

***Bridelia cathartica* Bertol. f. (Phyllanthaceae): a review of its pharmacological properties and medicinal potential**

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Abstract

Bridelia cathartica is an important medicinal plant throughout its distributional range in sub-Saharan Africa. The aim of the current study was to evaluate the botany, ethnomedicinal uses, chemical and biological properties of *B. cathartica*. Information on the medicinal, phytochemistry and biological properties of *B. cathartica* was undertaken using electronic databases such as Medline, Pubmed, SciFinder, SCOPUS, Google Scholar, Science Direct, EThOS, ProQuest, OATD and Open-thesis. Pre-electronic literature was sourced from the University library. Literature search revealed that *B. cathartica* is mainly used as a charm and to cast spells, as herbal medicine used by women during child bearing and pregnancy, remedy for fever and malaria, gastrointestinal, headache, haemorrhoids, menstrual problems, pain, sores and wounds, reproductive, respiratory disorders and sexually transmitted infections. Pharmacological studies of *B. cathartica* extracts revealed that the species has antibacterial, antifungal, antimalarial and antioxidant properties. Based on its wide use as herbal medicine in tropical Africa, *B. cathartica* should be subjected to detailed phytochemical and pharmacological evaluations aimed at elucidating its chemical, pharmacological and toxicological properties.

Keywords: *Bridelia cathartica*, Ethnopharmacology, Phyllanthaceae, Traditional medicine, Tropical Africa

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Introduction

The medicinal and pharmacological properties of *Bridelia cathartica* Bertol. f. were recognized not only by traditional healers but also by taxonomists who gave the species the specific name “*cathartica*” which means cathartic or purgative, in reference to the purgative properties of the species (Schimdt et al., 2002; Palmer and Pitman, 1972). *Bridelia cathartica* is a popular medicinal plant throughout its distributional range in sub-Saharan Africa with its bark, leaves and stems marketed as traditional medicines in informal herbal medicine markets and

other informal markets in Gauteng and KwaZulu Natal provinces in South Africa (Williams et al., 2001; Cunningham, 1993). *Bridelia cathartica* is a large shrub to small tree belonging to the family Phyllanthaceae, previously included in the Euphorbiaceae family. The name of the genus, “*Bridelia*” was derived from the name of a Swiss-German muscologist, Samuel Elisée Bridel-Brideri (1761-1828) (Palmer and Pitman, 1972; Schimdt et al., 2002; Maroyi, 2017). The Phyllanthaceae family was a sub-family of Euphorbiaceae until Hoffmann et al. (2006) separated the two families using molecular results that utilized DNA sequence data of nuclear



PHYC and plastid atpB, matK, ndhF and rbcL as well as morphological characteristics. Globally, the family has 59 genera and 2 000 species (Hoffmann et al., 2006). *Bridelia* is a genus of about 60 to 70 species that have been recorded in tropical and subtropical Africa and Asia (Smith, 1987; Ngueyem et al., 2009; Maroyi, 2017). Research by Ngueyem et al. (2009) revealed that *Bridelia* species are characterized by antihelmintic, antiamebic, antioxidant, antianemic, antiplasmodial, antibacterial, antinociceptive, anticonvulsant, antiarrhythmic, antidiarrhoeal, anti-hypertensive, muscle relaxant, anti-inflammatory, analgesic, stimulant, antimalarial, anti-cholinergic and antiviral properties and therefore, widely used as herbal medicines against abdominal pain, cardiovascular, gynecological and sexual diseases. It is within this context that the current study was undertaken aimed at reviewing the botany, ethnomedicinal uses, chemical and pharmacological properties of *B. cathartica* so as to provide baseline data required for evaluating the therapeutic potential of the species.

Material and Methods

Information relevant to the botany, ethnomedicinal uses, chemical and pharmacological properties of *B. cathartica* was carried out from September 2017 to March 2018. Online electronic databases including Google Scholar, SciFinder, ScienceDirect, Medline, Pubmed, SCOPUS, EThOS, ProQuest, OATD and Open-thesis were used to search for relevant literature. Pre-electronic literature of conference papers, scientific articles, books, book chapters, dissertations and theses were carried out at the University of Fort Hare library. The key words used in the electronic search criteria were “*Bridelia cathartica*”, synonyms of the plant species “*B. melanthesoides* (Baill.) Klotzsch, *B. fischeri* Pax, *B. lingelsheimii* Gehrm., *B. niedenzui* Gehrm., *B. schlechteri* Hutch., *Pentameria melanthesoides* Baill.”, English common names “blue sweetberry and knobbly bridelia”. The following keywords were used in combination with the species name, synonyms and English common names to search for relevant information: “biological properties”, “ethnobotany”, “ethnomedicinal uses”, “ethnopharmacological properties”, “medicinal uses”, “pharmacological properties” and “phytochemistry”. Total number of publications included 38 articles published between 1941 and 2017, and these were in agreement with the literature search criteria (Figure 1).

