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Short Communication

Plants that have Quinoline Alkaloid and their Biological Activity

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DESCRIPTION

A group of naturally occurring substances called quinoline alkaloids is present in many different plant species. Due to their wide range of biological activities, including their anticancer, antimalarial, anti-inflammatory, and antiviral characteristics, they have drawn researchers 'attention. *Cinchona species*, which are used to cure malaria and contain quinine and similar alkaloids, are another source of quinoline alkaloids. In addition to their therapeutic effects, quinoline alkaloids have also demonstrated promising results in the field of agro chemistry. *Choisya ternata* is another plant that contains alkaloids like skimmianine and is used in traditional medicine to treat fever and inflammation. This review focus on quinoline alkaloid isolated from some medicinal plants and the compounds were found to have pharmacological properties.

Quinoline alkaloids are a group of organic compounds that are present in several plant species. Their distinctive feature is a fused ring structure made up of two six-membered rings, one of which has an atom of nitrogen [1]. Quinine, which is generated from the bark of the cinchona tree and has been used for centuries to cure malaria, is one of the most well-known quinoline alkaloids [2-8]. Other quinoline alkaloids with medicinal potential include pyridoacridine alkaloids, which are found in a variety of plant species and have demonstrated activity against bacteria and viruses, and camptothecin, which is found in the Chinese tree *Camptotheca acuminate* and has shown promise as an anticancer agent [9].Medicinal plants are regarded as rich sources of components in the production of pharmaceutical drugs [10-18]. Bioactive phytocompounds found in medicinal plants are primarily employed for the treatment of many human diseases and also play a significant role in healing [19,20]. The health of humans, both individually and collectivesly, has depended on medicinal plants since antiquity [21]. Due to their obvious physiological effects on humans, several chemical components found in these plants offer therapeutic advantages [22,23].

Since ancient times, medicinal plants have played an essential role in human health, both personally and collectively [24,25]. Some chemical components in these plants have medical benefits because they have clear physiological effects on people [26,27]. This article focuses on quinoline alkaloids that were discovered to have pharmacological characteristics after being extracted from a few medicinal plants (Table 1).

S/N	Botanical name: Family name	Part used	List of isolation compound	Medicinal activities
1	*Cinhona*: Rubiaceae	Bark	7-hydroxymitragynine mitragynine	Antioxidants, Antiviral
2	Gosyuyu (Ruticarpun)	Fruit	3,4′,5-trihydroxystilbene	Antimicrobial
3	Rutaceae	Leave	Hydroxy-N-isobutyl-2,4,8,11.	Antimicrobial
4	*Leishmania spp*	Stem bark	2-phenylquinoline 2, n-pentylquinoline	Antioxidants, Antiviral
5	*Solanun*: Solanaceae	Fruit	Hydroxy-2-methylpropyl)-2,4,8,11-tetradeeatetraenamide 8-C-β-galactoside	Antioxidants

