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Review Article

Taxonomy, Traditional Uses and Pharmacological Properties of *Ormocarpum trichocarpum* (Taub.) Engl. (Fabaceae Family): A Narrative Review

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Abstract

Ormocarpum trichocarpum (Taub.) Engl. is a shrub or small tree harvested from the wild as a source of food, traditional medicines and wood. The present review compiles existing information on the medicinal uses and chemical and pharmacological properties of *O. trichocarpum*. Multiple searches on existing literature on the traditional, medicinal, phytochemistry and pharmacological properties of *O. trichocarpum* were conducted in online Databases such as Web of Science, Google Scholar, Scopus®, SpringerLink®, ScienceDirect®, SciELO and PubMed®, as well as using pre-electronic literature sources obtained from the university library. This study showed that the bark, leaves, roots, stem bark, stems and whole plant parts of *O. trichocarpum* are used against 32 human and animal diseases and ailments. The main ailments and diseases treated by *O. trichocarpum* crude extracts include its use as an emetic, poisoning antidote, protective charm and traditional medicine for erectile dysfunction, gastrointestinal problems, prolonged labour, sexually transmitted infections and skin infections. The phytochemical evaluation of the plant revealed that it contains alkaloids, alkanes, flavonoids, phenolics, saponins, tannins, diterpenes, sesquiterpenes and bioflavonoids. Pharmacological assessments showed that the crude extracts and phytochemical compounds isolated from the species have antibacterial, antifungal, antioxidant, antiplasmodial and tyrosinase-inhibiting activities. Detailed studies focusing on toxicological evaluations, *in vivo* and clinical research aimed at corroborating the traditional medical applications of *O. trichocarpum* are recommended.

Key words: Caterpillar bush, Fabaceae, Leguminosae, *Ormocarpum trichocarpum*, phytochemistry, toxicology

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Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

Ormocarpum trichocarpum (Taub.) Engl. (Fig. 1a-d), commonly known as “caterpillar bush”, “caterpillar pod”, “hairy caterpillar-pod”, “large caterpillar pod” and “ormocarpum” is a shrub or small tree belonging to the Leguminosae, Fabaceae or legume, pea or bean family. The family Fabaceae is subdivided into six subfamilies, that is, Duparquetioideae, a monotypic genus, Cercidoideae consisting of 12 genera and 335 species, Dialioidae (17 genera and 85 species), Detarioideae (84 genera and 760 species), Caesalpinioideae (148 genera and 4400 species) and Faboideae or Papilionoideae with 503 genera and 14,000 species¹. The family Fabaceae consists of about 20000 species represented in 770 genera^{1,2} and is the third largest plant family after Compositae, Asteraceae or sunflower with 23000 species and Orchidaceae family, the orchids represented by 22000 species^{2,3}. The plant species belonging to the family Fabaceae are mainly annual, biennial and perennial herbs, trees, subshrubs, shrubs, woody and climbing lianas⁴. Fabaceae species have been recorded in diverse ecological conditions ranging from arctic zones to the tropics, alpine habitats to seashore, deserts, rain forests, peat swamp forests, mangroves, seasonal, dry and wet tropical forests^{3,5}. Some species of the Fabaceae family such as bean (*Phaseolus vulgaris* L.), maize (*Zea mays* L.), pea (*Lathyrus oleraceus* Lam.), peanut (*Arachis hypogaea* L.) and soybean (*Glycine max* (L.) Merr.) are some of the economically important agricultural crops in the world, cultivated for their edible seeds⁵⁻¹⁰. Similarly, species of the *Ormocarpum* P. Beauv. genus belonging to the Fabaceae, Faboideae subfamily are regarded as multipurpose species used as sources of herbal medicines, timber, food, garden ornamentals, fibres, dyes, fuels, insecticides and gums¹¹⁻¹⁴.

