, B. S., & Kim, S. Y. (2021). Pharmacological activities for Morus alba L., focusing on the immunostimulatory property from the fruit aqueous extract. *Foods*, *10*(8), 1966.

Chauhan, J., Purohit, V. K., & Sharma, U. (2024). Metabolomics integration with chemometrics for the quality assessment: A case study with commercially important Himalayan medicinal plant Aconitum heterophyllum Wall. *Microchemical Journal*, *199*, 110129.

Chaudhary, R. P., Joshi, S. P., Rimal, S. K., Belbase, N., & Subedi, C. K. (2024). Plant diversity conservation in the Nepal Himalaya: Status, policies, and legislative frameworks. In *Flora and Vegetation of Nepal*: Springer International Publishing.

Chouhan, A. S., Bharadwaj, R., Baxi, M., & Zhylkybekova, A. (2024). Evaluating the therapeutic potential of Datura stramonium and Datura inoxia: A mini review. *West Kazakhstan Medical Journal*, 119-125.

Cordiano, R., Gammeri, L., Di Salvo, E., Gangemi, S., & Minciullo, P. L. (2024). Pomegranate (Punica granatum L.) Extract effects on inflammaging. *Molecules*, *29*(17), 4174.

Cui, Y., Leng, X., Zhao, Y., Zhao, Y., & Wang, Q. (2024). Effects of dietary Artemisia annua supplementation on growth performance, antioxidant capacity, immune function, and gut microbiota of geese. *Poultry Science*, *103*(5), 103594.

Darina, S., Lubis, H., Siagian, D. J. M., Husni, N., Sitorus, J., Sinaga, A. P., & Harahap, M. (2024). The pattern of use of herbal plants by the community to increase body immunity. In *IOP Conference Series: Earth and Environmental Science* (Vol. 1297, No. 1, p. 012033). IOP Publishing.

de O. Trovão, L., dos S. Rodrigues, L., Mendes, P. M., Alves, P. C., da S. Oliveira, A., Brito, J. M., ... & Maciel, M. C. (2023). The immunomodulatory activity of Punica granatum L. Peel extract increases the lifespan of Mice with Lethal Sepsis. *Journal of Immunology Research*, *2023*(1), 2868707.

Dhakal, N., Joshi, R., Acharya, S., Bhandari, S., Subedi, A., & Nath, M. (2024). Exploring the diverse ethnopharmacological applications of Urtica dioica L.: An extensive review. *Journal of Agricultural Sciences and Engineering*, *6*(2), 60-72.

Drishya, S., Dhanisha, S. S., Raghukumar, P., & Guruvayoorappan, C. (2022). Amomum subulatum mitigates total body irradiation-induced oxidative stress and its associated inflammatory response by enhancing the antioxidant status and regulating the pro-inflammatory cytokines. *The Journal of Nutritional Biochemistry*, *107*, 109064.

Drishya, S., Dhanisha, S. S., Raghukumar, P., & Guruvayoorappan, C. (2023). Amomum

subulatum fruits protect against radiation-induced esophagitis by regulating antioxidant status and inflammatory responses. *Food Research International*, *174*, 113582.

El-Saber Batiha, G., Magdy Beshbishy, A., G. Wasef, L., Elewa, Y. H., A. Al-Sagan, A., Abd El-Hack, M. E., ... & Prasad Devkota, H. (2020). Chemical constituents and pharmacological activities of garlic (*Allium sativum L.*): A review. *Nutrients*, *12*(3), 872.

Enejiyon, S., Abdulrahman, A. H., Adedeji, A., Abdulsalam, R., & Oyedum, M. (2020). Antibacterial activities of the extracts of *Allium sativum* (Garlic) and Allium cepa (Onion) against selected pathogenic bacteria. *Tanzania Journal of Science*, *46*(3), 914-922.

Faradilla, M., Fidrianny, I., & Iwo, M. I. (2024). Antioxidant and immunomodulatory activities of ethanol extracts from Syzygium cumini L. Skeels and Pogostemon cablin Benth. *Narra J*, *4*(3), e918-e918.