The sources of data included research articles results published in international journals (23), books (eight), other scientific publications (three), dissertations (two), book chapter and conference proceeding (one each).

Botanical profile and description of *Bridelia cathartica*

Bridelia cathartica is an evergreen, small multi-stemmed tree with a flat, spreading crown growing to a maximum height of 9 meters (Smith, 1987). The trunk is grey, greyish-brown or black in colour, rough, reticulate, fissured or stringy. Leaves are alternate, obovate to elliptic-oblongate in shape with rounded, obtuse to sub-acute at the apex, grey-green to blue-green on the underside and darker green and glossy on the upper side. The small greenish to yellowish flowers are male or female, formed in terminal axillary clusters carried on short stalks. The fruits are small, round berries, changing colour from red to black as they mature (Van Wyk and Van Wyk, 1997; Palmer and Pitman, 1972). *Bridelia cathartica* is native to Swaziland, Somalia, Malawi, the Democratic Republic of Congo (DRC), Mozambique, Botswana, Ethiopia, Zambia, South Sudan, Sudan, South Africa, Namibia, Tanzania, Zimbabwe and Kenya. *Bridelia cathartica* grows in woodland, bushland, along stream banks, in riverine fringe thicket and rocky places, persisting in secondary associations at an altitude ranging from 0 to 2000 m above sea level (Smith, 1987).

Bridelia cathartica is divided into two subspecies, *B. cathartica* subsp. *cathartica* and *B. cathartica* subsp. *melanthesoides* (Klotzsch) J. Léon. The two subspecies are separated mainly on a small difference in the veining, in the subspecies *cathartica*, the lateral veins are slender, clearly marked, extend to the edge of the leaf margin while in the subspecies *melanthesoides*, the lateral veins are branched, forming loops before they reach the edge of the leaf (Coates Palgrave, 2002; Palmer and Pitman, 1972). The majority of ethnobotanical literature does not separate *B. cathartica* into specific subspecies, but rather *B. cathartica* and this is the plant name that is going to be used throughout this study.

Medicinal uses of *Bridelia cathartica*

Several parts of the plant including bark, fruits, leaves and root bark are used to prepare herbal concoctions used to treat 44 human diseases in tropical Africa (Table 1). The major diseases and ailments include the



species being used as a charm and to cast out evil spells, used as herbal medicine during child bearing and pregnancy, remedy for fever and malaria, gastrointestinal, headache, haemorrhoids, menstrual problems, pain, sores and wounds, reproductive, respiratory disorders and sexually transmitted infections (Figure 2). There is a cross-cultural agreement of medicinal usage of *B. cathartica* as herbal medicine against these diseases recorded in at least three countries and literature records (Figure 2). *Bridelia cathartica* is also used in multi-therapeutic applications taken by pregnant women, as remedy for headache, menstrual problems, reproductive and respiratory disorders (Table 1). *Bridelia cathartica* is used to manage and treat some ailments and diseases listed by the World Health Organization (2014) as the leading causes of disease burden in tropical and sub-tropical Africa, and these include (in descending order of importance) respiratory infections, human immunodeficiency virus / acquired immune deficiency syndrome (HIV/AIDS), diarrhoeal diseases, malaria, birth asphyxia and trauma, and preterm birth complications. There is therefore, need to validate the ethnomedicinal applications of *B. cathartica* through phytochemical and pharmacological evaluations of both the crude extracts and compounds associated with the species. World Health Organization has recognized the role of traditional medicines in resource-poor regions like the sub-Saharan Africa where usage of herbal medicines has been scientifically validated (WHO, 2013; Hughes et al., 2015). Therefore, the significance of herbal medicines in the face of increasing global practice of using both the orthodox and traditional medicines cannot be ignored (WHO, 2013; Hughes et al., 2015).

