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**Pseudocedrela kotschyi: a review of ethnomedicinal uses, pharmacology and phytochemistry**
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**Abstract**
Context: Pseudocedrela kotschyi (Schweinf) Harms (Meliaceae) is an important medicinal plant found in tropical and subtropical countries of Africa. Traditionally, P. kotschyi is used in the treatment of various diseases including diabetes, malaria, abdominal pain and diarrhoea. Objective: To provide an overview of traditional medicinal claims, pharmacological properties, and phytochemical principles of P. kotschyi as a basis for its clinical applications and further research and development of new drugs. Methods: Through interpreting already published scientific manuscripts retrieved from different scientific search engines, namely, Medline, PubMed, EMBASE, Science Direct and Google scholar databases, an up-to-date review on the medicinal potentials of P. kotschyi from inception until September, 2020 was compiled. 'Pseudocedrela kotschyi', 'traditional uses', 'pharmacological properties' and 'chemical constituents' were used as search words. Results: At present, more than 30 chemical constituents have been isolated and identified from the root and stem bark of P. kotschyi, among which limonoids and triterpenes are the main active constituents. Based on prior research, P. kotschyi has been reported to possess anti-inflammatory, analgesic, antipyretic, anthelminthic, antimalaria, anti-leishmaniasis, anti-trypanosomiasis, hepatoprotective, antioxidant, antidiabetic, antidiarrheal, antimicrobial, and anticancer effects. Conclusions: P. kotschyi is reported to be effective in treating a variety of diseases. Current phytochemical and pharmacological studies mainly focus on antimalaria, anti-leishmaniasis, anti-trypanosomiasis and anticancer potential of the root and stem bark of P. kotschyi. Although experimental data support the beneficial medicinal properties of this plant, there is still a paucity of information on its toxicity profile. Nonetheless, this review provides the basis for future research work. © 2021 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.

**Author Keywords**
bioactive compounds; kostchyienones; kotschyins; limonoid orthoacetates; pseudrelones; scientific claims; toxicity; Traditional uses

**References**

- Abubakar, K., Danjuma, M.N., Maiha, B.B., Anuka, J.A., Yam, F.M., Bello, I., Nasiba, U.S., Zaini, M.A.
  **Antinociceptive activity of the crude methanolic extract of Pseudocedrela kotschyi and its chloroform and n-butanol fractions in mice**
  (2016) *J Pharm Biomed Sci*, 6, pp. 158-164.
- Adeniyi, C.B.A., Odumosu, B., Ayelaagbe, O., Kolude, B.
  **In-vitro antimicrobial activities of methanol extracts of Zanthoxylum xanthoxyloides and Pseudocedrela kotschyi**
  (2010) *Afr J Biomed Res*, 13, pp. 61-68.

- Ahmed, A.U.
  **An overview of inflammation: mechanism and consequences**
  (2011) *Front Biol*, 6 (4), pp. 274-281.

- Ahua, K.M., Ioset, J.R., Ioset, K.N., Diallo, D., Mauël, J., Hostettmann, K.
  **Antileishmanial activities associated with plants used in the Malian traditional medicine**
  (2007) *J Ethnopharmacol*, 110 (1), pp. 99-104.

- Akuodor, G.C., Essien, A.D., Essiet, G.A., David-Oku, E., Akpan, J.L., Udoh, F.V.
  **Evaluation of antipyretic potential of Pseudocedrela kotschyi Schweint. Harms**
  (2013) *EJMP*, 3 (1), pp. 105-113.

- Alain, K.Y., Oronce, D.O.L., Boniface, Y., Mhudro, Y., Pascal, A.D.C.
  **Free radical scavenging and antibacterial potential of two plants extracts (Khaya senegalensis and Pseudocedrela kotschyi) used in veterinary pharmacopoeia in Benin**
  (2014) *Elixir Appl Chem*, 76, pp. 28720-28726.

- Alhassan, A.M., Ahmed, Q.U., Latip, J., Shah, S.A.A., Khan, A.Y.F., Sarian, M.N., Wahab, R.A., Khatib, A.
  **Phytoconstituents from Vernonia glaberrima Welw. Ex O. Hoffm. leaves and their cytotoxic activities on a panel of human cancer cell lines**
  (2018) *S Afr J Bot*, 116, pp. 16-24.

- Alhassan, A.M., Malami, I., Abdullahi, M.I.
  **Phytochemical screening and antimicrobial evaluation of stem bark extract of Pseudocedrela kotschyi (Schweinf.) Herms**
  (2014) *BJPR*, 4 (16), pp. 1937-1944.

- Asase, A., Oteng-Yeboah, A.A., Odamtten, G.T., Simmonds, M.S.J.
  **Ethnobotanical study of some Ghanaian anti-malarial plants**
  (2005) *J Ethnopharmacol*, 99 (2), pp. 273-279.