Fatima, H., Shahid, M., Pruitt, C., Pung, M. A., Mills, P. J., Riaz, M., & Ashraf, R. (2022). Chemical fingerprinting, antioxidant, and anti-inflammatory potential of hydroethanolic extract of Trigonella foenum-graecum. *Antioxidants*, *11*(2), 364.

Fouelefack, F. R., Tapan, K. P., Dongmo, L. J. B., Ndonkeu, M. G., Mekam, P. N., & Nguefack, J. (2024). Correlation between the chemical composition of fresh and dried Cymbopogon citratus essential oil fractions and their antifungal effects against the causal agents of brown spot and bakanae diseases of rice. *European Journal of Plant Pathology*, 1-16.

Gahatraj, S., Bhusal, B., Sapkota, K., Dhami, B., & Gautam, D. (2020). Common medicinal plants of Nepal: A review of Triphala: Harro (Terminalia chebula), Barro (Terminalia bellirica), and Amala (Emblica officinalis). *Asian J. Pharmacogn*, *4*(3), 5-13.

Gaurav, H., Yadav, D., Maurya, A., Yadav, H., Yadav, R., Shukla, A. C., ... & Palazon, J. (2023). Biodiversity, biochemical profiling, and pharmaco-commercial applications of Withania somnifera: A review. *Molecules*, *28*(3), 1208.

Ghimire, S. K., Bista, G., Lama, N. S., Craig, S. R., Lama, W., Gurung, T. N., ... & Lama, T. C. (2021). Without the plants, we have no medicine: Sowa Rigpa, ethnobotany, and conservation of threatened species in Nepal. *WWF Nepal.*

Gupta, A., Marquess, A. R., Pandey, A. K., & Bishayee, A. (2023). Jackfruit (Artocarpus heterophyllus Lam.) in health and disease: a critical review. *Critical Reviews in Food Science and Nutrition*, *63*(23), 6344-6378.

Gururani, R., Patel, S., Bisht, A., Jain, S., Kumari, K., Paliwal, S., ... & Sharma, S. (2024). Airways relaxant and antiasthmatic activity of Aconitum heterophyllum wall ex Royle.

roots: A mechanistic insight. *Cell Biochemistry and Biophysics*, 1-18.

Ha, H. A., Al-Humaid, L. A., Aldawsari, M., Bharathi, D., & Lee, J. (2024). Evaluation of phytochemical, antibacterial, thrombolytic, anti-inflammatory, and cytotoxicity profile of Achyranthes aspera aerial part extracts. *Environmental Research*, *243*, 117802.

Heppy, F., Mulyana, R., Syah, N. A., & Tjandrawinata, R. R. (2023). The effect of Psidium guajava leaves' extract for mild and asymptomatic corona virus disease-19. *Saudi Pharmaceutical Journal*, *31*(4), 592-596.

Islas, J. F., Acosta, E., Zuca, G., Delgado-Gallegos, J. L., Moreno-Treviño, M. G., Escalante, B., & Moreno-Cuevas, J. E. (2020). An overview of Neem (Azadirachta indica) and its potential impact on health. *Journal of Functional Foods*, *74*, 104171.

Jabeen, R., Ali, T., Naeem, M., Hussain, F., Danish, S., Alahmadi, T. A., ... & Ansari, M. J. (2023). An insight into biochemical characterization and explorations of antioxidant, antibacterial, cytotoxic, and antidiabetic activities by trachyspermum ammi nanosuspensions. *Frontiers in Bioscience-Landmark*, *28*(12), 340.

Jahan, N., Hussain, N., Touqeer, S. I., Shamshad, H., & Abbas, N. (2024). Formulation of Mentha piperita-based nanobiopesticides and assessment of the pesticidal and antimicrobial potential. *Life*, *14*(1), 144.

Jain, N. K., Anand, S., Keshri, P., Kumar, S., Sengar, A. S., Bajhaiya, M. K., ... & Mishra, S. (2024). A comprehensive review of ethnomedicinal, phytochemical and pharmacological activity profile of Achyranthes aspera. *Seeds*, *1*, 7.