Phytochemical and nutritional composition of *Bridelia cathartica*

Several phytochemical compounds and minerals have been identified from leaves, stems, roots, root and stem bark of *B. cathartica*. Van Valen (1978) identified triglochinin (Figure 2, Table 2), a cyanogenic glycoside from the seeds of *B. cathartica*. Chhabra et al. (1984) identified tannins, flavonoids, anthracene glycosides, fatty acids, steroids, emodins, triterpenoids, volatile oils and anthocyanins from leaves of *B. cathartica*. Similarly, Madureira et al. (2012) identified alkaloids, flavonoids, phenolics and terpenes from roots of *B. cathartica*. Cumbane and Munyemane (2017) identified flavonoids, phenolics, condensed and hydrolysable tannins from leaves and

stems of *B. cathartica* (Table 2). Azimova and Glushenkova (2012) identified five fatty acids (Figure 1) from the seeds of *B. cathartica*. The major fatty acids in the seeds were linolenic acid (44.0%), oleic acid (23.0%), linoleic acid (15.0%), palmitic acid (10.0%) and stearic acid (8.0%) (Azimova and Glushenkova, 2012). The macronutrients identified from leaves, root and stem bark of *B. cathartica* included phosphorus (P), calcium (Ca), potassium (K) and magnesium (Mg), while micronutrients included copper (Cu), iron (Fe), manganese (Mn) and zinc (Zn) (Ouma, 1994; Ouma et al., 1997). Some of these phytochemical compounds and minerals may not confirm the medicinal applications of *B. cathartica* but will provide ethnopharmacological evidence of the therapeutic potential of the species. For example, Ouma et al. (1997) argued that the iron content exhibited by the leaves, root and stem bark of *B. cathartica* ranging from 3.5 to 35.7 mg/100g was adequate to justify the use of the species against anaemia in Kenya (Ouma, 1994; Ouma et al., 1997).

Pharmacological activities of *Bridelia cathartica*

Some of the pharmacological activities of *B. cathartica* listed in literature include antibacterial (Madureira, 2012; York, 2012; Cumbane et al., 2017), antifungal (Sawhney, 1978; York, 2012), antimalarial (Jurg, 1991; Ramalhete, 2008), antioxidant (Cumbane and Munyemana, 2017) and cytotoxicity (Moshi et al., 2004) activities. These pharmacological activities of various parts of the species are summarized below.

Antibacterial activities

Madureira (2012) assessed antibacterial properties of dichloromethane, ethyl acetate, methanol and n-hexane root extracts of *B. cathartica* against *Staphylococcus aureus*, *Escherichia coli*, *Enterococcus faecalis*, *Pseudomonas aeruginosa*, *Mycobacterium smegmatis* and *Klebsiella pneumoniae* using broth microdilution method with gentamicin, rifampicin and vancomycin as positive controls. All extracts showed activities with minimum inhibitory concentration (MIC) values stretching from 7.5 µg/ml to 250 µg/ml (Madureira et al., 2012). Similarly, York (2012) assessed antibacterial properties of aqueous and dichloromethane-methanol (1:1) root extracts of *B. cathartica* against *Klebsiella pneumoniae*, *Moraxella catarrhalis*, *Mycobacterium smegmatis* and *Staphylococcus aureus* using microdilution assay with ciprofloxacin as positive control. York et al. (2012) also evaluated the sum of



the fractional inhibitory concentration (Σ FIC) which was assessed for *B. cathartica* when used mixed with *Lippia javanica*. The extract showed activities with MIC values stretching from 0.5 mg/ml to 16.0 mg/ml. The combination of aqueous and organic extracts and essential oil extract of *Lippia javanica*, and organic extract of *B. cathartica* against *Klebsiella pneumoniae*, *Moraxella catarrhalis*, *Mycobacterium smegmatis* and *Staphylococcus aureus* resulted in additive interactions with Σ FIC values stretching from 0.53 to 0.88 (York, 2012). Antibacterial evaluations of *B. cathartica* combined with *Lippia javanica* support this common practice of mixing these remedies for chills, cough, headache and runny nose in South Africa (York, 2011; York, 2012). Cumbane and Munyemana (2017) assessed antibacterial properties of ethyl acetate and hydroethanol leaf and root extracts of *B. cathartica* against *Pseudomonas aeruginosa*, *Escherichia coli*, *Staphylococcus aureus*, *Enterococcus faecalis* and *Streptococcus pneumoniae* using the disc diffusion method with dimethylsulfoxide (DMSO) as negative control, ciprofloxacin and gentamycin as positive controls. The extracts demonstrated activities with MIC values stretching from 250 μ g/mL to >1000 μ g/mL (Cumbane and Munyemana, 2017). These antibacterial properties exhibited by different extracts of *B. cathartica* corroborate the traditional application of the species as traditional medicine against bacterial infections causing diarrhoea in Tanzania and Zambia (Chhabra et al., 1990; Chinsembu, 2016), gonorrhoea in DRC, Tanzania and Zambia (Mbayo et al., 2016; Chhabra et al., 1990; Chinsembu, 2016), oral infections in Zambia (Chinsembu, 2016), sexually transmitted infections in South Africa (De Wet, 2012), stomachache and stomach ailments in Kenya and Malawi (Kokwaro, 1993; Morris, 1996), syphilis and syphilitic sores in DRC and Malawi (Morris, 1996; Mbayo et al., 2016) and wounds in Malawi (Morris, 1996).