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6	*Pinnata*: Pengamiacea	Root	1-Azanaphthalene Leucoline	Antimicrobial, Antioxidants
7	*Ruta chaplepnesis*	Root	Dictamine 1,3-dioxolen-5-yl	Antimicrobial
8	*Galipea bracteata*	Stem	Actinomycin Aminoglycesides	Antibacterial, Anticancer'
9	Sarcomelicop Megistophylla	Bark	Furo (2,3,6) quinoline	Antimicrobial Activity
10	*Melodinus*	Bark	Monoterpenoid quinoline	Biosynthesis of quinoline alkaloid
11	*Astropa belladonna*	Stem	Actinomycin Glycemic	Antibacterial
12	*Boswella serrate*: Burseracea	Root	Huperzine A (1R,9R, 13E)-1-Amino-13-ethylidene-11-methyl	Anti-inflammatory
13	*Orixa japonica*	Stem	N-demethylunidonme 8-methoxy-N-methyl	Antibacterial
14	*Moringa oleifera*: Moringaceae	Leaves	5,5′-di-tert-butyl-3-(carboxymethyl) bipheny 1.3-benzylidene	Anti-inflammatory, Antibacterial
15	*Trigonella foenum:* Fabaceae	Leave	hydroxylupanine quercetin 3,7-di-1hydrox	Anti-inflammatory
16	*Oroxylum indicum*	Flower	Atropine, Scopolamine	Antimicrobial
17	*Triumfetta grandidun:* Taliaceae	Leaves	4-quinoline alkaloid tri.isoquinoline	Antimicrobial
18	Berberine	Leaves	Polyphenols, Isoquinoline	Anti-inflammatory
19	*Hibicus vitifolun*: Malvaceae	Stem	Beta-amarin n-octacosanol	Antibacterial
20	*Meiocarpidun lepidu:* Annnonaceae	Stem	Acetyl salicylic Indomethacin	Anti-inflammatory
21	*Poppies*: Poppaceae	Root	Quinuclidine 2-alkylquinoline	Anti-inflammatory
22	*Peganun harmala*: Zygophyllaceae	Flower	2-n-propylquinoline Chimanine B	Antibacterial Activity
23	Convolvuinceae	Leaves	8-azabicyclo (3,2,1) Aljamacun	AntimicrobiaL Activity
24	*Macleagy*: Macleacceae	Root	Trimethylene Benzopyrrole	Antimicrobial Activity
25	*Cinchona*	Bark	Dihydroquinoline Diethylamine	Antimalarial Activity

Table 1: Chemical components of medicinal plants.

Various plant species include a group of natural substances known as quinoline alkaloids. They are distinguished by having a fused ring structure made up of two six-membered rings, one of which has an atom of nitrogen [28]. Quinoline alkaloids

have a variety of biological effects, including as antibacterial, antimalarial, anticancer, and anti-inflammatory characteristics [29-36]. The diagnosis, treatment, and prevention of sickness all benefit greatly from plant-based medicines [37-42].

CONCLUSION

All of the compounds in this study were isolated from various medicinal plant parts, including the stem bark, fruits, leaves, stems, roots, and flowers. As a result, they demonstrated a variety of pharmacological actions on human health, including antioxidant, anti-inflammatory, anti-proliferative, antimicrobial, anti-mutagenic, anti-oangiogenic and neuroprotective actions. The pharmacological potentials of various plant extracts and several novel compounds derived from medicinal plants that have been demonstrated to be effective against a range of illnesses have been confirmed by docking studies.