The *Ormocarpum* genus consists of approximately 17 species that have been recorded in Southern and Tropical Africa, South Pacific, India, Papuasias, Malaysia and Indonesia^{15,16}. Plant species belonging to this genus are shrubs or small trees with either stiff, dark, swollen-based hairs which persist or are whitish, weak hairs which do not persist¹⁷. Some *Ormocarpum* species play an important role in the provision of goods and ecosystem services that are important for human survival and wellbeing¹⁸⁻²⁰. For example, *Ormocarpum kirkii* S. Moore, *O. keninse* J.B. Gillet, *O. cochinchinense* (Lour.) Merr. and *O. sennoideae* (Willd.) DC. are widely used as traditional medicines in Tropical Africa^{19,20}. Similarly, *O. trichocarpum* is listed in the monograph “Medicinal and Magical Plants of

Southern Africa: An Annotated Checklist” as a valuable medicinal plant²¹. The current study was aimed at evaluating the medicinal, chemical and pharmacological properties of *O. trichocarpum*.

MATERIALS AND METHODS

The literature search on medicinal uses, chemical and pharmacological properties of *Ormocarpum trichocarpum* was conducted from July, 2023 to April, 2024.

This information on these aspects was obtained using online Databases such as Web of Science, Scopus®, SpringerLink®, Google Scholar, SciELO, PubMed® and ScienceDirect®. Additional information on the medicinal uses, chemical and pharmacological properties of *Ormocarpum trichocarpum* was also obtained by systematic search of various resources that are not covered by electronic databases and these included journal papers, books, dissertations, book chapters, thesis and other scientific articles obtained from the university library. The keywords used in the search included “*O. trichocarpum*”, the synonyms of the species “*O. trichocarpum* (Baker) Planch.”, English common names “caterpillar bush”, “caterpillar pod”, “hairy caterpillar-pod”, “large caterpillar pod” and “ormocarpum”. An additional search was also conducted using the keywords “Biological activities of *Ormocarpum trichocarpum*”, “Pharmacological properties of *Ormocarpum trichocarpum*”, “Ethnobotany of *Ormocarpum trichocarpum*”, “Medicinal uses of *Ormocarpum trichocarpum*”, “Phytochemistry of *Ormocarpum trichocarpum*” and “Traditional uses of *Ormocarpum trichocarpum*”.

RESULTS AND DISCUSSION

Morphological description and taxonomy of *Ormocarpum trichocarpum*: The generic name “*Ormocarpum*” is based on Greek words meaning “necklace” and “fruit” to the shape of the pods of the jointed fruits of the type species *O. verrucosum* P. Beauv.²². The specific name “*trichocarpum*” is Greek meaning “bristly fruit” or “hairy fruit”²². Both generic and specific names thus refer to the most outstanding feature of the species and its constricted pods²². The synonyms of *O. trichocarpum* (Taub.) Engl. include *Diphaca trichocarpa* Taub., *O. setosum* Burt Davy and *Saldania acanthocarpa* Sim²³⁻²⁷. The English common names of *O. trichocarpum* include “caterpillar bush”, “caterpillar pod”, “hairy caterpillar-pod”, “large caterpillar pod” and “ormocarpum”^{17,22,28,29}.