- Ayo, R.G., Audu, O.T., Ndukwe, G.I., Ogunshola, A.M.
  **Antimicrobial activity of extracts of leaves of Pseudocedrela kotschyi (Schweinf.) Harms**
  (2010) *African J Biotechnol*, 9, pp. 7733-7737.

- Balekundri, A., Mannur, V.
  **Quality control of the traditional herbs and herbal products: a review**
  (2020) *Future J Pharm Sci*, 6, pp. 67-76.

- Balunas, M.J., Kinghorn, A.D.
  **Drug discovery from medicinal plants**
  (2005) *Life Sci*, 78 (5), pp. 431-441.

- Bielefeldt, K., Davis, B., Binion, D.G.
  **Pain and inflammatory bowel disease**
  (2009) *Inflamm Bowel Dis*, 15 (5), pp. 778-788.

- Bothon, F.T.D., Debiton, E., Avlessi, F., Forestier, C., Teulade, J., Sohounhloue, D.K.C.
  **In-vitro biological effects of two anti-diabetic medicinal plants used in Benin as folk medicine**
  (2013) *Complement Altern Med*, 13 (1), pp. 1-8.

- Boyom, F.F., Fotio, D., Zollo, P.H.A., Agnaniet, H., Menut, C., Bessière, J.M.
**Aromatic plants of Tropical Central Africa. Part XLIV. Volatile components from Pseudocedrela kotschyi (Schweinf) Harms growing in Cameroon**
(2004) *Flavour Fragr J*, 19 (1), pp. 9-11.

- Calderwood, S.K., Khaleque, M.A., Sawyer, D.B., Ciocca, D.R.
**Heat shock proteins in cancer: chaperones of tumorigenesis**
(2006) *Trends Biochem Sci*, 31 (3), pp. 164-172.

- Chen, J.Y., Zhu, G.Y., Su, X.H., Wang, R., Liu, J., Liao, K., Ren, R., Liu, L.
**7-Deacetylgedunin suppresses inflammatory responses through activation of Keap1/Nrf2/HO-1 signaling**
(2017) *Oncotarget*, 8 (33), pp. 55051-55063.

- Christian, A.G., Ahunna, A.G., Nwakaego, E.M., Chimsorom, C.K., Chile, A.E.
**Antimalarial potential of the ethanolic leaf extract of Pseudocedrala kotschyi**
(2015) *J Acute Dis*, 4 (1), pp. 23-27.

- Dal Piaz, F., Malafronte, N., Romano, A., Gallotta, D., Belisario, M.A., Bifulco, G., Gualtieri, M.J., Pisano, C.
**Structural characterization of tetranortriterpenes from Pseudrocedrela kotschyi and Trichilia emetica and study of their activity towards the chaperone Hsp90**
(2012) *Phytochemistry*, 75 (1), pp. 78-89.

- Dawet, A., Stephen, S.
**The antimalarial activity of the crude leaf extract of Pseudocedrala kotschyi in P. berghei berghei infected mice**
(2014) *Afr J Nat Sci*, 17 (1), pp. 19-27.

- Dawet, A., Yakubu, P.
**Antiplasmodial efficacy of stem bark extracts of Pseudocedrela kotschyi in mice infected with Plasmodium berghei berghei**
(2014) *BJPR*, 4 (5), pp. 594-607.

- Ekor, M.
**The growing use of herbal medicines: Issues relating to adverse reactions and challenges in monitoring safety**
(2014) *Front Pharmacol*, 4, pp. 177-186.

- Eleha, S.I., Ola, M.A., Oyewole, O.S., Ganiyu, A.O., Onaolapo, A.O., Afodun, A.M.
**Anti-oxidative and hepatoprotective effects of Pseudocedrela kotschyi against paracetamol induced liver damage. A biochemical and histological evaluation in rats**
(2016) *J Adv Med Pharm Sci*, 7 (3), pp. 1-11.

- Erinoso, S.M., Fawibe, O.O., Oyelakin, A.S., Ajiboye, A.A., Agboola, D.A.
**Herbal recipes used for the traditional management of infantile dermatitis in Odeda, southwestern Nigeria**
(2016) *Afr J Trad Compl Alt Med*, 13 (3), pp. 33-43.

- Essiet, G.A., Christian, A.G., Ogbonna, A.D., Uchenna, M.A., Azubuike, J., Michael, N.E.
**Antidiarrhoeal and antioxidant properties of ethanol leaf extract of Pseudocedrela kotschyi**
(2016) *J App Pharm Sci*, 6 (3), pp. 107-110.

- Ezeokpo, B.C., Akuodor, G.C., Owomofoyon, O., Erejuwa, J.L.A., Nnolim, B.I., Ogiji, E.D., Nwobodo, M.U., Ezeonu, C.T.
  **Assessment of acute and sub-acute toxicity of ethanol extract of Pseudocedrela kotschyi leaf in Wistar rats**
  (2020) *J Biol Sci*, 3, pp. 48-57.

