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Review

A REVIEW ON MEDICINAL TREE ACACIA NILOTICA LINN. PLANT

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ABSTRACT

Acacia nilotica Linn. (Fabeaece), commonly referred to as a 'Babul or kikar' is a wellknown, medium- sized tree found broadly in tropical and subtropical regions. It has an inspiring array of medicinal properties and reported potential anti- oxidant behaviour. Acacia nilotica contributed a various compound, among which are alkaloids, volatile, essential oil, resins, oleosins, phenols and phenolic glycosides, flavonoids, steroids, terpenes and tannins. Acacia nilotica recognized to be rich in phenolic content, comprising condensed tannins and phlobatannins, along with gallic acid, protocatechuic acid, pyrocatechol, (+) catechin (-), epigallocatechin -7- gallate, and (-) epigallocatechin -5,7- digallate. Acacia nilotica is a remarked as a valuable plant for its medicinal activities, which leading to develop interests among the further new researchers. This review aimed to gather both early and recently published articles that validated the various different medicinal properties of Acacia nilotica trees. The researches finding from earlier studies indicated that Acacia extracts possess numerous therapeutic effects, such as Antipyretic, Anticancer, Antimicrobial, Antiparasitic, Anti-diabetics, Antihyperlipidemic, and Antimutagenic, Anti- inflammatory, Antinociceptive, Anti-diarrheal and Anti- Oxidant. This review compiles information concerning the phytochemistry, pharmacological properties and biological activities of the Acacia nilotica (Linn.)

KEYWORDS: Acacia nilotica, medicinal plant, pharmacological activities, Antibacterial and Antifungal, Phytomedicine.

INTRODUCTION

Acacia nilotica (Linn.) babul is a crucial tree that possesses numerous medicinal properties. (Ali A, 2012) (Singh BN, 2009). Acacia nilotica has a rich antioxidant phenolics, which primarily include condensed tannins and phlobatannins, gallic acid, protocatechuic acid, pyrocatechol, (+) catechin (-), epigallocatechin -7- gallate, and (-) epigallocatechin -5,7digallate. (M., 2018) (El Toumy S, 2011) (Omara EA, 2012) Acacia nilotica is a tree that reaches height of about 5-20 m high with features of dense, rounded canopy. Its stems and branches are generally dark to black coloured, with fissured bark, a grey- pink interior and exuding a low- quality of reddish gum. The tree possesses thin, straight, light grey spines in auxiliary pairs, usually 3 to12, measuring 5 to 7.5 cm long in younger specimens, while the mature trees usually lack these thorns. The leaves are bipinnate, exhibiting 3 to 6 pairs of pinnulae and each containing 10 to 30 leaflets, with a gland present at the base of the last pair of pinnulae on the rachis. The flowers form in globular clusters, about 1.2 to 1.5cm in diameter of a bright golden – yellow hue and appearing either in axillaries positions or in whorls on peduncles 2-3 cm long located at the end of branches. The pods are noticeably constricted, hairy, and have a thick, white- grey appearance. (GA., 2010) The bark possesses various medicinal purposes, acting as expectorants, acrid cooling, astringents, aphrodisiac, antihelmintics, styptics, emollient, and emetics and nutritive, particularly in cases of haemorrhage, wound ulcers, leucoderma, leprosy, skin conditions, and seminal weakness. The Gum is also utilized as an emollient, antiastringent, antipyretic liver tonic and antihistamine. (Baravkar AA, 2008)

SCIENTIFIC CLASSIFICATION

Kingdom: Plantae Subkingdom: Tracheobionta Super division: Spermatophyta Division: Magnoliophyta Class: Magnoliopsida Subclass: Rosidae Order: Fabales Family: Fabaceae Genus: Acacia Species: Nilotica^[18] **ORIGIN AND DISTRIBUTION:** Acacia nilotica (L.) Wild, commonly referred to as prickly acacia in Australia, originates from the tropical and subtropics of Africa, the Middle East, and the Indian subcontinent. It is being as a nitrogen- fixing species with multipurpose make it highly preferred by Farmers, leading to its wide distribution in the various field. (Raj A, 2014)This plant is significant multipurpose species (Kaur K, 2005) that was brought into Queensland from India in the late 1890s for ornamental purposes (MP, 1989) It is a complex species which consisting of nine subspecies, of which are native to the African tropics while three remaining are indigenous to the Indian subcontinent. It is thrives of Southern Tropical dry deciduous forests and Southern Tropical thorn forests, as specialised by (Champion HG, 1968)

COMMON NAMES: Indian Gum –Arabic-tree, Gum Arabic tree, Thorn –Mimosa, Thorny-Acacia, Gommier Rouge, Goma Arabica, Casha, Cassie, Black Piquant, Egyptian Acacia, Babul, Babul Acacia, Acacia Gomifera, Acacia De Cayenne, Acacia A` Gomme.