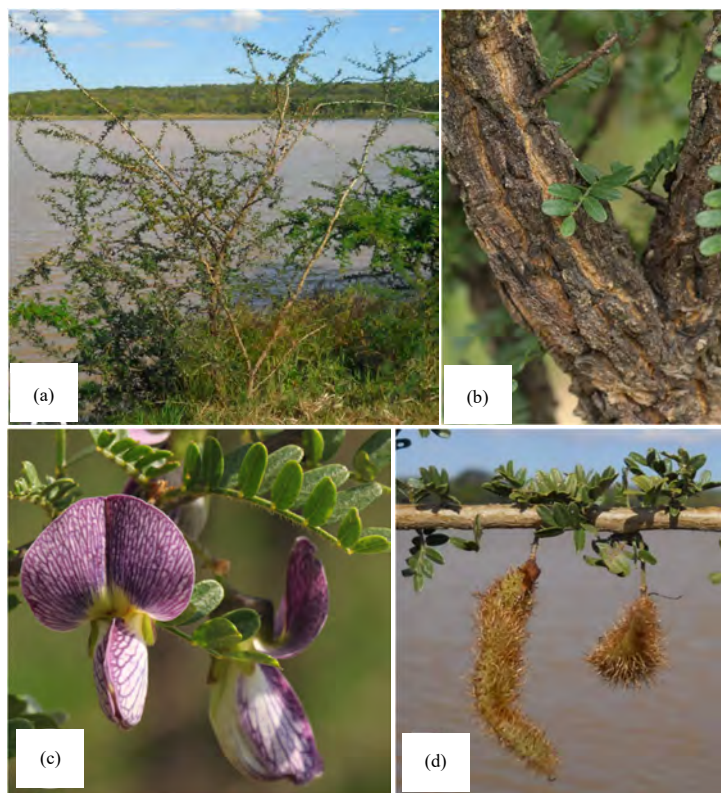


Fig. 1(a-d): *Ormocarpum trichocarpum*, (a) General habit of the species, (b) Deeply fissured and corky bark, (c) Branch showing flowers and leaves and (d) Branch showing pods covered with stiff hairs
(a, d) L Lauristen and (b, c) B Wursten

Ormocarpum trichocarpum is a large slender shrub to a short tree, sometimes spiny, usually 2-5 m in height^{17,30}. *Ormocarpum trichocarpum* is single-stemmed and has a small crown of rigid, arching and ridged branches with rough, thick, deeply fissured and corky bark which is blackish to greyish-brown in color. The young twigs are purplish in color, hairy and becoming creamy with age.

The compound leaves are small, clustered on older branches and also borne in tufts on small knobs up the twigs or on short side branches which sometimes end in a stout spiny point. The leaflets are oblong with a tiny sharp point at the end. The midrib is dark, distinctly hairy, prominent below and the margin is not rolled under. The flowers are borne in the axils of the leaves on hairy stalks. The flowers are solitary, bisexual, violet-blue or pink (Fig. 1c), sometimes grey-veined with blue. The flowers develop into pods, which are cylindrical, golden brown and covered with stiff hairs so that they look like furry tails or caterpillars. The pods are sometimes borne in numbers at the same time as the flowers so that the branches are both purple and brown. *Ormocarpum trichocarpum* has been recorded in Eswatini, Rwanda, South Sudan, Ethiopia, Zambia, Burundi, Kenya, Botswana, Malawi, Somalia, Uganda,

the Democratic Republic of Congo (DRC), Mozambique, Sudan, Zimbabwe, Tanzania and South Africa^{17,22-27,31}. It has been recorded in savanna, mixed woodland, thicket, brackish areas, rocky hillsides, bushveld, stony valleys, shallow, stony loam and sandy clayey loam soils, in valleys, ridges and flats at an altitude ranging from 50 to 1550 m above sea level^{17,22-27,31,32}. *Ormocarpum trichocarpum* resembles *O. kirkii*, it differs from this species in the leaflets which are more than 10.0 mm in length, also in the corolla which drops off as the ovary swells and in the pod which is densely covered with bristles about half as long as the width of the pod³³.

Ethnomedicinal and traditional uses of *Ormocarpum trichocarpum*: Throughout Tropical Africa, *O. trichocarpum* has been used as food, ornamental plant, traditional medicine, fodder, firewood and for various cultural applications. *Ormocarpum trichocarpum* is used as an ornamental plant in Central, Eastern and Southern Africa in well-drained soils and where frost is not severe, particularly in small gardens³⁴. In Southern Africa, *O. trichocarpum* is an important source of firewood³⁵. In Tanzania, *O. trichocarpum* is collected from the wild and cooked as a leafy vegetable^{34,36}. In Eastern and

Southern Africa, the leaves, branches, twigs and pods of *O. trichocarpum* are eaten by game and livestock^{22,34,37}. Current reports show that *O. trichocarpum* is mainly collected from the wild and not threatened with extinction and is common in bushveld, woodland and grassland. For example, in South Africa, *O. trichocarpum* is widespread, recorded in a wide range of habitats characterized by a large population size and categorized as of Least Concern on IUCN Red List Categories and Criteria³⁸.