- Garami, A., Steiner, A.A., Romanovsky, A.A.
  **Fever and hypothermia in systemic inflammation**
  (2018) *Handb Clin Neurol*, 157, pp. 565-597.

- Georgewill, U.O., Georgewill, O.A.
  **Effect of extract of Pseudocedrela kotschyi on blood glucose concentration of alloxan induced diabetic albino rats**
  (2019) *East J Med*, 14 (1), pp. 17-19.

- Gupta, S.D., Bommaka, M.K., Banerjee, A.
  **Inhibiting protein-protein interactions of Hsp90 as a novel approach for targeting cancer**
  (2019) *Eur J Med Chem*, 178, pp. 48-63.

- Hassler, M.
  (2019),
  Pseudocedrela kotschyi, (Schweinf.) Harms. World Plants: Synonymic checklists of the vascular plants of the world. [accessed 2020 Sep 20]. Available from

- Hay, A.-E., Ioset, J.-R., Ahua, K.M., Diallo, D., Brun, R., Hostettmann, K.
  **Limonoid orthoacetates and antiprotozoal compounds from the roots of Pseudocedrela kotschyi**
  (2007) *J Nat Prod*, 70 (1), pp. 9-13.

- Hobson, C., Chan, A.N., Wright, G.D.
  **The Antibiotic resistome: a guide for the discovery of natural products as antimicrobial agents**
  (2021) *Chem Rev*, 121 (6), pp. 3464-3494.

- Hornberg, J.J., Laursen, M., Brenden, N., Persson, M., Thougaard, A.V., Toft, D.B., Mow, T.
  **Exploratory toxicology as an integrated part of drug discovery. Part I: why and how**
  (2014) *Drug Discov Today*, 19 (8), pp. 1131-1136.

- Hotez, P.J., Kamath, A.
  **Neglected tropical diseases in sub-Saharan Africa: review of their prevalence, distribution, and disease burden**
  (2009) *PLoS Negl Trop Dis*, 3 (8), p. e412.

- Kabiru, A., Muhammad, D.N., Bello, M.B., Akpojo, A.J., Fei, Y.M., Oricha, B.S., Adlin, Y., Asmawi, Z.M.
  **A 28-day oral toxicity study of Pseudocedrela kotschyi methanol extract in Sprague-Dawley rats**
  (2015) *EJMP*, 10 (3), pp. 1-11.

- Kantati, Y.T., Kodjo, K.M., Dogbeavou, K.S., Vaudry, D., Leprince, J., Gbeassor, M.
  **Ethnopharmacological survey of plant species used in folk medicine against central nervous system disorders in Togo**

(2016) *J Ethnopharmacol*, 181, pp. 214-220.

- Kassim, O.O., Copeland, R.L., Kenguele, H.M., Nekhai, S., Ako-Nai, K.A., Kanaan, Y.M.
  **Antiproliferative activities of Fagara xanthoxyloides and Pseudocedrela kotschyi against prostate cancer cell lines**
  (2015) *Anticancer Res*, 35 (3), pp. 1453-1458.

- Kayode, J., Sanni, P.
  **Survey of barks used for medicine in the central zone of Lagos State, Nigeria**
  (2016) *J Bot Papers*, 1 (1), pp. 1-7.

- Koné, W.M., Atindehou, K.K., Dossahoua, T., Betschart, B.
  **Anthelmintic activity of medicinal plants used in northern Côte d'Ivoire against intestinal helminthiasis**
  (2005) *Pharm Biol*, 43 (1), pp. 72-78.

- Mambou, C.S., Nono, R.N., Chouna, J.R., Tamokou, J.-D.-D., Nkeng-Efouet-Alango, P., Sewald, N.
  **Antibacterial secotirucallane triterpenes from the stem bark of Pseudocedrela kotschyi**
  (2018) *Z Naturforsch C J Biosci*, 73 (5-6), pp. 241-246.

- Medzhitov, R.
  **Origin and physiological roles of inflammation**
  (2008) *Nature*, 454 (7203), pp. 428-435.

- Nadembega, P., Boussim, J.I., Nikiema, J.B., Poli, F., Antognoni, F.
  **Medicinal plants in Baskoure, ethnopharmacological survey of plant species used in folk medicine against central nervous system disorders in Togo Kourittenga Province, Burkina Faso: an ethnobotanical study**
  (2011) *J Ethnopharmacol*, 133 (2), pp. 378-395.