INDIAN NAMES:

- 1. **Hindi:** Babul, Kikar.
- 2. Bengali: Babla, Babul.
- 3. Gujarati: Babaria, Baval, Kaloabaval.
- 4. Punjabi: Sak.
- 5. Tamil: Kaluvelamaram, Karuvelam.
- 6. Telugu: Nallatumma, Tuma.
- 7. Orissa: Bambuda, Baubra.
- 8. Marathi: Babhul, Vedibabul.
- 9. Malayalam: Karivelan, Karuvelum.
- 10. Kannad: Gobbli, Karijali.

The objective of this study was to review and evaluate the existing scientific information on the medicinal properties of Acacia nilotica (L.) by bibliographic literature review.

MEDICINAL USES AND PHARMACOLOGICAL EFFECTS

Acacia nilotica is a versatile species tree. Generally, it is known as a green fertilizer, fodder provider and a timber source tree in agro - forestry systems all over the world. The pharmacological activities and medicinal properties attributed to different parts of Acacia nilotica are illustrated below:

- 1. Acetyl cholinesterase inhibitory activities: Acetyl cholinesterase is a key target in the treatment of Alzheimer's diseases. Many researches shown that Acacia nilotica influence activities in the central nervous system due to potent its strong inhibitory effects on Acetyl cholinesterase. Furthermore study is required for the treatment of Alzheimer's disease. (Crowch CM, Kinetics of acetylcholinesterase inhibitory activities by aqueous extracts of Acacia nilotica (L.) and Rhamnus prinoides., 2009)
- 2. Anti oxidant activities: The water extracts and fractions of acacia nilotica exhibit the properties to scavenge the peroxyl radicals in lipid per oxidation assays that results demonstrate the plant's antioxidant properties. Using the maceration extraction method, the various solvent extracts of the bark powder from the plant found the scavenging activity. (WE., 2009) Further, additional study shows that Acacia nilotica serves as a readily accessible source of natural antioxidants, which can be utilized as supplements in the treatments of diseases associated with free radical mediated such as diabetes, cancer, inflammation and others. (Amos S, 1999)Moreover, the Acacia nilotica has ability of strong scavenging may be indicate to the presence of hydroxyl groups in the phenolic compounds, which can be effective in neutralizing free radicals. (Kalaivani T, 2010)
- **3. Anti plasmodial activities:** The ethyl acetate extract demonstrates the greatest activity on Plasmodium falciparum. Phytochemical examination indicated that the most effective phase contained terpenoids and tannins while lacking alkaloids and saponins. (El- Tahir A, 1999) Crude methanolic root extracts from Acacia nilotica demonstrated notable activity against the chloroquine sensitive strain of Plasmodium berghei in mice. (Jigam AA, 2010)
- 4. Antibacterial and antifungal activities: The tests of the stem bark extracts reveal their antimicrobial properties against Streptococcus viridians, Staphylococcus aureus, Shigella sonnei, Baciilus subtilis, and Escherichia coli using the Agar diffusion technique. Acacia nilotica amy be potential source of antimicrobial compounds. (A., 2009) Acacia nilotica shows the greatest activity against three bacterial (E. coli, S. aureus and Salmonella typhi) and the other two belongs to fungal strains (Aspergillus niger and Candida albicans). (Kalaivani T R. C., 2011)
- 5. Anti hypertensive and anti spasmodic activities: A reduction in arterial blood pressure has been documented with the utilization of methanolic extract from the pods of Acacia nilotica, that demonstrating the evidence of anti- hypertensive properties that are independent on the activation of muscarinic receptors. In vitro analyses reported that acacia nilotica suppresses the effect of both the force and frequency of spontaneous

contractions in the guinea pig paired atria and the rabbit jejunum. Additionally, Acacia nilotica inhibit contractions in induced by K+ in the rabbit jejunum, suggesting its antispasmodic effects, which may operate through the calcium channel blockade and this contribute to the blood pressure – lowering effect of acacia nilotica seen in a in- vivo studies. (Gilani AH, 1999) An aqueous extract from the seeds of Acacia nilotica was also demonstrating on the isolated guinea – pig ileum, which revealing the sustained dose-dependent contractile activity. Intravenous administration of the extracts leads to a significant elevation of blood – pressure that is related to dose. (Amos S A. P., 1999)