In traditional medicine, the bark, leaves, roots, stem bark, stems and whole plant parts of *O. trichocarpum* are used against 32 human and animal diseases and ailments (Table 1-2). The medicinal uses of *O. trichocarpum* have been recorded in Eswatini, Mozambique, South Africa, Tanzania, Uganda, Zimbabwe, Ethiopia, Kenya and Zambia, representing 50.0% of the countries where *O. trichocarpum* is indigenous. The main ailments and diseases treated by *O. trichocarpum*

crude extracts include its use as an emetic, poisoning antidote, protective charm and traditional medicine for erectile dysfunction, gastrointestinal problems, prolonged labour, sexually transmitted infections and skin infections (Fig. 2). In Zimbabwe, the roots of *O. trichocarpum* are mixed with those of *Dichrostachys cinerea* (L.) Wight & Arn. and *Ozoroa paniculata* (Sond.) R.Fern. & A.Fern. var. *salicina* (Sond.) R.Fern. & A.Fern. as traditional medicine for abdominal pains³⁹. Similarly, the powdered roots of *O. trichocarpum* are mixed with those of *D. cinerea*, *O. paniculata* var. *salicina* and *Heteromorpha arborescens* (Spreng.) Cham. & Schltdl. var. *abyssinica* (Hochst. ex A.Rich.) H.Wolff as traditional medicine for stomach problems³⁹. The leaves of *O. trichocarpum* are mixed with those of *Terminalia brachystemma* Welw. ex Hiern as remedy for allergies while roots are mixed with those of *D. cinerea* and *O. paniculata* var. *salicina* and used as remedy for colic³⁹. To prevent illnesses, the roots of *O. trichocarpum* are taken orally, mixed with those of *Asparagus* spp. (Table 2).

Table 1: Mono-therapeutic applications of *Ormocarpum trichocarpum*

Medicinal uses	Parts used	Country	References
Bilharzia	Root decoction taken orally	Tanzania	Watt <i>et al.</i> ⁴⁰ and Moshi <i>et al.</i> ⁴¹
Bone setting	Root powder applied topically	Tanzania	Moshi <i>et al.</i> ⁴¹
Depressed fontanelle	Chewed leaves applied topically	Zimbabwe	Gelfand <i>et al.</i> ⁴² and Scott ⁴³
Emetic	Bark decoction taken orally	South Africa	Palmer and Pitman ²² , Schmidt <i>et al.</i> ³⁰ and Scott ⁴³
Erectile dysfunction	Bark and root infusion taken orally	Eswatini and South Africa	Loffler ³¹ and Tshikalange <i>et al.</i> ⁴⁴
Gastrointestinal problems (abdominal pains, diarrhoea, stomachache and stomach problems)	Leaf, root and stem bark decoctions taken orally	Eswatini, Kenya, Tanzania and Zimbabwe	Loffler ³¹ , Ruffo <i>et al.</i> ³⁴ , Gelfand <i>et al.</i> ⁴² , Scott ⁴³ , Tshikalange <i>et al.</i> ⁴⁴ , Johns <i>et al.</i> ⁴⁵ , Johns <i>et al.</i> ⁴⁶ , Kisangau <i>et al.</i> ⁴⁷ and Jacqueline <i>et al.</i> ⁴⁸
Headache	Leaves rubbed on the forehead	Tanzania	Ruffo <i>et al.</i> ³⁴
Oedema	Leaf decoction taken orally	Tanzania	Mosina <i>et al.</i> ⁸ and Ruffo <i>et al.</i> ³⁴
Poisoning antidote	Bark decoction taken orally	South Africa	Palmer and Pitman ²² , Schmidt <i>et al.</i> ³⁰ and Scott ⁴³
Pregnancy cramps, bleeding during pregnancy or after miscarriage	Bark decoction taken orally	Kenya	Nankaya <i>et al.</i> ⁴⁹
Prolonged labour	Leaf and root powder taken orally	Zimbabwe	Harvey and Armitage ³⁹ , Gelfand <i>et al.</i> ⁴² and Scott ⁴³
Protect against abortion	Bark decoction taken orally	Kenya	Phanuel <i>et al.</i> ⁵⁰
Protective charm	Roots used	South Africa	Schmidt <i>et al.</i> ³⁰ , Arnold and Gulumian ³⁵ and Scott ⁴³
Rheumatism	Root paste applied topically	Tanzania	Ruffo <i>et al.</i> ³⁴
Sexually transmitted infections (syphilitic sores)	Leaf, root and whole plant decoction taken orally	Kenya and Zambia	Ndubani and Hojer ⁵¹ and Odongo <i>et al.</i> ⁵²
Skin infections (abscess, burns and ringworm)	Leaf and root paste applied topically	Kenya, Ethiopia and Mozambique	Kisangau and Herrmann ⁵³ , Bruschi <i>et al.</i> ⁵⁴ and Paulos <i>et al.</i> ⁵⁵
Stroke paralysis	Root decoction taken orally	Tanzania	Moshi <i>et al.</i> ⁴¹
Tuberculosis	Root decoction taken orally	Uganda	Tabuti <i>et al.</i> ⁵⁶
Typhoid	Leaf and stem decoction taken orally	Kenya	Jacqueline <i>et al.</i> ⁴⁸ and Kokwaro ⁵⁷
Ulcers	Leaf infusion taken orally	Kenya	Mutwiwa <i>et al.</i> ⁵⁸
Ethnoveterinary medicine (diarrhoea and swollen leg)	Leaves and roots	Ethiopia	Lulekal <i>et al.</i> ⁵⁹ and Kidane <i>et al.</i> ⁶⁰