Kalyani, G. (2024). Medicinal and nutritional importance of Psidium guajava Linn. in human health. In *Medicinal Plants and their Bioactive Compounds in Human Health: Volume 1* (pp. 301-314). Springer Nature Singapore.

Kaur, S., & Bains, K. (2023). *Aloe Barbadensis Miller* (Aloe Vera) Pharmacological activities and clinical evidence for disease prevention. *International Journal for Vitamin and Nutrition Research*.

Krishnan, N., Singh, P. K., Devadasan, V., Mariappanadar, V., Gopinath, S. C., Chinni, S. V., & Raman, P. (2024). Enhanced production of actinidine and glaziovine alkaloids from Nardostachys jatamansi (D. Don) DC. through cell suspension culture with elicitors treatment. *Process Biochemistry*, *138*, 139-149.

Kulyar, M. F. E. A., Li, R., Mehmood, K., Waqas, M., Li, K., & Li, J. (2021). Potential influence of Nagella sativa (Black cumin) in reinforcing immune system: A hope to decelerate the COVID-19 pandemic. *Phytomedicine*, *85*, 153277.

Lasso, P., Rojas, L., Arevalo, C., Murillo, N., Nossa, P., Sandoval, T., ... & Uruena, C. (2024). 977 Piper nigrum extract retards tumor growth and improves antitumor immune response in murine breast cancer and melanoma models.

Li, Y., Chen, Y., Li, C., Wu, G., He, Y., Tan, L., & Zhu, K. (2024). Polysaccharide from Artocarpus heterophyllus Lam.(Jackfruit) Pulp Ameliorates Dextran Sodium Sulfate-Induced Enteritis in Rats. *International Journal of Molecular Sciences*, *25*(3), 1661.

Lin, S. Y., Chang, C. L., Liou, K. T., Kao, Y. K., Wang, Y. H., Chang, C. C., ... & Shen, Y. C. (2024). The protective role of Achyranthes aspera extract against cisplatin-induced nephrotoxicity by alleviating oxidative stress, inflammation, and PANoptosis. *Journal of Ethnopharmacology*, *319*, 117097.

Malhotra, N., & Sharma, S. (2021). Aconitum heterophyllum. In *Himalayan medicinal plants* (pp. 5-25). Academic Press.

Maryam, Rizwan, I., Munir, Z., Tahir, M. F., Babar, Q. U. A., & Jamil, B. (2024). Medicinal and Nutritional Importance of Carica papaya in Human Health. In *Medicinal Plants and their Bioactive Compounds in Human Health: Volume 1* (pp. 47-67). Singapore: Springer Nature Singapore.

Maurya, A. K., & Agnihotri, V. K. (2024). Valeriana jatamansi: bioactive compounds and their medicinal uses. *Current Topics in Medicinal Chemistry*, *24*(9), 757-796.

Meena, S. S., Sharma, Y. K., Mahatma, M. K., Lal, S., Meena, M. D., Meena, R. D., ... & Bhardwaj, V. Cumin (Cuminum cyminum L.) an export-oriented Indian seed spice with inherent nutraceutical and therapeutic attributes: A review. *International Journal of Seed Spices*, *12*(1), 1-12.

Mekky, R. H., Hegazy, M. M., Afifi, W. M., Mostafa, A. E., Abbass, H. S., & Abd-Elraouf, M. (2023). Composition and functional properties of Cardamom leaves. In *Cardamom (Elettaria cardamomum): Production, Processing and Properties* (pp. 157-178). Cham: Springer International Publishing.

Meradi, S., Messaï, A., & Aouachria, M. (2022). The effect of spices Coriandrum sativum L., Trigonella foenum-graecum L., Pimpinella anisum L., and their combinations on growth performance, carcass trait, and hematobiochemical parameters in broiler chicken. *Veterinary World*, *15*(7), 1821.

Miah, M. A., Akter, S., Uddin, M. S., Sujan, K. M., Mustari, A., & Akter, S. (2024). Enhancing effects of Aloe vera gel extracts on the humoral and cellular immune response and growth performance in broiler chickens. *Journal of Advanced Veterinary and Animal*

Research, *11*(1), 40.