- Nchouwet, M.L., Wansi Ngnokam, S.L., Kodjio, N., Poualeu, S.K., Nkengeffouet, P.A., Kamanyi, A.
  **Hepatoprotective and antioxidant effect of stem barks extracts: methanolic and aqueous extracts of Pseudocedrela kotschyi (Meliaceae) on paracetamol-induced hepatic damage in rats**
  (2018) *Asian J Biomed Pharm Sci*, 7 (63), pp. 1-9.

- Nchouwet, M.L., Wansi, N.S., Oumar, M.M., Nkeng-Efouet, A.P., Poualeu, K.S.
  **Toxicological evaluation of the aqueous extract of Pseudocedrela kotschyi (Meliaceae) stem bark in albino rats**
  (2017) *J Pharm Biol Sci*, 5, pp. 168-174.

- Olabanji, S.O., Adesina, S.K., Ceccato, D., Buoso, M.C., Moschini, G.
  **PIXE analysis of some medicinal plants used in cleaning teeth in southwestern Nigeria**
  (2007) *Biol Trace Elem Res*, 116 (2), pp. 171-184.

- Pedersen, M.E., Vestergaard, H.T., Hansen, S.L., Bah, S., Diallo, D., Jäger, A.K.
  **Pharmacological screening of Malian medicinal plants used against epilepsy and convulsions**
  (2009) *J Ethnopharmacol*, 121 (3), pp. 472-475.

- Roy, A., Saraf, S.
  **Limonoids: overview of significant bioactive triterpenes distributed in plants kingdom**
  (2006) *Biol Pharm Bull*, 29 (2), pp. 191-201.

- Saidu, I.N., Umar, K.S., Isa, M.H.
  **Ethnobotanical survey of anticancer plants in Askira/Uba local government area of Borno State, Nigeria**
  (2015) *Afr J Pharm Pharmacol*, 9 (5), pp. 123-130.

- Salihu Shinkafi, T., Bello, L., Wara Hassan, S., Ali, S.
  **An ethnobotanical survey of antidiabetic plants used by Hausa-Fulani tribes in Sokoto, Northwest Nigeria**
  (2015) *J Ethnopharmacol*, 172 (1), pp. 91-99.

- Sarigaputi, C., Sangpech, N., Palaga, T., Pudhom, K.
  **Suppression of inducible nitric oxide synthase pathway by 7-deacetylgedunin, a limonoid from Xylocarpus sp**
  (2015) *Planta Med*, 81 (4), pp. 312-319.

- Sidjui, L.S., Nganso, Y.O., Toghueo, R.M.K., Wakeu, B.N.K., Dameue, J.T., Mkounga, P., Adhikari, A., Ali, M.S.
  **Kostchyienones A and B, new antiplasmodial and cytotoxicity of limonoids from the roots of Pseudocedrela kotschyi (Schweinf.) Harms**
  (2018) *Zeitschrift für Naturforsch C*, 73 (3-4), pp. 153-160.

- **Trypanocidal and leishmanicidal activity of six limonoids**
  (2020) *J Nat Med*, 74 (3), pp. 606-611.
  Steverding D, Sidjui LS, Ferreira ÉR, Ngameni B, Folefoc GN, Mahiou-Leddet V, Ollivier E, Stephenson GR, Storr TE, Tyler KM

- Tan, T.Y.C., Lee, J.C., Yusof, N.A.Y., Teh, B.P., Mohamed, A.F.S.
  **Malaysian herbal monograph development and challenges**
  (2020) *J Herb Med*, 23, pp. 100380-100385.

- Tan, Q.G., Luo, X.D.
  **Meliaceous limonoids: chemistry and biological activities**
  (2011) *Chem Rev*, 111 (11), pp. 7437-7522.

- Tapsoba, H., Deschamps, J.P.
  **Use of medicinal plants for the treatment of oral diseases in Burkina Faso**
  (2006) *J Ethnopharmacol*, 104 (1-2), pp. 68-78.

- Taylor, D.A.H.
  **A limonoid, pseudrelone B, from Pseudocedrela kotschyi**
  (1979) *Phytochemistry*, 18 (9), pp. 1574-1576.

- Ukwubile, C.A., Oise, I.E., Umar, S.A.
  **Evaluation of in vitro anthelminthic activity of Pseudocedrela kotschyi Harms. (Meliaceae) a dry zone ceder stem bark aqueous extract**
  (2017) *Int Biol Biomed J*, 3 (1), pp. 30-33.

- Williams, A.
  **A concise note on herbal medicine**
  (2021) *J Pharma Reports*, 5, p. e107.

- Wolinsky, L.E., Sote, E.O.
  **Isolation of natural plaque-inhibiting substances from 'Nigerian chewing sticks'**
  (1984) *Caries Res*, 18 (3), pp. 216-225.

- Zhang, S., Guo, S., Li, Z., Li, D., Zhan, Q.
  **High expression of HSP90 is associated with poor prognosis in patients with colorectal cancer**
  (2019) *Peer J*, 7, p. e7946.



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