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REFERENCES

1. Hariyanti H, mauludu R, calnyan S. Activities of quinoline alkaloid of *cinchona Spp* from stem bark. Pharmacol Sci. 2011;10(5).9-13.
2. Raj MK, Balachandran C, Duraipandiyan V, Agastian P, Ignacimuthu S. Antimicrobial activity of Ulopterol isolated from *Toddalia asiatica* (L.) Lam.: A traditional medicinal plant. J Ethnopharmacol. 2012;140(1):161-165.
3. Fournet A, Barrios AA, Muñoz V, Hocquemiller R, Roblot F, Cavé A, et al. Antiprotozoal activity of quinoline alkaloids isolated from *Galipea longiflora*, a Bolivian plant used as a treatment for cutaneous leishmaniasis. Phytother Res. 1994;(3):174-178.
4. Garg AK, Singh S. Role of medicinal plant in human health disease. Asian J Plant Sci Res. 2021.
5. Ahmed JU, Waziri M, Dauda A, Bida KM. A Short Review of Medicinal Plants Extract Accompanied by Potential Antidepressant Activity. Chem Rev. 2021;3:307-319.
6. Madumelu M, Iwuala NB, Uttu JA. Antimicrobial potentials and phytochemical investigation of stem bark methanolic extract and fractions of *Milletia chrysophylla* Dunn. FUDMA J Sci. 2022;6(3): 222-225.
7. Iyun OR, Uttu AJ, Sallau MS, Ibrahim H. GC-MS analysis of methanol extract of *Strychnos innocua* (Delile) root bark. Adv J Chem A. 2022;5(2):104-117.
8. Sallau MS, Uttu AJ, Iyun OR, Ibrahim H. *Strychnos innocua* (Delile): Phytochemical and antimicrobial evaluations of its root bark extracts. Ad J Chem B. 2022;4(2022):17-28.
9. Wadood A, Ghufran M, Jamal SB, Naeem M, Khan A, Ghaffar R, et al. Phytochemical analysis of medicinal plants occurring in local area of Mardan. Biochem Anal Biochem. 2013;2(4):1-4.
10. Uttu AJ, Sallau MS, Iyun OR, Ibrahim H. Antimicrobial Efficacy of Selected Strychnos Species: A Mini Review. J Chem Rev. 2022;4:59-62.
11. Sallau MS, Uttu AJ, Ibrahim H, Idris AY, Dama HJ. Isolation of a major antimicrobial compound from stem bark of *Glossonema boveanum* (Decne). Br Biotechnol J. 2016;16(2):1-0.
12. Uttu AJ, Waziri M. Phytochemical and antimicrobial studies of root back extracts from *Glossonema boveanum* (Decne). Afr J Pharm Pharmacol. 2017;9(2):112-118.
13. Uttu AJ, Sallau MS, Ibrahim H, Dambatta MB, Idris AY. Phytochemical and antimicrobial screening of stem bark extracts from *Glossonema boveanum* (Decne). J Pharmacogn Phytochem. 2015;4(2):86-88.
14. Ibrahim H, Uttu AJ, Sallau MS, Iyun OR. Gas chromatography–mass spectrometry (GC–MS) analysis of ethyl acetate root bark extract of *Strychnos innocua* (Delile). J Basic Appl Sci. 2021;10:1-8.
15. Uttu AJ, Maimalari ZB, Usman MM. Proximate composition, mineral content and antinutritional factors of leaves of *Senna occidentalis* (Linn). AJPP. 2021;13(2):127-32.
16. Baffa AA, Waziri M, Uttu AJ. Dietary Intake of Heavy Metals from the Consumption of Fruits and Vegetables in Gashua, Nigeria. In Proceedings of the 45th Annual International Conference, Workshop, and Exhibition of the Chemical Society of Nigeria (CSN). 2022:211-217.
17. Uttu AJ, Sallau MS, Iyun OR, Ibrahim H. In vitro antimicrobial studies of some major bioactive compounds isolated from Strychnos innocua (Delile) root bark. Steroids. 2023;195:1092-1141.
18. Fournet A, Munoz V, Roblot A, Brunetta B.Antifungal quinoline alkaloid from *leishmania spp* stem. Nat Prod. 2016;79(2).300-307.
19. Cristina A, Rimeo L, Paul E, Laura C. Solanum Fruit Phytochemical And bioaccessibility their Heathly-Promoting-Effect. Phytochem Anal. 2014;10(5).9-13.
20. Roeder E, Wiedenfeld H. Pyrrolizidine alkaloids in plants used in the traditional medicine of Madagascar and the Mascarene islands. Pharmazie. 2011;66(9):637-647.
21. Nikolas F, Khalid El S, Mansor S.New quinoline alkaloid from *Ruta Cheplepsis*. Nat Prod Res. 2000;3(7).995-997.
22. Cai XH, Li Y, Su J, Liu YP, Li XN, Luo XD et al. Novel indole and quinoline alkaloids from *Melodinus yunnanensis*. Nat Products Bioprospect. 2011;25-28.
23. Veeresham C. Natural products derived from plants as a source of drugs. J Adv Pharm Technol Res. 2012;3(4):200-201.
24. Funayama S, Murata K, Nozoe S. Quinoline alkaloids from *Orixa japonica*. Phytochem. 1994;36(2):525-8.
25. Liyongo CI, Bongo GN, Ashande CM, Lufualabo LG, Gbolo BZ, Djoza DR, et al. An updated review on the bioactivities and phytochemistry of the nutraceutical plant Moringa oleifera Lam (Moringaceae) as valuable phytomedicine of multi-purpose. Discovery Phytomedicine. 2018;5(4):52-63.
26. Ahmad F, Anwar F, Hira S. Review on medicinal importance of Fabaceae family. Plants (Basel). 2016;3:151-7.
27. John M, Roblot A, Brunetta B. Antifungal quinoline alkaloid from indacum flower. J Nat Prod. 2016;79(2).300-307.
28. Yeog J, Qang le D, Yong HG.Nematicidal Activities 4-quunoline alkaloid isolated from aerial part. J Phytopharm. 2015;(2).68-74.
29. Ramasany D, Saraswalthy A. Vitiquunoline alkaloid from Hibiscus. Food Chem. 2014;14(5).970-975.
30. Pennman S, Musz Y. Analgesic properties of Medicinal annanaer. Med Chem. 2016;5(2).10-27.
31. Snehe S, Paliank N, Fatima E. Isolation of Medicinal quinoline from the stem. Pharm Biol. 2011;2(11).91-98.
32. Zaman K, Munirah A, Muhammad A A. Poppies Toxicity alkaloid and their toxic of root Pharm. Sci.2017;6(2).21-29.
33. Iranshahy M, Bazzaz SF, Haririzadeh G, Abootorabi BZ, Mohamadi AM, Khashyarmanesh Z et al.Chemical composition and antibacterial properties of *Peganum harmala* L. Avicenna J Phytomed. 2019;(6):530.