Table 2: Uses of *Ormocarpum trichocarpum* as traditional medicine in combination with other plant species

Medicinal uses	Parts used
Abdominal pain	Roots mixed with those of <i>Dichrostachys cinerea</i> (L.) Wight & Arn. and <i>Ozoroa paniculata</i> (Sond.) R.Fern. & A.Fern. var. <i>salicina</i> (Sond.) R. Fern. & A. Fern.
Alleges	Leaves mixed with those of <i>Terminalia brachystemma</i> Welw. ex Hiern
Colic	Roots mixed with those of <i>D. cinerea</i> and <i>O. paniculata</i> var. <i>salicina</i>
Stomach problems	Powdered roots mixed with those of <i>D. cinerea</i> , <i>O. paniculata</i> var. <i>salicina</i> and <i>Heteromorpha arborescens</i> (Spreng.) Cham. & Schltdl. var. <i>abyssinica</i> (Hochst. ex A.Rich.) H. Wolff
To prevent illness	Roots mixed with those of <i>Asparagus</i> spp.

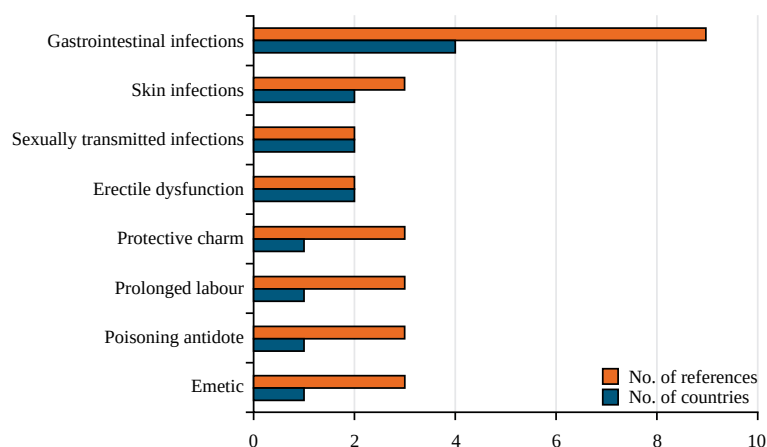


Fig. 2: Main ethnomedicinal applications of *Ormocarpum trichocarpum* in tropical Africa

