IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

An Overview On Indian Bael (Aegle marmelos)

Shaikh Sahil , Aghav Ishvar , Bhivarkar Pradip , Romade Akash

SAJVPM'S College Of Pharmaceutical Science And Research Centre, Kada (Beed), Maharashtra, India

Abstract:-

Indian bael (Aegle marmelos), commonly known as "Bilva," is an emblem of the intricate interplay between culture, tradition, and natural resources. This review delves into the diverse facets of Indian bael's significance, encompassing its historical use in traditional medicine, its role in cultural rituals, and its potential contributions to contemporary health and wellness practices. Through an amalgamation of historical insights and contemporary scientific investigations, this paper seeks to unveil the enduring connection between ancient wisdom and modern exploration. Indian bael has been an integral part of traditional medicine systems, with its leaves, fruits, and extracts finding application in remedies for various ailments. Its presence in these systems underscores its therapeutic potential and enduring importance. Beyond its medicinal uses, Indian bael holds cultural and religious significance, woven into rituals and practices that reflect its sacred attributes. This tree's aesthetic charm has inspired artistic expressions, further embedding it in the cultural consciousness. Scientific scrutiny of Indian bael's phytochemical composition has unravelled a spectrum of bioactive compounds, including alkaloids, flavonoids, and essential oils. These compounds underpin its reported antimicrobial, antioxidant, and anti-inflammatory properties. The convergence of traditional knowledge and scientific exploration validates Indian bael's holistic significance. From its historical roots to contemporary applications, Indian bael maintains its relevance. Modern research corroborates traditional wisdom, showcasing its potential in addressing various health concerns, including gastrointestinal disorders and metabolic health. This review assimilates these dimensions, offering a comprehensive portrayal of Indian bael's importance. In conclusion, Indian bael's profound ties to cultural heritage, tradition, and modern well-being illuminate its continued significance. This review traverses the landscape of traditional knowledge and scientific advancement, contributing to a deeper comprehension of Indian bael's intricate role. By contextualizing its past and present applications, this paper accentuates Indian bael's timeless legacy in shaping diverse aspects of society.

Keywords:-

Indian bael , Aegle marmelos

Introduction:-

Indian bael, also referred to as Aegle marmelos, is a tremendously valued tree inside the Indian subcontinent due to its numerous medicinal values and cultural importance.

This evaluate targets to offer a comprehensive analysis of Indian bael, exploring its botanical characteristics, conventional uses in Indian medicinal systems, and recent research on its medicinal blessings. In current years, there was increasing hobby in Indian bael and its capability healing packages. The Indian bael tree, scientifically called Aegle marmelos and belonging to the own family Rutaceae, has garnered interest for its antioxidant, anti inflammatory, antimicrobial, and antidiabetic residences.

The leaves, fruits, plant life, seeds, roots, and bark of the Indian bael tree were used in conventional remedy to treat a extensive range of illnesses. These encompass persistent diarrhea, dysentery, and peptic ulcers. Moreover, Indian bael has won reputation for its capability to beautify reminiscence and sell intellect.

Numerous research have been carried out to research the medicinal blessings of Indian bael, validating its traditional uses and uncovering extra healing houses. These studies have proven that Indian bael possesses antioxidant compounds that could assist guard against oxidative stress and related diseases. Furthermore, Indian bael has been determined to exhibit anti inflammatory outcomes, which make it a ability candidate for the remedy of inflammatory situations such as arthritis and inflammatory bowel disorder. In addition, the antimicrobial properties of Indian bael were explored, suggesting its potential use in combating numerous infections caused by bacteria and fungi. The pharmacological homes of Indian bael can be attributed to its rich composition of phytochemicals, along with alkaloids, flavonoids, carotenoids, coumarins, saponins, terpenoids, and tannins.

The presence of these phytochemicals in Indian bael highlights its potential as a precious source of natural treatments for diverse fitness situations. Furthermore, the religious importance of Indian bael can't be unnoticed. In the traditional Indian System of Medicine, such as Ayurveda and Unani, Indian bael has been appeared as an critical medicinal plant.

Indian bael

Morphology:-

Tree Characteristics: Indian bael (Aegle marmelos) is a deciduous tree that belongs to the Rutaceae circle of relatives. It is recognized for its wonderful appearance and exquisite features. The tree generally attains a moderate height, starting from 8 to twelve meters, with a strong trunk included in pale, clean bark. The young branches are regularly in moderation thorned, even as older branches have a tendency to lose their thorns.