Michel, P., & Olszewska, M. A. (2024). Phytochemistry and biological profile of Gaultheria procumbens L. and wintergreen essential oil: From traditional application to molecular mechanisms and therapeutic targets. *International Journal of Molecular Sciences*, *25*(1), 565.

Munekata, P. E., Pateiro, M., Zhang, W., Dominguez, R., Xing, L., Fierro, E. M., & Lorenzo, J. M. (2021). Health benefits, extraction and development of functional foods with curcuminoids. *Journal of Functional Foods*, *79*, 104392.

Naseem, N., Khaliq, T., Jan, S., Nabi, S., Sultan, P., Hassan, Q. P., & Mir, F. A. (2024). An overview on pharmacological significance, phytochemical potential, traditional importance and conservation strategies of Dioscorea deltoidea: A high valued endangered medicinal plant. *Heliyon*.

Nasir, M., Ramash, R., Fatima, H., Ashraf, S., Munir, I., Asghar, S., ... & Chaudhari, S. K. (2024). Phytochemical characterization and assessment of crude extracts from Justicia adhatoda for phytotoxic and cytotoxic activity. *Scientifica*, *2024*(1), 1374346.

Nassarawa, S. S., Dandago, M. A., Yusuf, H. L., Gambo, A., Isma'il Sanusi, N., Bako, H. K., ... & Garba, U. (2024). Pharmacological properties of citrus fruit. In *Citrus Fruits and Juice: Processing and Quality Profiling* (109-132). Springer Nature Singapore.

Nigam, M., Mishra, A. P., Adhikari Devkota, A., Dirar, A. I., Hassan, M. M., Adhikari, A., ... & Devkota, H. P. (2020). Fruits of Terminalia chebula Retz.: A review on traditional uses, bioactive chemical constituents and pharmacological activities. *Phytotherapy Research*, *34*(10), 2518-2533.

Njoya, H. K., Christina, O. U., & Vania, E. D. (2024). Effects of datura stramonium crude ethanolic leaf extract on some hematological indices in adult male wistar albino rats. *IJBB*, *6*(1), 29-37.

Oli, B., & Gautam, D. (2022). Medicinal value of Azadirachta indica: A review. *Modern Phytomorphology*, *15*, 161-167.

Olszewska, M. A., Owczarek, A., Magiera, A., Granica, S., & Michel, P. (2021). Screening for the active anti-inflammatory and antioxidant polyphenols of Gaultheria procumbens and their application for standardisation: from identification through cellular studies to quantitative determination. *International Journal of Molecular Sciences*, *22*(21), 11532.

Pagliari, S., Forcella, M., Lonati, E., Sacco, G., Romaniello, F., Rovellini, P., ... & Bruni, I. (2023). Antioxidant and anti-inflammatory effect of cinnamon (Cinnamomum verum J.

Presl) bark extract after in vitro digestion simulation. *Foods*, *12*(3), 452.

Panara, K., Nariya, M., & Karra, N. (2020). Central nervous system depressant activity of Jatamansi (Nardostachys jatamansi DC.) rhizome. *AYU (An International Quarterly Journal of Research in Ayurveda)*, *41*(4), 250-254.

Pavarino, M., Cagliero, C., Marengo, A., Bicchi, C., Rubiolo, P., & Sgorbini, B. (2023). Essential oils as potential acetylcholinesterase and butyrylcholinesterase inhibitors. A case study: Elettaria cardamomum (L.) Maton essential oil. In *Book of abstract* (pp. 152-152).

Pham, T. V., Koirala, R., & Kohrt, B. A. (2021). Traditional and biomedical care pathways for mental well being in rural Nepal. *International Journal of Mental Health Systems*, *15*, 1-16.

Phan, U. T. T., Nguyen, H. D., Nguyen, T. K. O., Tran, T. H., Le, T. H., & Tran, T. T. P. (2024). Anti-inflammatory effect of Piper longum L. fruit methanolic extract on lipopolysaccharide-treated RAW 264.7 murine macrophages. *Heliyon*, *10*(4).

Popstoyanova, D., Gerasimova, A., Gentscheva, G., Nikolova, S., Gavrilova, A., & Nikolova, K. (2024). Ziziphus jujuba: Applications in the pharmacy and food industry. *Plants*, *13*(19), 2724.