34. Sri-Guru T, Queinz M. Alkaloid important therapeutic secondary metabolite plant.Innovora. Academic Sci. 2015;2(3).530-537.
35. Jaka L Kumar B. Isolation of medicinal plant of quinoline from malvaceae root. Med Chem. 2021;11(5).30-40.
36. Murauer A, Ganzera M. Quantitative determination of major alkaloids in Cinchona bark by Supercritical Fluid Chromatography. J Chromatogr A. 2018;1554:117-22.
37. Uttu AJ, Sallau MS, Iyun OR, Ibrahim H. Coumarin and fatty alcohol from root bark of *strychnos innocua* (delile): Isolation, characterization and *in silico* molecular docking studies. Bull Natl Res Cent. 2022;46(1):174.
38. Emmanuel I E, Uttu A J, Oluwaseye A, Hassan S, Ajala A. A Semi-empirical based QSAR study of indole‐Diketo acid, Diketo acid and Carboxamide Derivatives as potent HIV-1 agent Using Quantum Chemical descriptors. IOSR J Appl Chem. 2015;8(11i);12-20.
39. Uttu AJ, Sallau MS, Ibrahim H, Iyun OR. *In silico* modelling and NMR Characterization of some steroids from *Strychnos innocua* (Delile) root bark as potential antifungal agents. Steroids. 2023;194:109-222.
40. Ajala A, Uzairu A, Idris SO, Uttu A J. Theoretical investigation of correlations between molecular and electronic structure and antifungal activity in coumarin derivatives: Combining QSAR and DFT studies. World J Pharm Pharm Sci.2018;16(3): 1-18.
41. Uttu AJ, Sallau MS, Iyun OR, Ibrahim H. Isolation, characterization and *in silico* molecular docking studies of two terpenoids from Strychnos innocua Delile root bark for antibacterial properties. Adv J Chem Sect A. 2022;5:241-252.
42. Uttu AJ, Sallau MS, Ibrahim H, Iyun OR. Isolation, characterization, and docking studies of campesterol and β-sitosterol from *Strychnos innocua* (Delile) root bark. J. Taibah Univ Sci. 2023;18(3):566-578.