Table 3: Phytochemical composition of *Ormocarpum trichocarpum*

Phytochemical compound	Plant part	References
Alkaloids	Stem bark	Kilonzo <i>et al.</i> ⁶¹
2-methylhexacosane	Stem bark	Kilonzo <i>et al.</i> ⁶¹
3"-epidiphsin	Aerial parts	Chukwujekwu <i>et al.</i> ⁶²
7,7"-di-O-methylchamaejasmin	Aerial parts	Chukwujekwu <i>et al.</i> ⁶²
7,7"-di-O-methylisochamaejasmin	Aerial parts	Chukwujekwu <i>et al.</i> ⁶²
τ-cadinol	Stem bark	Kilonzo <i>et al.</i> ⁶¹
(+)-chamaejasmin	Aerial parts	Chukwujekwu <i>et al.</i> ⁶²
(-)-diphsin	Aerial parts	Chukwujekwu <i>et al.</i> ⁶²
Dotriacontane	Stem bark	Kilonzo <i>et al.</i> ⁶¹
Flavonoids	Stem bark	Kilonzo <i>et al.</i> ⁶¹
Nonacosane	Stem bark	Kilonzo <i>et al.</i> ⁶¹
Phenolics	Leaves	Chukwujekwu <i>et al.</i> ⁶³
Phytol	Stem bark	Kilonzo <i>et al.</i> ⁶¹
Saponins	Stem bark	Kilonzo <i>et al.</i> ⁶¹
Tetracontane	Stem bark	Arbainsyah ¹⁶
Tannins	Leaves and stem bark	Kilonzo <i>et al.</i> ⁶¹ and Chukwujekwu <i>et al.</i> ⁶³

Phytochemistry and pharmacological properties of *Ormocarpum trichocarpum*: Several phytochemical compounds such as alkaloids, alkanes, flavonoids, phenolics, saponins, tannins, diterpenes, sesquiterpenes and biflavonoids (Table 3) have been isolated from the aerial parts, leaves and stem bark of *O. trichocarpum*. Some of the phytochemical compounds isolated from *O. trichocarpum* and its crude extracts exhibited antibacterial, antifungal, antioxidant, antiparasitic and tyrosinase-inhibiting activities.

Antibacterial activities: Chukwujekwu *et al.*⁶² evaluated the antibacterial activities of the phytochemical compounds (+)-chamaejasmin, (-)-diphsin, 3"-epidiphsin, 7,7"-di-O-methylchamaejasmin and 7,7"-di-O-methylisochamaejasmin isolated from the aerial parts of *O. trichocarpum* against *Staphylococcus aureus*, *Escherichia coli*, *Bacillus subtilis* and *Klebsiella pneumoniae* using the microtiter bioassay with neomycin as a positive control. The phytochemical compounds exhibited activities against the tested pathogens

with minimum inhibitory concentration (MIC) values ranging from 4.0 to 136.7 μ M⁶². Chukwujekwu *et al.*⁶³ assessed the antibacterial activities of hexane and dichloromethane extracts of *O. trichocarpum* leaves against *Enterococcus faecalis*, *Staphylococcus aureus*, *Bacillus subtilis*, *Escherichia coli*, *Klebsiella pneumoniae* and *Pseudomonas aeruginosa* using the microtiter method with neomycin as positive control. The extracts demonstrated antibacterial activities against the all tested pathogens with MIC values ranging from 0.16 to >2.50 mg/mL⁶³. Similarly, Jacqueline *et al.*⁴⁸ assessed the antibacterial activities of the crude extracts of *O. trichocarpum* leaves against methicillin-resistant *Staphylococcus aureus*, *Salmonella typhi*, *Escherichia coli*, *Bacillus subtilis* and *Staphylococcus aureus* using the disc diffusion assay with chloramphenicol as positive control. The crude extract exhibited activities against the tested pathogens with the zone of inhibition ranging from 6.0 to 15.5 mm⁴⁸. Kilonzo *et al.*⁶¹ evaluated the antibacterial activities of petroleum ether, ethyl acetate and aqueous extracts of

O. trichocarpum stem bark, root bark and leaves against *Staphylococcus aureus*, *Salmonella typhi*, *Klebsiella pneumoniae* and *Escherichia coli* using the microdilution method with fluconazole as a positive control. The extracts exhibited activities against the tested pathogens with MIC values ranging from 0.05 to 6.25 mg/mL⁶¹. These findings somehow confirm the antibacterial potential of *O. trichocarpum* and its usefulness in the treatment of microbial infections such as gastrointestinal problems, sexually transmitted infections and tuberculosis.