Leaves:-

Tree Characteristics: Indian bael (Aegle marmelos) is a deciduous tree that belongs to the Rutaceae circle of relatives. It is recognized for its wonderful appearance and exquisite features. The tree generally attains a moderate height, starting from 8 to twelve meters, with a strong trunk included in pale, clean bark. The branches are regularly in moderation thorned, even as older branches have a tendency to lose their thorns.

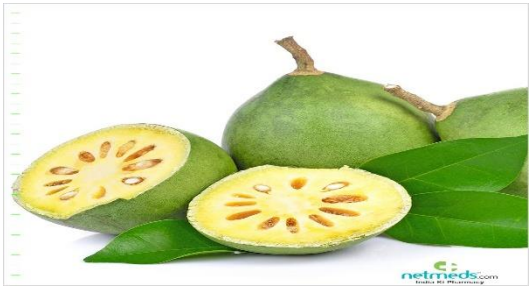
Flower:-

The flora of Indian bael are aesthetically attractive and carry a pleasant fragrance. They are usually greenish-white or pale yellow in coloration and are borne in axillary clusters. The plants are bisexual and own 5 sepals and petals. Numerous stamens are arranged in a imperative column, and the ovary is superior.

Fruits:-

The flora of Indian bael are aesthetically attractive and carry a pleasant fragrance. They are usually greenish-white or pale yellow in coloration and are borne in axillary clusters. The plants are bisexual and own 5 sepals and petals. Numerous stamens are arranged in a imperative column, and the ovary is superior.

Roots:-



The root device of Indian bael is giant and deeply penetrating, allowing the tree to get admission to water and nutrients from various soil depths. The roots contribute to the tree's stability and energy, permitting it to thrive in various soil situations.

Scientific classification:-

Kingdom :- Plantae

Phylum :- Magnoliopsida

Subclass:- Rosidae

Order:- Sapindales

Family:- Rutaceae

Gens :- Aegle

Subject:- Aegle marmelos

Phytochemical Composition:-

The profound residences of Indian bael (Aegle marmelos) are rooted in its difficult phytochemical make-up. The tree's numerous components harbor an array of bioactive compounds, contributing to its healing potential and cultural significance.

Alkaloids:-

Alkaloids are prominent components located inside Indian bael. Notable examples consist of marmelosin and fagarine, that have been recognized in special parts of the plant. Alkaloids showcase various organic activities, encompassing antimicrobial, anti-inflammatory, and capability analgesic outcomes. Their presence underscores Indian bael's alignment with conventional medicinal practices.

Flavonoids:-

Flavonoids, plentiful in Indian bael, constitute a critical factor of its phytochemical profile. Compounds like quercetin and kaempferol endow the plant with antioxidant capability. Through scavenging loose radicals and mitigating oxidative strain, flavonoids make contributions to the tree's reputation as a source of well being.

Essential Oils:-

The fragrant charm of Indian bael emanates from its critical oil content material. Limonene, terpinen-four-ol, and eugenol are among the unstable compounds diagnosed inside the plant's leaves and culmination. Beyond their aromatic essence, those oils may also confer antimicrobial and insecticidal attributes, underscoring the plant's multi-dimensional software.

Tannins:-

Tannins, with their characteristic astringent properties, have a presence in Indian bael. These compounds, distributed throughout exclusive plant components, might also impact the plant's results on digestive health. Tannins are recognized for their capability to bind to proteins and modulate enzymatic sports, imparting insights into conventional packages.

Phenolic Compounds:-

Phenolic compounds, exemplified by means of gallic acid and ellagic acid, represent an essential facet of Indian bael's phytochemical charter. With antioxidant potency, those compounds make contributions to cell safety and potential health benefits attributed to the plant.

Significance:-

The phytochemical variety of Indian bael portrays its elaborate connection to both conventional practices and present day medical investigations. These compounds collectively underpin the pronounced antimicrobial, antioxidant, and anti-inflammatory properties related to Indian bael. The interplay among historical understanding and present day knowledge is manifested inside the wealthy phytochemical tapestry of Indian bael.

Pharmacological properties:-

Indian bael (Aegle marmelos) owes its enduring importance to a spectrum of pharmacological houses that emanate from its various phytochemical composition. Traditional practices and modern-day studies converge to unveil its capability contributions to health and wellness.