Antifungal activities

Sawhney (1978) assessed antifungal properties of methanol root bark extract of *B. cathartica* against *Trichophyton mentagrophytes* and *Candida albicans*. The extract exhibited activities against the tested pathogens (Sawhney, 1978). Similarly, York (2012) assessed antifungal properties of aqueous and

dichloromethane/methanol (1:1) root extracts of *B. cathartica* against *Cryptococcus neoformans* using microdilution assay with amphotericin B as positive control. York et al. (2012) also evaluated the summation of the fractional inhibitory concentration (Σ FIC) which was assessed for *B. cathartica* used when mixed with *Lippia javanica*. The dichloromethane/methanol (1:1) extract demonstrated the best activity with MIC value of 0.67 mg/ml, while aqueous extract exhibited activities with MIC value of 8.0 mg/ml (York et al., 2012). The combination of aqueous extracts of *B. cathartica* and *Lippia javanica* as well as essential oils of *Lippia javanica* and *B. cathartica* resulted in additive interactions with Σ FIC values of 0.73 and 0.92, respectively. The antifungal evaluations of *B. cathartica* combined with *Lippia javanica* support the traditional practice of mixing these remedies for microbial infections in South Africa (York et al., 2011; York, 2012) and also monotherapeutic applications against fungal and microbial infections such as oral infections in Zambia (Chinsembu, 2016) and wounds in Malawi (Morris, 1996).

Antimalarial activities

Jurg et al. (1991) evaluated the antimalarial activities of ethanol, petroleum ether and aqueous leaf, root and stem extracts of *B. cathartica* against *Plasmodium falciparum*. The aqueous and ethanol root extracts caused 50% inhibition (ID_{50}) of parasite growth at an incubation concentration of 0.05 μ g/mL (Jurg et al., 1991). Ramalhete (2008) assessed antimalarial properties of n-hexane, ethyl acetate, dichloromethane and methanol extracts of root extracts of *B. cathartica* against *Plasmodium falciparum*. The extracts showed weak moderate to no significant activity with half maximal inhibitory concentration (IC_{50}) values stretching from 44.0 ± 1.30 mg/mL to > 100 mg/mL (Ramalhete, 2008). These results corroborate the use of *B. cathartica* as traditional medicine for fever in Tanzania (Chhabra, 1990) and malaria in Mozambique (Jurg, 1991; Bandeira et al., 2001) and Zambia (Chinsembu, 2016) and lack of significant *in vitro* antimalarial activity could be explained by the fact that the species may act as antipyretic or may enhance the immune system rather than having direct antiparasitic properties (Phillipson and Wright, 1991).