Antifungal activities: Jacqueline *et al.*⁴⁸ evaluated the antifungal activities of the crude extracts of *O. trichocarpum* leaves against *Trichophyton mentagrophyte*, *Aspergillus niger*, *Microsporum gypseum*, *Candida albicans* and *Cryptococcus neoformans* using the disc diffusion method with miconazole as a positive control. The crude extract exhibited activities against the tested pathogens with the zone of inhibition ranging from 6.0 to 8.5 mm⁴³. Kilonzo *et al.*⁶¹ evaluated the antifungal activities of petroleum ether, ethyl acetate and aqueous extracts of *O. trichocarpum* stem bark, root bark and leaves against *Candida albicans* and *Cryptococcus neoformans* using the microdilution method with gentamicin as a positive control. The extracts exhibited activities against the tested pathogens with MIC values ranging from 0.1 to 6.25 mg/mL⁶¹. These findings corroborate the traditional uses of crude extracts of *O. trichocarpum* against sexually transmitted infections^{51,52} and skin infections⁵³⁻⁵⁵.

Antioxidant activities: Chukwujekwu *et al.*⁶³ evaluated the antioxidant activities of dichloromethane and hexane extracts of *O. trichocarpum* leaves using against 2,2-Diphenyl-1-Picrylhydrazyl (DPPH) free scavenging and β -carotene-linoleic acid assays with Butylated Hydroxytoluene (BHT) as a positive control. The extracts exhibited dose-dependent antioxidant activities⁶³. The documented *in vitro* antioxidant activities exhibited by the extracts of *O. trichocarpum* leaves could imply that the species can protect human body cells from harmful damage caused by free radicals.

Antiplasmodial activities: Chukwujekwu *et al.*⁶² evaluated the antiplasmodial activities of the phytochemical compounds (+)-chamaejasmin, (-)-diphyisin, 3"-epidiphyisin, 7,7"-di-O-methylchamaejasmin and 7,7"-di-O-methylisochamaejasmin isolated from the aerial parts of *O. trichocarpum* against the chloroquine-sensitive (D10) strain of *Plasmodium falciparum* using the *in vitro* Parasite Lactate Dehydrogenase (pLDH) assay with chloroquine as a positive control. The phytochemical compounds showed activities and exhibited

Half Maximal Inhibitory Concentration (IC₅₀) values ranging from 4.0 to 94.3 μ M⁶².

Tyrosinase inhibiting activities: Stapelberg *et al.*⁶⁴ evaluated the tyrosinase-inhibiting potential of crude extracts of *O. trichocarpum* leaves using the tyrosinase inhibition assay with kojic acid and lipoic acid as positive controls. The extract demonstrated activities with an IC₅₀ value of 2.95 μ g/mL, which was better than the IC₅₀ value of 6.45 μ g/mL exhibited by the positive control⁶⁴.

CONCLUSION

The current study provides a summary of the medicinal, phytochemical and biological properties of *O. trichocarpum*. Such evaluations are needed considering that *O. trichocarpum* is widely used as traditional medicine throughout its distributional range in Tropical Africa and it is clear that the full therapeutic potential of the species has not yet been realized. Literature studies show that there is growing demand for medicinal plants such as *O. trichocarpum* which are used as traditional medicines, nutraceuticals and sources of complementary treatments. This is usually the case with medicinal plants that are characterized by bioactive components such as flavonoids, phenolics and terpenoids which are beneficial to human health. Therefore, future studies should focus on detailed ethnopharmacological evaluations of the species, emphasizing phytochemical, pharmacological, toxicological, *in vivo* and clinical research aimed at corroborating the traditional medical and food applications of the species.

SIGNIFICANCE STATEMENT

This study provided information about the taxonomy, traditional uses and pharmacological properties of *O. trichocarpum*, a widely used plant species in traditional medicine. Results of this study contributes to the existing literature on the ethnopharmacological properties of *O. trichocarpum* that could be useful in bio-prospecting for new health-promoting products required in the primary healthcare delivery system in Tropical Africa. Therefore, future studies should focus on conducting detailed ethnopharmacological evaluations of the species emphasizing phytochemistry, pharmacological properties and toxicological evaluations of the species, *in vivo* and clinical research aimed at corroborating the traditional medical applications of the species. Such studies are needed as the use of medicinal plants in primary healthcare has been increasing in developing countries.

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