Rawat, S., Goswami, R., Ambwani, S., & Ambwani, T. K. (2024). Exploring the immunomodulatory and antioxidant capacities of Berberis aristata in avian lymphocytes.

Salem, A., Bamosa, A., Alam, M., Alshuraim, S., Alyalak, H., Alagga, A., ... & Obeid, O. (2021). Effect of Nigella sativa on general health and immune system in young healthy volunteers; a randomized, placebo-controlled, double-blinded clinical trial. *F1000Research*, *10*.

Savita, K. K., Irchhiaya, R., & Tiwari, P. (2021). Ocimum sanctum ameliorate anti-oxidant, anti-microbial and immune system for the control of diabetes against coronavirus: An episode. *European Journal of Pharmaceutical and Medical Research*, *8*(7), 308-319.

Shaheen, C., Ahmad, I. A., Aslam, R., Naz, S., Mushtaq, S., Ahmed, S., ... & Riaz, T. (2024). A review of therapeutic and medicinal uses of Fenugreek (Trigonella foenum-graceum L.). *Journal for Research in Applied Sciences and Biotechnology*, *3*(5), 39-50.

Siddiquie, F., Ahsan, F., Mahmood, T., Ahmad, M. A., Singh, A., & Bano, S. (2024). Unlocking the food treasures: Trachyspermum ammi–A comprehensive exploration from field to pharmacology. *Food Safety and Health*.

Singh, N., Yadav, S. S., Kumar, S., & Narashiman, B. (2021). A review on traditional uses,

phytochemistry, pharmacology, and clinical research of dietary spice Cuminum cyminum L. *Phytotherapy Research*, *35*(9), 5007-5030.

Subedi, A., & Bashyal, B. (2022). Medicinal properties and uses of *Aegle marmelos* (Bel) plant: A review. *Asian J Pharm*, *6*(1), 10-20.

Subedi, M., Timilsina, B., Adhikari, N., & Gautam, D. (2022). Tinospora Cordifolia (Gurjo) and its potential role to combat with COVID-19: A Review. *Janapriya Journal of Interdisciplinary Studies*, *11*(1), 121-132.

Subramaniam, K., Subramanian, S. K., Bhargav, S., Parameswari, R., Praveena, R., Ravikumar, R., ... & Kumar, V. M. (2021). Review on potential antiviral and immunomodulatory properties of Piper Longum. In *IOP conference series: materials science and engineering* (Vol. 1145, No. 1, p. 012099). IOP Publishing.

Tamang, R., Jayaprakash, P., Sarma, N., Begum, T., & Lal, M. (2024). Integration of in vitro and in silico analysis of Indian Valerian (Valeriana jatamansi Jones) against anti-oxidant, anti-diabetic and anti-inflammatory activities. *Industrial Crops and Products*, *220*, 119186.

Umeyama, L., Hardianti, B., Kasahara, S., Dibwe, D. F., Awale, S., Yokoyama, S., & Hayakawa, Y. (2021). Anti-inflammatory effects of Morus alba Linne bark on the activation of toll-like receptors and imiquimod-induced ear edema in mice. *BMC Complementary Medicine and Therapies*, *21*, 1-10.

Van Doan, H., Lumsangkul, C., Sringarm, K., Hoseinifar, S. H., Dawood, M. A., El-Haroun, E., ... & Paolucci, M. (2022). Impacts of Amla (Phyllanthus emblica) fruit extract on growth, skin mucosal and serum immunities, and disease resistance of Nile tilapia (Oreochromis niloticus) raised under biofloc system. *Aquaculture Reports*, *22*, 100953.

Van, H. T. (2021). Chemical constituents and biological activities of essential oils of Amomum genus (Zingiberaceae). *Asian Pacific Journal of Tropical Biomedicine*, *11*(12), 519-526.

Verma, D. K., Hasan, A., Rengaraju, M., Devi, S., Sharma, G., Narayanan, V., ... & Sunil, S. (2024). Evaluation of Withania somnifera based supplement for immunomodulatory and antiviral properties against viral infection. *Journal of Ayurveda and Integrative Medicine*, *15*(5), 100955.