Table 1: Medicinal applications of *Bridelia cathartica* in tropical Africa

Medical problems	Plant parts used	Countries	References
Charms and casting of spells			
Bewitchment, love charm and spiritual ailments	Leaves and roots	Zimbabwe, South Africa and Kenya	Gerstner, 1941; Gelfand et al., 1985; Pakia and Cooke, 2003
Child bearing and pregnancy problems			
Cleanse the blood when pregnant, ease labour, prevent pre-mature birth and pre-natal care	Leaves and roots mixed with those of <i>Crotalaria monteiri</i> Baker f., <i>Grewia occidentalis</i> L., <i>Opuntia stricta</i> (Haw.) Haw., <i>Garcinia livingstonei</i> T. Anderson, <i>Rhoicissus digitata</i> (L. f.) Wild & R. B. Drumm., <i>Ochna natalitia</i> (Meisn.) Walp., <i>Rhus nebulosa</i> Schönland and <i>Commiphora neglecta</i> Verd.,	Kenya, Malawi and South Africa	Morris, 1996; Pakia and Cooke, 2003; De Wet and Ngubane, 2014
Convulsions and epilepsy			
Convulsions and epilepsy	Leaves and roots	Kenya and Zimbabwe	Gelfand et al., 1985; Kokwaro, 1993; Pakia and Cooke, 2003
Fever and malaria			
Fever and malaria	Fruits, leaves and roots	Mozambique, Tanzania and Zambia	Bandeira et al., 2001; Chhabra et al., 1990; Chinsebu, 2016; Jurg et al., 1991
Gastro-intestinal problems			
Amoebic dysentery, anorexia, constipation, diarrhoea and stomach ailments	Fruits, leaves, roots and root bark	Kenya, Malawi, Tanzania and Zambia	Chhabra et al., 1990; Kokwaro, 1993; Morris, 1996; Chinsebu, 2016
Headache			
Headache	Roots and leaves mixed with those of <i>Lippia javanica</i> (Burm. f.) Spreng.	Zimbabwe, Malawi and Mozambique	Gelfand et al., 1985; York, 2012; Bandeira et al., 2001; York et al., 2011; Morris, 1996
Haemorrhoids			
Haemorrhoids and protruding rectum	Roots and root bark	Tanzania, Kenya and Malawi	Hedberg et al., 1983; Morris, 1996; Kokwaro, 1993
Menstrual problems			
Amenorrhoea, dysmenorrhoea, menorrhagia and oligomenorrhoea	Bark, leaves and roots mixed with those of <i>Acalypha brachiata</i> Krauss, <i>Erythrina humeana</i> Spreng., <i>Garcinia livingstonei</i> , <i>Hyphaene coriacea</i> Gaertn., <i>Ochna natalitia</i> , <i>Commiphora neglecta</i> , <i>Peltophorum africanum</i> Sond., <i>Crotalaria monteiri</i> , <i>Rhoicissus digitata</i> , <i>Grewia occidentalis</i> , <i>Rhus nebulosi</i> and <i>Tabernaemontana elegans</i> Stapf.	South Africa, Zimbabwe and DRC	Gelfand et al., 1985; De Wet and Ngubane, 2014; Mbayo et al., 2016
Pain, sores and wounds			
Abdominal pain, sores and wounds	Bark, leaves and roots	DRC, Malawi, Tanzania and South Africa	Chhabra et al., 1990; Mbayo et al., 2016; Morris, 1996; De Wet et al., 2012
Purgative			
Purgative and to prevent vomiting	Roots and root bark	Tanzania and Zambia	Watt and Breyer-Brandwijk, 1962; Chhabra et al., 1984, 1990
Reproductive problems			
Aphrodisiac and infertility	Root bark and roots mixed with those of <i>Acalypha brachiata</i> , <i>Erythrina humeana</i> , <i>Hyphaene coriacea</i> , <i>Ozoroa engleri</i> , <i>Peltophorum africanum</i> , <i>Rhoicissus digitata</i> , <i>Rhus nebulosa</i> and <i>Tabernaemontana elegans</i>	Zimbabwe, Tanzania and South Africa	Palmer and Pitman, 1972; De Wet and Ngubane, 2014; Gelfand et al., 1985; Chhabra et al., 1990; Maroyi, 2011
Respiratory problems			
Asthma, chills, cough, respiratory infections and runny nose	Roots, root bark and leaves mixed with those of <i>Lippia javanica</i>	Malawi, Tanzania and South Africa	Chhabra et al., 1990; York, 2012; Morris, 1996; York et al., 2011
Sexually transmitted infections			
Gonorrhoea and syphilis	Bark, fruits, leaves and roots	Zambia, DRC, Tanzania, Malawi and South Africa	Chhabra et al., 1990; Mbayo et al., 2016; Morris, 1996; De Wet et al., 2012; Chinsebu, 2016
Miscellaneous			
Anaemia, bilharzia, cardiac pains, depression, heartburn, hernia, kwashiorkor and oral infections	Fruits, leaves, roots and root bark	Kenya, Malawi, Tanzania and Zambia	Chhabra et al., 1990; Ouma, 1994; Morris, 1996; Ouma et al., 1997; Chinsebu, 2016



Antioxidant activities

Cumbane and Munyemana (2017) evaluated antioxidant properties of ethyl acetate and hydroethanol leaf and root extracts of *B. cathartica* using the phosphomolybdenum method and the 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging assay. The phosphomolybdenum method showed total antioxidant activities ranging from 42.4% to 57.9% against 100% exhibited by quercetin, the standard. The extracts in DPPH assay showed half maximal effective concentration (EC₅₀) values stretching from 3.63 µg/mL to 14.60 µg/mL, against 1.50 µg/mL exhibited by quercetin, the standard (Cumbane and Munyemana, 2017). These antioxidant properties of *B. cathartica* are probably due to the flavonoids and phenolics that

have been identified from the leaves and stems of the species (Cumbane and Munyemane, 2017).