6. Chemo – preventive, cytotoxic and anti – mutagenic activities: It has been noted, that the antimutagenic and cytotoxic properties exhibited by the acetone extract may be stem from the presence of gallic acid and other polyphenols. (Kaur K, In vitro bioactivity-guided fractionation and characterization of polyphenolic inhibitory fractions from Acacia nilotica(L.) Willd. ex Del., 2005) It has been reported that the leaf extract of acacia nilotica has greatest significant chemopreventive and anti- mutagenic effects compared to its other parts. (Kalaivani T M. L., 2010)The chemopreventive properties of aqueous extracts of acacia nilotica from the gum, flowers, and leaves effective against skin papillomagenesis induced by 7,12 – dimethylben(a)anthracene (DMBA) in male Swiss albino mice have been demonstrated. Other than all among these, the leaf extract of Acacia nilotica reported that the most pronounced chemopreventive and anti – mutagenic effects, followed by the gum and the extract of flower. (Meena PD, 2006)

FUTURE ASPECTS

According to numerous studies on different parts of Acacia nilotica, there is a significant necessity to extract and to identify a new compound from the tree that may possible antimutagenic and cytotoxic properties. Consequently, the spread ability of naturally occurring polyphenolic compounds having the offer protection against certain specific mutagens and carcinogens in a crucial. The extract of Acacia nilotica was also demonstrated for its potential interaction with serotonin (5-HT) receptors, which are linked with hypertension. Additionally, it contains serotonin- blocking compounds that warrant further detailed examination for with serotonin receptor subtypes. (Gilani AH, 1999) Due to the presence of phenolic compounds, Acacia nilotica reported as a notable scavenging activity. However, there is an additional research required to identify the individual components that form its antioxidative system and to explore their applications in the food sector and pharmaceuticals. (Kalaivani T M. L., 2010) Umbelliferon, a strong antioxidant extracted from

the Acacia nilotica plant, along with anti-oxidants derived from food, are implicated in cancer and aging prevention by neutralizing oxidative species that target carcinogenesis through the oxidative damage of deoxyribonucleic Acid (DNA). The supplementation of functional food with antioxidants, which prevent the formation of free radicals, may contribute to the avoidance of certain diseases. As most of the antimutagenic compounds operate by scavenging free radicals, there is a intense need to explore the antioxidant properties of the functional components found in the extract of Acacia nilotica. (Singh BN S. B., 2009) However, there is limited efficacy of gallotannins as antiplasmodial agents, which indicating the necessity for further researches. (Jigam AA, Polygalloyltannin isolated from the roots of Acacia nilotica Del. (Leguminoseae) is effective against Plasmodium berghei in mice., 2010) Given the potential uses of this plant, it is highly recognized to cultivate it extensively to get maximize production for the welfare of humanity.

CONCLUSION

In conclusion, this review of both early and recently research paper has affirmed many numerous of medicinal activities of extracts from Acacia's stem bark, pods, roots, and leaves. Additionally, this study highlighted many therapeutic effects for Acacia, including Antipyretic, Anticancer, Antimicrobial, Antiparasitic, Anti-diabetics, Antihyperlipidemics, and Antimutagenic, Anti- inflammatory, Antinociceptive, Anti-diarrheal and Anti- Oxidant. Therefore, Acacia extracts have the potential to become serve as a natural and cost- effective alternative to pharmaceuticals and prescribed drugs. Acacia nilotica is a versatile species, which is widely distributed and utilized for several therapeutics and pharmacological applications. The Global scenario shifting towards utilizing of non – toxic plant based herbal products. This review article aims to raise awareness among people individuals about taking control measures based on herbal plants in against of infectious diseases. More comprehensive detailed clinical researches study are required to explore its medicinal worth establish and to confirm its status as a standard medication.

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