Wang, Z., Zhao, S., Tao, S., Hou, G., Zhao, F., Tan, S., & Meng, Q. (2023). Dioscorea spp: Bioactive compounds and potential for the treatment of inflammatory and metabolic diseases. *Molecules*, *28*(6), 2878.

World Health Organization (2020) Traditional medicine in the WHO South-East Asia Region:

Review of progress 2014–2019.

Xi, C., Li, W., Liu, X., Xie, J., Li, S., Tian, Y., & Song, S. (2023). The potential role of Moringa oleifera Lam. leaf proteins in Moringa allergy by functionally activating Murine Bone Marrow-Derived Dendritic cells and inducing their differentiation toward a Th2-Polarizing Phenotype. *Nutrients*, *16*(1), 7.

Xiao, X., Wang, J., Meng, C., Liang, W., Wang, T., Zhou, B., ... & Zhang, L. (2020). Moringa oleifera Lam and its therapeutic effects in immune disorders. *Frontiers in Pharmacology*, *11*, 566783.

Yazdanpanah, E., Dadfar, S., Shadab, A., Orooji, N., Nemati, M., Pazoki, A., ... & Haghmorad, D. (2024). Berberine: A natural modulator of immune cells in multiple sclerosis. *Immunity, Inflammation and Disease*, *12*(3), e1213.

Zhu, J., Lu, Y., & He, Q. (2024). Recent advances on bioactive compounds, health benefits, and potential applications of jujube (Ziziphus Jujuba Mill.): A perspective of by-products valorization. *Trends in Food Science & Technology*, 104368.

Hu, Q., Wang, S., Cheng, R., Liu, Y., Chang, Z., Huang, Y., ... & Zhang, L. (2024). Tannins in Phyllanthus emblica L. improves cisplatin efficacy in lung cancer cells by boosting endoplasmic reticulum stress to trigger immunogenic cell death. *Phytomedicine*, *123*, 155219.

Sharma, M., & Gautam, D. (2022). Phytoconstituents and medicinal value of Mentha piperita. *Modern Phytomorphology*, *15*, 156-160.

Kim, S. J., Kim, S., Jang, S., Gu, D. H., Park, J. M., Ryu, J. A., ... & Jung, S. K. (2024). Curcuma longa L. extract increased immune responses in RAW 264.7 cells and cyclophosphamide-induced BALB/c mice. *Applied Biological Chemistry*, *67*(1), 24.

Chen, L., Liu, X., Zheng, K., Wang, Y., Li, M., Zhang, Y., ... & He, Y. (2024). Cordyceps Polysaccharides: A review of their immunomodulatory effects. *Molecules*, *29*(21), 5107.

Li, S., Pang, W., Wang, Y., & Zhang, Y. (2024). Cordyceps sinensis extract protects against acute kidney injury by inhibiting perforin expression in NK cells via the STING/IRF3 pathway. *Aging (Albany NY)*, *16*(7), 5887.

Juariah, S., Juliantari, E., Hanggara, D., Surya, A., & Endrini, S. (2024). Chemical profiling, antifungal and anti-inflammatory evaluations of ethanol Extract of Zingiber officinale var. rubrum and Curcuma caesia mixture from Riau, Sumatera Island, Indonesia. *Tropical Journal of Natural Product Research*, *8*(1).

Kiziltas, H. (2024). Genus Dactylorhiza: A phytochemical and pharmacological

overview. *Natural Antioxidants and in vitroAntioxidant Assays*, 163.

Shrivastava, A., & Jain, S. (2023). Dactylorhiza Hatagirea (D. Don) Soo: Himalayan Marsh Orchid. In *Immunity Boosting Medicinal Plants of the Western Himalayas* (pp. 145-171). Springer Nature Singapore.

Hasan-Al-Sharif, M., Hossain, M. M., Asha, A. S., & Al-Mamun, M. (2023). Lemongrass (Cymbopogon Citratus) essential oil improves gut health and production performance in Broiler: A Review. *Int. J. Curr. Sci*, *13*, 788-801.