Cytotoxicity activities

Moshi et al. (2004) evaluated the cytotoxicity activities of aqueous ethanol stem bark extract of *B. cathartica* using the brine shrimp lethality test. The concentrations killing 50% of the shrimps (LC₅₀) was 58.5 µg/ml for the extract (Moshi et al., 2004). These findings imply that extracts of the species may have deleterious health implications and detailed toxicological evaluations are required to determine toxicity and/or any side effects associated with consumption of plant extracts and other products derived from the species.

Table 2: Phytochemical and nutritional composition of *Bridelia cathartica*

Caloric and nutritional composition	Values	Plant parts	Reference
Ash (g/100g)	9.3 - 13.0	Leaves, root and stem bark	Ouma, 1994
Ca (mg/100g)	1566.8 - 2367.0	Leaves, root and stem bark	Ouma, 1994
Condensed tannins (mg cyanidin 3-glucoside equivalents/g dry extract)	34.9 - 65.3	Leaves and stem	Cumbane and Munyemane, 2017
Cu (mg/100g)	0.6 - 0.8	Leaves, root and stem bark	Ouma, 1994
Fe (mg/100g)	3.5 - 35.7	Leaves, root and stem bark	Ouma, 1994
Flavonoids (mg rutin equivalents/g dry extract)	0.5 - 25.5	Leaves and stem	Cumbane and Munyemane, 2017
Hydrolysable tannins (mg tannic acid equivalents/g dry extract)	1.4 - 2.7	Leaves and stem	Cumbane and Munyemane, 2017
K (mg/100g)	600.8 - 1305.5	Leaves, root and stem bark	Ouma, 1994
Mg (mg/100g)	131.2 - 555.3	Leaves, root and stem bark	Ouma, 1994
Mn (mg/100g)	3.1 - 10.9	Leaves, root and stem bark	Ouma, 1994
Moisture (g/100g)	11.8 - 12.2	Leaves, root and stem bark	Ouma, 1994
Na (mg/100g)	90.6 - 142.4	Leaves, root and stem bark	Ouma, 1994
P (mg/100g)	50.0 - 181.4	Leaves, root and stem bark	Ouma, 1994
Phenolic (mg gallic acid equivalent/g dry weight)	427.5 - 437.0	Leaves and stem	Cumbane and Munyemane, 2017
Zn (mg/100g)	1.3 - 4.4	Leaves, root and stem bark	Ouma, 1994
Cyanogenic glycoside			
Triglochinin	-	seed	Van Valen, 1978
Fatty acids			
Linoleic acid (%)	15.0	Seed	Azimova and Glushenkova, 2012
Linolenic acid (%)	44.0	Seed	Azimova and Glushenkova, 2012
Oleic acid (%)	23.0	Seed	Azimova and Glushenkova, 2012
Palmitic acid (%)	10.0	Seed	Azimova and Glushenkova, 2012
Stearic acid (%)	8.0	Seed	Azimova and Glushenkova, 2012