Antimicrobial Activity:-

The bioactive compounds within Indian bael showcase promising antimicrobial results. Alkaloids, such as marmelosin and fagarine, along side important oil components, contribute to the plant's capability to fight microbial pathogens. These compounds have proven inhibitory consequences towards a variety of micro organism and fungi, hinting at Indian bael's function in traditional wound restoration and infection control.

Antioxidant Potential:-

Indian bael's flavonoid and phenolic content material equips it with strong antioxidant houses. These compounds neutralize dangerous free radicals, safeguarding cells from oxidative pressure. The antioxidant capability aligns with conventional uses and shows capability benefits for preventing oxidative harm-connected problems.

Anti-Inflammatory Effects:-

Several elements of Indian bael, inclusive of flavonoids and alkaloids, keep anti inflammatory attributes. These compounds modulate inflammatory pathways and cytokine production. By curbing immoderate irritation, Indian bael may additionally make a contribution to the management of inflammatory situations.

Immunomodulatory Actions:-

Indian bael's immunomodulatory ability has captured interest. Certain compounds in the plant can also influence immune responses through modulating cytokines and immune cells. This shows avenues for studies into Indian bael's capacity position in immune system modulation.

Digestive Health Benefits:-

Traditional uses of Indian bael in digestive health align with its pharmacological homes. Tannins and different compounds are thought to confer gastroprotective and anti-diarrheal results. These attributes resonate with the plant's historic application in assuaging digestive ailments.

Potential Antidiabetic Effects:-

Emerging research pointers at Indian bael's capability in diabetes control. Compounds like marmelosin have tested antidiabetic effects via influencing glucose metabolism and insulin secretion. While similarly studies are wanted, this offers an thrilling street for exploration.

Caveats and Considerations:-

While Indian bael's pharmacological residences keep promise, caution is important. Dosing, interactions, and protection profiles warrant thorough investigation. Additionally, conventional practices ought to be harmonized with modern-day clinical perspectives to ensure powerful and secure utilization

Application and health benefits:-

Traditional and Contemporary Applications:-

Indian bael (Aegle marmelos) is a versatile botanical entity that bridges the chasm between traditional practices and contemporary programs. Its wealthy phytochemical composition and pharmacological residences have paved the way for a myriad of makes use of in health and well-being

Digestive Health and Gastrointestinal Disorders:-

Indian bael's ancient function in selling digestive health reveals resonance in modern programs. Compounds like tannins and essential oils may additionally contribute to its gastroprotective results. Traditional treatments for diarrhea and dysentery align with medical findings, suggesting its capability as an accessory in coping with gastrointestinal problems.

Antioxidant and Anti-Inflammatory Support:-

The antioxidant and anti-inflammatory residences of Indian bael's phytochemical materials maintain promise for combatting oxidative pressure and infection-associated situations. The flavonoids and alkaloids present within the plant may also contribute to cell protection and the control of inflammatory issues.

Diabetes Management and Metabolic Health:-

Emerging studies suggests Indian bael's potential in diabetes control. Compounds like marmelosin display promise in influencing glucose metabolism and insulin secretion. This could open avenues for natural interventions in addressing diabetes and related metabolic challenges.

Immune System Modulation:-

Indian bael's immunomodulatory homes are of unique hobby. The capability to influence immune responses may want to have implications for numerous fitness conditions, consisting of autoimmune disorders. Further studies is warranted to release its mechanisms and clinical packages.

Skin Care and Wound Healing:-

The antimicrobial and anti inflammatory attributes of Indian bael's compounds enlarge to its ability in pores and skin care and wound recuperation. Traditional use for pores and skin ailments aligns with modern insights into its capability to combat pathogens and mitigate infection, potentially helping in wound management.

Safety and Considerations:-

While Indian bael's programs offer promising avenues, concerns are paramount. Dosage, interactions, and person responses need thorough exploration. The alignment of traditional wisdom with contemporary requirements guarantees its safe and powerful utilization

A Holistic Bridge:-

The packages and health advantages of Indian bael underscore its position as a holistic bridge among lifestyle and modernity. From its historical role in digestive health to its capacity impact on metabolic disorders and immunity, Indian bael embodies the convergence of historical knowledge with modern well being practices.

