Int.J.Curr.Microbiol.App.Sci (2019) *8*(3): 2617-2620

International Journal of Current Microbiology and Applied Sciences
***ISSN: 2319-7706* Volume 8 Number 03 (2019)**
Journal homepage: http://www.ijcmas.com

Review Article

https://doi.org/10.20546/ijcmas.2019.803.310

Anticancer properties of *Murraya koenigii* L. in biological systems

Guda Swapna[1] and K.Sukumar[2]*

[1]PVNRTVU, Hyderabad, India
[2]PJTSAU, Hyderabad, India

**Corresponding author*

Keywords

Anticancer properties, *Murraya koenigii* L. herbal medicine, bioactive chemicals

Article Info

Accepted:
04 February 2019
Available Online:
10 March 2019

A B S T R A C T

Murraya koenigii L. the plant being widely used in herbal medicine for the treatment for various health disorders. The plant contains useful phytoconstituents like bismahanine, murrayacine, murrayafoline-A, murrayanine bismurrayaquinone, murrayazolidine, mukoenine-A, mukoenine-B, bi-koeniquinone-A, mukoenine-C, murrastifoline, Murrayazolinol, girinimbine, murrayazoline, mahanimbine, Quinone A and koenigine-Quinone B koenioline, xynthyletin, koenigine, present in MK which attracted many researchers to work on various therapeutic uses. The plant exhibits anticancer properties due the presence of bioactive chemicals.

Introduction

Presently, many cancer cases are reporting in India. However, due to high risk treatments with chemotherapy and radiation, many side effects are noticed among the people and because of this the people look for alternate tradition medicine which is cost-effective with no side effects. In this context, herbal medicine will serve these purpose. Majority of the population (90%) in Germany depends upon herbal medicine for the cure (Joos *et al.* 2012). It is a well-known fact that herbal medicine is predominantly used both in developed and developing nations. Hence, researchers should develop a strong base by conducting clinical trials for herbal medicine.

Bioactive compounds- Anti cancer properties in *Murraya koenigii* (MK)

There are various phytoconstituentslike bismahanine, murrayacine, murrayafoline-A, murrayanine bismurraya quinone, murrayazolidine, mukoenine-A, mukoenine-B, bi-koeniquinone-A, mukoenine-C, murrastifoline, Murrayazolinol, girinimbine, murrayazoline, mahanimbine, Quinone A and koenigine-Quinone B koenioline, xynthyletin, koenigine, present in MK which attracted many researchers to work on

various therapeutic uses (Anwar *et al*., 1973; Priyanka *et al.,* 2012 and Raghunathan and Mitra, 1985).

The major phytoconstituents in MK are carbazole alkaloids, flavonoids and coumarins (Nayak *et al*., 2012). Carbazole alkaloids and methanolic extracts exhibited anti-oxidative anti-diarrheal and anti-trichomonal activities (Lawal *et al.,* 2008; Gupta and Prakash, 2009) Mahanine, a carbazole alkaloid purified from *M. koenigii* leaves exhibited anticancer properties (Ito *et al.,* 2006).

Nearly, eighty carbazole alkaloids were identified from the MK plant besides, phenols, proteins, terpenoids, carbohydrates, essential oils, carotene, fibre, minerals, vitamin C, nicotinic acid, resin, oxalic acid and crystalline glycosides. However, some of the terpenoids and carbazole alkaloids exhibited anti-proliferative activity against cancers. The excessive reactive oxygen species (ROS) drives DNA destruction (mutation) and cause the initiation of cancer accompanied by the addition of new mutations in cell guides to cancer promotion, further modification in different growth signaling pathways (cell proliferation, apoptosis, angiogenesis, metastasis) leads to cancer progression and metastasis (Waris and Ahsan, 2005). Various phytochemicals dysregulate the carcinogenic pathways by acting at different stages.

Ali Ghasemzadeh *et al*., (2014) reported that myricetin was the most abundant flavonoid in curry leaf and a high myricetin concentration was detected in the samples from Kelantan (0.703 ± 0.063 mg/g DW) followed by those from Selangor (0.600 ± 0.078 mg/g DW) and Johor (0.502±0.040 mg/g DW). Myricetin is a flavonoid found in many herbs, fruits, and vegetables as well as other plants (Mieanand Mohamed, 2001). Myricetin exerts powerful biological effects including anticancer and antioxidant activities (Sun *et al.,* 2012 and Takasawa *et al.,* 2011). Noolu *et al.,* 2013 reported that polyphenol-rich hydro-methanolic extract of MK leaves mediated the inhibition of 26S proteasome proteolytic activity and induced apoptosis of the MDA-MB-231 and MCF-7 breast cancer cells by decreased cell viability, growth kinetics and S phase cell cycle arrest thus suggesting that MK leaves are a potent source for the treatment of different types of cancers. Total alkaloid extract and mahanine exhibited the anticancer activity through inhibition of trypsin-like 26S proteasome activity, and induced apoptosis (reduced cell viability, altered growth kinetics, and arrested the MDA-MB-231 (breast cancer cells) at S-phase) (Ismail *et al.,* 2016). Amita *et al.,* 2013 reported the antitumor activity of MK. Nagappan *et al.,* 2011 reported that Mahanimbine, Girinimbine, Mahanine, Murrayafoline in MK possessed the anti-cancer effects.