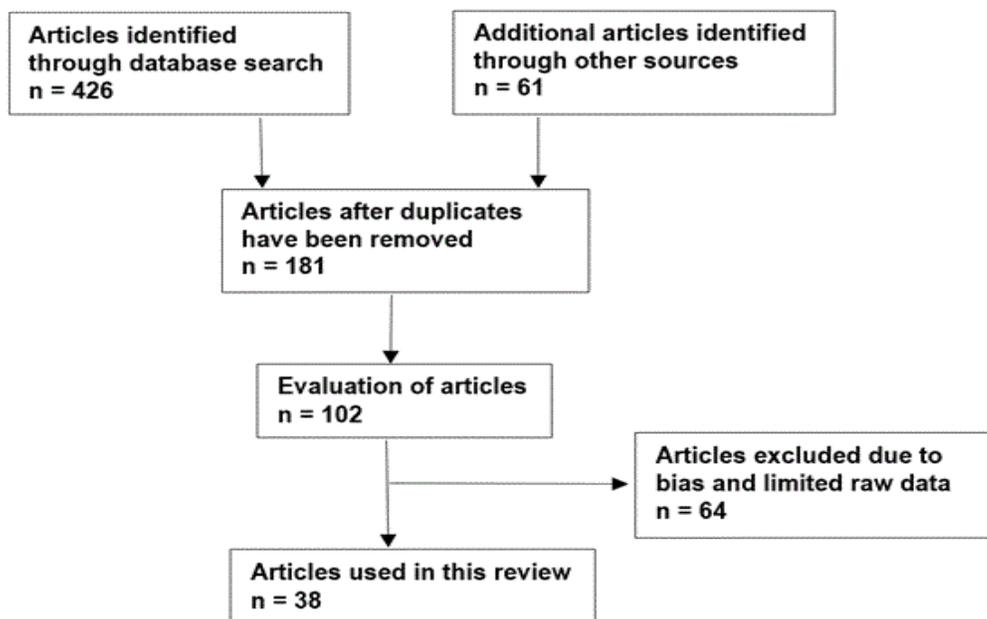


Figure 1: Flow diagram showing literature search and selection processes

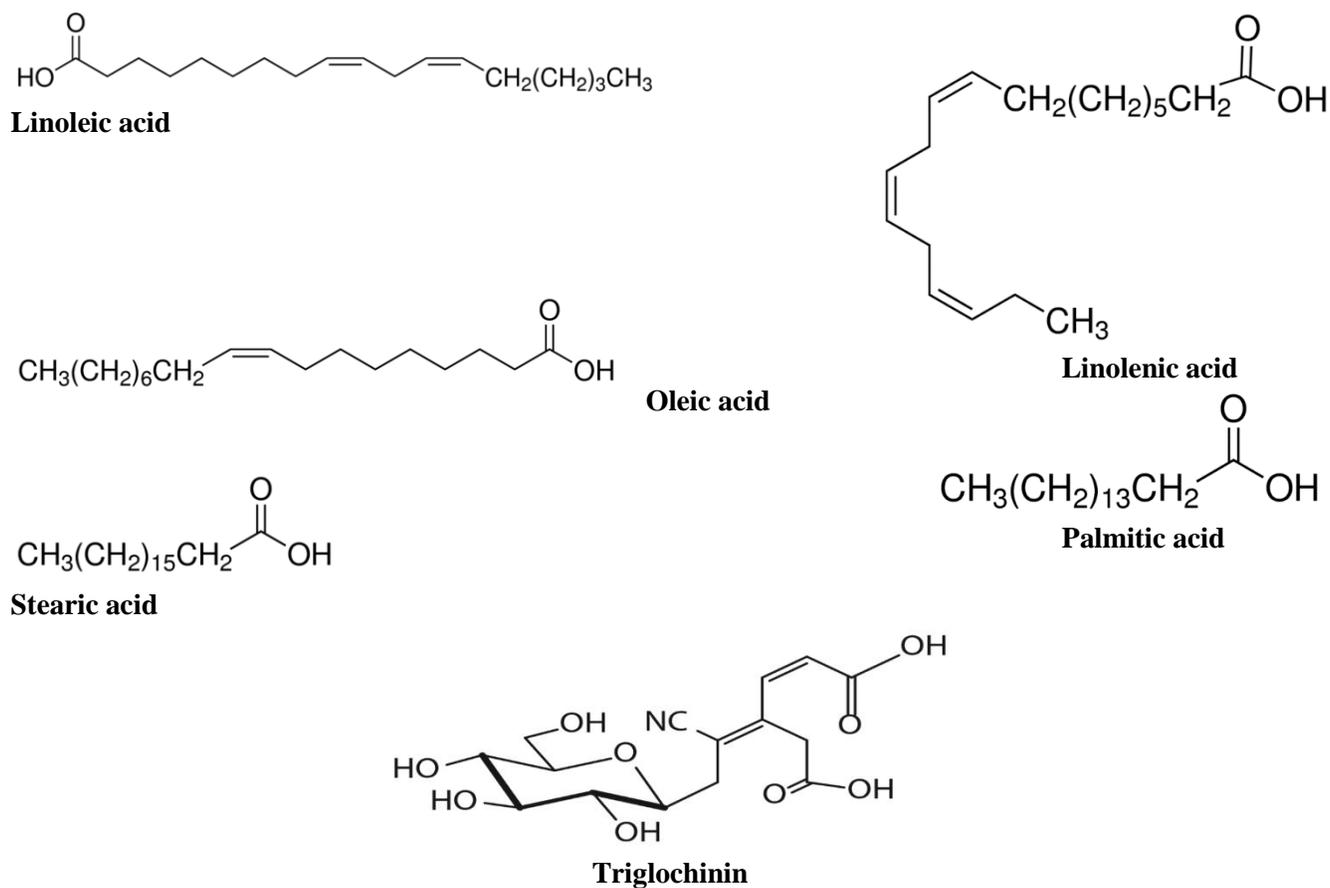


Figure 2: Chemical structures of fatty acids and triglochinin

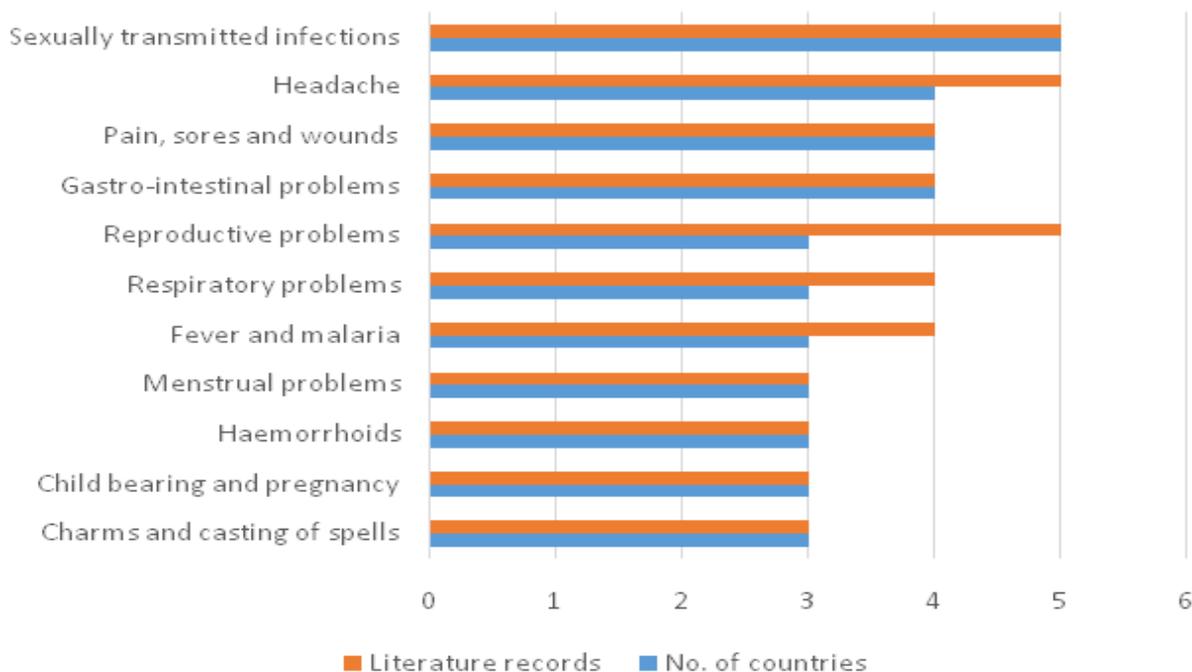


Figure 3: Major medicinal uses of *B. cathartica* in tropical Africa based on literature records

Conclusions

Bridelia cathartica is an important medicinal plant throughout its distributional range. Few studies carried out so far provided supporting evidence for most of the documented ethnomedicinal uses of the species focusing on child bearing and pregnancy, fever and malaria, gastro-intestinal, headache, haemorrhoids, menstrual, pain, sores and wounds, reproductive, respiratory disorders and sexually transmitted infections. Therefore, it seems premature to draw firm conclusions about the alleged therapeutic effects of *B. cathartica*. More detailed research is needed aimed at assessing several plant parts of the species used as traditional medicines, evaluating their chemical compounds, biological and toxicological properties. Detailed clinical trials are also required aimed at evaluating the efficacy of crude extracts of *B. cathartica* or compounds isolated from the species. Detailed pharmacological, molecular and cellular mechanisms of action are needed for *B. cathartica* when used alone or mixed with other plant species to confirm synergetic, additive, efficacy and safety of such combinations and usage. Therefore, evaluation of the chemical, biological and toxicological properties of *B. cathartica* are important as this baseline data is required for future research on the species.

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Conflict of interest

The author declares that there is no conflict of interest regarding the publication of this paper

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