Conclusion:-

The tale of Indian bael (Aegle marmelos) is one in all a harmonious combination among ancient understanding and modern exploration. This overview has illuminated the multi-dimensional importance of Indian bael, spanning conventional practices, cultural rituals, and capability health applications. From its roots in Ayurveda to its presence in non secular ceremonies, Indian bael resonates as a image of India's cultural and botanical historical past.The numerous phytochemical composition of Indian bael, encompassing alkaloids, flavonoids, critical oils, and greater, paints a complex portrait of its potential pharmacological residences. From antimicrobial prowess to antioxidant safety, those compounds intersect with traditional uses and present day health aspirations.The demanding situations that accompany Indian bael's integration into cutting-edge healthcare underscore the delicate balance among cultural protection and medical rigor. Bridging this hole requires collaboration, validation, and a deep respect for conventional knowledge. With standardized formulations, responsible sourcing, and schooling, Indian bael's destiny contributions can be harnessed without compromising its cultural background.As we gaze toward the horizon, the destiny of Indian bael unfolds with promise. Further studies, medical validation, and sustainable practices keep the keys to unlocking its capacity as a natural remedy. The journey ahead entails weaving collectively threads of traditional practices, contemporary proof, and cultural appreciation.In essence, Indian bael transcends its botanical life to encompass a profound connection among the beyond and the prevailing. Its leaves flutter with the whispers of tradition, its culmination evoke memories of rituals, and its potential impacts echo the aspirations of modern-day wellness. The tricky tale of Indian bael reminds us that nature's presents, while explored holistically, have the power to complement now not handiest our health but additionally our cultural heritage.

Reference:-

1. Brijesh, S.; Daswani, P.; Tetali, P.; Antia, N.; Birdi, T. Studies on the antidiarrhoeal activity of Aegle marmelos unripe fruit:

Validating its traditional usage. BMC Complement. Altern. Med. 2009, 9, 47. [CrossRef] [PubMed]

2. Pathirana, C.K.; Madhujith, T.; Eeswara, J. Bael (Aegle marmelos L. Corrêa), a Medicinal Tree with Immense Economic Potentials.

Adv. Agric. 2020, 2020, 8814018. [CrossRef]

3. Rahman, S.; Parvin, R. Therapeutic potential of Aegle marmelos (L.)-An overview. Asian Pacific J. Trop. Dis. 2014, 4, 71–77.

[CrossRef]

4. Sarkar, T.; Salauddin, M.; Chakraborty, R. In-depth pharmacological and nutritional properties of bael (Aegle marmelos): A critical

review. J. Agric. Food Res. 2020, 2, 100081. [CrossRef]

5. Jagetia, G.C.; Venkatesh, P.; Baliga, M.S. Aegle marmelos (L.) Correa inhibits the proliferation of transplanted Ehrlich ascites

carcinoma in mice. Biol. Pharm. Bull. 2005, 28, 58–64. [CrossRef] [PubMed]

6. Dhankhar, S.; Ruhil, S.; Balhara, M.; Dhankhar, S.; Chhillar, A.K. Aegle marmelos (Linn.) Correa: A potential source of Phy-

tomedicine. J. Med. Plants Res. 2011, 5, 1497–1507.

7. Iqbal, T.; Hussain, A.I.; Chatha, S.A.S.; Naqvi, S.A.R.; Bokhari, T.H. Antioxidant activity and volatile and phenolic profiles of

essential oil and different extracts of wild mint (Mentha longifolia) from the Pakistani flora. J. Anal. Methods Chem. 2013, 2013,

536490. [CrossRef]

8. Xu, X.; Liu, A.; Hu, S.; Ares, I.; Martínez-Larrañaga, M.R.; Wang, X.; Martínez, M.; Anadón, A.; Martínez, M.A. Synthetic phenolic

antioxidants: Metabolism, hazards and mechanism of action. Food Chem. 2021, 353, 129488. [CrossRef]

9. Lugo-Flores, M.A.; Quintero-Cabello, K.P.; Palafox-Rivera, P.; Silva-Espinoza, B.A.; Cruz-Valenzuela, M.R.; Ortega-Ramirez, L.A.;

Gonzalez-Aguilar, G.A.; Ayala-Zavala, J.F. Plant-derived substances with antibacterial, antioxidant, and flavoring potential to

formulate oral health care products. Biomedicines 2021, 9, 1669. [CrossRef]