Elachouri, M., Idrissi, A., & Bussmann, R. W. (2024). Cinnamomum burmanni (Nees & T. Nees) Blume Cinnamomum camphora (L.) J. Presl Cinnamomum verum J. Presl Neolitsea cassia (L.) Kosterm. Lauraceae. In *Ethnobotany of Northern Africa and Levant* (pp. 1-13). Springer International Publishing.

Chandra, P., Sachan, N., Pathak, R., Patel, A. K., & Pal, D. (2024). Camellia and lotus seeds: Plant made subunit in prevention and treatment of malignant diseases. *Seeds: Anti-proliferative Storehouse for Bioactive Secondary Metabolites*, 869-900.

Malabadi, R. B., Sadiya, M. R., Kolkar, K. P., Chalannavar, R. K., Mammadova, S. S., Baijnath, H., ... & Abdi, G. (2024). Tea (Camellia sinensis) leaves accumulate higher levels of Aluminum: Potential health risk-Alzheimer's disease (AD): An updated review of evidence. *GSC Advanced Research and Reviews*, *20*(1), 313-337.

Boru, G. W., Birhan, T. S., & Beyene, T. L. (2024). Integrated effects of furrow irrigation systems and irrigation regimes on water productivity of onion (Allium Cepa L.) crop in a semi-arid area. *Heliyon*.

Kushwaha, N., & Singh, A. (2024). Bergenia ciliata—phytochemistry and pharmacology: A review *Biomedical Materials & Devices*, 1-14.

Sapkota, B. K., Khadayat, K., Sharma, K., Raut, B. K., Aryal, D., Thapa, B. B., & Parajuli, N. (2022). Phytochemical analysis and antioxidant and antidiabetic activities of extracts from Bergenia ciliata, Mimosa pudica, and Phyllanthus emblica. *Advances in Pharmacological and Pharmaceutical Sciences, (1),* 4929824.

Paniagua-Zambrana, N. Y., Bussmann, R. W., & Kikvidze, Z. (2024). Asparagus acutifolius L. Asparagus officinalis L. Asparagus verticillatus L. Asparagaceae. In ethnobotany of the mountain regions of eastern Europe: Carpathians (pp. 1-13). Springer International Publishing.

Dogra, S., Singh, J., Koul, B., & Yadav, D. (2023). Artemisia vestita: a folk medicine with hidden herbal fortune. *Molecules*, *28*(6), 2788.

Marefati, N., Ghorani, V., Shakeri, F., Boskabady, M., Kianian, F., Rezaee, R., & Boskabady, M. H. (2021). A review of anti-inflammatory, antioxidant, and immunomodulatory effects of Allium cepa and its main constituents. *Pharmaceutical biology*, *59*(1), 285-300.

Das, K. (2022). Herbal plants as immunity modulators against COVID-19: A primary preventive measure during home quarantine. *Journal of Herbal Medicine*, *32*, 100501.

Zhou, X., Afzal, S., Wohlmuth, H., Münch, G., Leach, D., Low, M., & Li, C. G. (2022). Synergistic anti-inflammatory activity of ginger and turmeric extracts in inhibiting lipopolysaccharide and interferon-γ-induced proinflammatory mediators. *Molecules*, *27*(12), 3877.

Memarzia, A., Khazdair, M. R., Behrouz, S., Gholamnezhad, Z., Jafarnezhad, M., Saadat, S., & Boskabady, M. H. (2021). Experimental and clinical reports on anti inflammatory, antioxidant, and immunomodulatory effects of Curcuma longa and curcumin, an updated and comprehensive review. *BioFactors*, *47*(3), 311-350.

Sharma, M., & Gautam, D. (2022). Phytoconstituents and medicinal value of Mentha piperita. *Modern Phytomorphology*, *15*, 156-160.

Cheng, M., Zheng, Y., Wu, G., Tan, L., Xu, F., Zhang, Y., ... & Zhu, K. (2024). Protective effect of Artocarpus heterophyllus Lam.(Jackfruit) Polysaccharides on liver injury induced by Cyclophosphamide in mice. *Nutrients*, *16*(1), 166.