Future prospects

Majority of the studies were carried out on curry leaf but not on bark, seeds, etc. which also have active phytoconstituents. However, limited clinical studies were conducted on cancer research using herbal medicines. Hence this area has future scope and pharmacokinetic profiles and nano-formulation need to be explored for further strengthening of cancer research.

References

Amita P, Aditya M. Journal of Medical Pharmaceutical and Allied Sciences, 2013; 2:1

Anwer F, Masaldan AS, Kapil RS, et al. Synthesis of Murrayacine; oxidation

with DDQ of the activated aromatic methyl group of the alkaloids of *Murraya koenigii* Spreng. Indian J Chem. 1973;11: 1314– 1315.

Gupta S, Prakash J: Studies on Indian green leafy vegetables for their antioxidant activity. Plant Foods Hum Nutr 2009, 64(1): 39–45. 11. Tachibana Y, Kikuzaki H, Lajis NH, Nakatani N: Antioxidative activity of carbazoles from *Murraya koenigii* leaves. J Agric Food Chem 2001, 49(11):5589–5594.

Ismail A, Noolu B, Gogulothu R, Perugu S, Rajanna A, Babu SK. Cytotoxicity and proteasome inhibition by alkaloid extract from *Murraya koenigii* leaves in breast cancer cells-molecular docking studies. J Med Food. 2016; 19(12): 1155–65.

Ito C, Itoigawa M, Nakao K, Murata T, Tsuboi M, Kaneda N, Furukawa H: Induction of apoptosis by carbazole alkaloids isolated from *Murraya koenigii*. Phytomedicine 2006, 13(5):359–365.

Joos S, Glassen K, Musselmann B. 2012. Herbal medicine in primary healthcare in Germany: The Patient's perspective. Evid Based Complement Alternat Med. 294638.

Lawal HA, Atiku MK, Khelpai DG. 2008. Hypoglycaemic and hypolipidemic effect of aqueous leaf extract of *Murraya koenigii* in normal and alloxan diabetic rats. Niger J Physiol Sci. 23(1–2):37–40. 10.

Miean and S. Mohamed. 2001. Flavonoid (myricetin, quercetin, kaempferol, luteolin, and apigenin) content of edible tropical plants. Journal of Agricultural and Food Chemistry, vol. 49, no. 6, pp. 3106–3112.

Nagappan T, Ramasamy P, Effendy M, et al. Biological Activity of Carbazole Alkaloids and Essential Oil of *Murraya koenigii* Against Antibiotic Resistant Microbes and Cancer Cell Lines. Molecules. 2011;16(11):9651–9664

Noolu B, Ajumeera R, Chauhan A, Nagalla B, Manchala R, Ismail A. *Murraya koenigii* leaf extract inhibits proteasome activity and induces cell death in breast cancer cells. BMC Complem Altern Med. 2013; 13:7

Nayak A, Banerji J, Banerji A, Mandal S: Review on chemistry and pharmacology of *Murraya koenigii* Spreng (Rutaceae). J Chem Pharm Res 2010, 2:286–299.

Priyanka Gupta, Alok Nahata, Vinod K. et al. An update on MurayyaKoenigii: a multifunctional Ayurvedic herb. Journal of Chinese integrative medicine. 2012;9(8):824–833.

Raghunathan K, Mitra R. Pharmacognosy of indigenous drugs. Central Council for Research in Ayurveda and Siddha. 1985; 1:433.

Samanta SK, Kandimalla R, Gogoi B, Dutta KN, Choudhury P, Deb PK, Devi R, Pal BC, Talukdar NC. Phytochemical portfolio and anticancer activity of *Murraya koenigii* and its primary active component, mahanine. Pharmacol Res. 2018; 129:227–36.

Sun, X. Y. Zheng, J. Ye, T. T. Wu, Jl. Wang, and W. Chen, 2012. Potential anticancer activity of myricetin in human T24 bladder cancer cells both in vitro and in vivo. Nutrition and Cancer, vol. 64, no. 4, pp. 599–606.

Takasawa, A. Tao, K. Saeki. 2011. Discovery of a new type inhibitor of human glyoxalase i by myricetin-based 4-point pharmacophore, Bioorganic and Medicinal Chemistry Letters, vol. 21, no. 14, pp. 4337–4342.

Waris G, Ahsan H. Reactive oxygen species: role in the development of cancer and various chronic conditions. J Carcinog. 2006; 5:14.

How to cite this article:

Guda Swapna and Sukumar, K. R. 2019. Anticancer properties of *Murraya koenigii* L. in biological systems. *Int.J.Curr.Microbiol.App.Sci.* 8(03): 2617-2620.
doi: https://doi.org/10.20546/ijcmas.2019.803.310