10. Salman, B.N.; Darvish, S.; Goriuc, A.; Mazloomzadeh, S.; Hossein Poor Tehrani, M.; Luchian, I. Salivary oxidative stress markers'

relation to oral diseases in children and adolescents. Antioxidants 2021, 10, 1540. [CrossRef]

11. Pytko-Polo ´nczyk, J.; Stawarz-Janeczek, M.; Kryczyk-Poprawa, A.; Muszy ´nska, B. Antioxidant-rich natural raw materials in the

prevention and treatment of selected oral cavity and periodontal diseases. Antioxidants 2021, 10, 1848. [CrossRef] [PubMed]

12. Pant, P.; Sut, S.; Castagliuolo, I.; Gandin, V.; Maggi, F.; Gyawali, R.; Dall'Acqua, S. Sesquiterpene rich essential oil from Nepalese

Bael tree (Aegle marmelos (L.) Correa) as potential antiproliferative agent. Fitoterapia 2019, 138, 104266. [CrossRef]

13. Poonkodi, K.; Vimaladevi, K.; Suganthi, M.; Gayathri, N. Essential Oil Composition and Biological Activities of Aegle marmelos

(L.) Correa Grown in Western Ghats Region-South India. J. Essent. Oil-Bear. Plants 2019, 22, 1013–1021. [CrossRef]

14. Nocini, R.; Lippi, G.; Mattiuzzi, C. The worldwide burden of smoking-related oral cancer deaths. Clin. Exp. Dent. Res. 2020, 6,

161–164. [CrossRef] [PubMed]

15. Pires, F.R.; Ramos, A.B.; de Oliveira, J.B.C.; Tavares, A.S.; de Luz, P.S.R.; dos Santos, T.C.R.B. Oral squamous cell carcinoma:

Clinicopathological features from 346 cases from a single oral pathology service during an 8-year period. J. Appl. Oral Sci. 2013,

21, 460–467. [CrossRef]

16. Lambertini E, Piva R, Khan MT, et al. Effects of extracts from Bangladeshi medicinal plants on in vitro proliferation of human breast cancer cell lines and expression of estrogen receptor alpha gene. Int J Oncol. 2004;24:419-423.

17. Subramaniam D, Giridharan P, Murmu N, et al. Activation of apoptosis by 1-hydroxy-5,7-dimethoxy-2-naphthalene-carboxaldehyde, a novel compound from Aegle marmelos. Cancer Res. 2008;68:8573-8581.

18. Saleem M, Maddodi N, Abu Zaid M, et al. Lupeol inhibits growth of highly aggressive human metastatic melanoma cells in vitro and in vivo by inducing apoptosis. Clin Cancer Res. 2008;14:2119-2127.

19. Hata K, Hori K, Murata J, Takahashi S. Remodeling of actin cytoskeleton in lupeol-induced B16 2F2 cell differentiation. J Biochem. 2008;138:467-472.

20. Saleem M, Kaur S, Kweon MH, Adhami VM, Afaq F, Mukhtar H. Lupeol, a fruit and vegetable based triterpene, induces apoptotic death of human pancreatic adenocarcinoma cells via inhibition of Ras signaling pathway. Carcinogenesis. 2005;26:1956-1964.

21. Prasad S, Madan E, Nigam N, Roy P, George J, Shukla Y. Induction of apoptosis by lupeol in human epidermoid carcinoma A431 cells through regulation of mitochondrial, Akt/PKB and NFκB signaling pathways. Cancer Biol Ther. 2009;8:1632-1639.

22. Zhang L, Zhang Y, Zhang L, Yang X, Lu Z. Lupeol, a dietary triterpene, inhibited growth, and induced apoptosis through down-regulation of DR3 in SMMC7721 cells. Cancer Invest. 2009;27:163-170.

23. Saleem M, Kweon MH, Yun JM, et al. A novel dietary triterpene lupeol induces fas-mediated apoptotic death of androgen-sensitive prostate cancer cells and inhibits tumor growth in a xenograft model. Cancer Res. 2005;65:11203-11213.

24. Prasad S, Nigam N, Kalra N, Shukla Y. Regulation of signaling pathways involved in lupeol induced inhibition of proliferation and induction of apoptosis in human prostate cancer cells. Mol Carcinog. 2008;47:916-924.

25. Saleem M, Murtaza I, Tarapore RS, et al. Lupeol inhibits proliferation of human prostate cancer cells by targeting beta-catenin signaling. Carcinogenesis. 2009;30:808-817.