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REVIEW ARTICLE

Use of herbal formulations for the treatment of circumcision wounds in Eastern and Southern Africa

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ABSTRACT

Medicinal plants used to treat and manage circumcision wounds have remained an integral part of traditional practice in Eastern and Southern Africa. This study reviews the traditional usage of medicinal plants to treat and manage circumcision wounds in Eastern and Southern Africa. Drawing on data from Kenya, Namibia, South Africa and Tanzania, information was collected from different sources including books, theses and electronic scientific search engines such as Scopus, Science Direct, PubMed, SciFinder and Google Scholar. A literature search was also undertaken focusing on medicinal plants used against circumcision wounds that demonstrated antibacterial and anti-inflammatory activities in *in vitro* studies. Twenty-eight medicinal plants from 15 families are recorded as traditional therapies for circumcision wounds following an extensive literature search. These species used to treat and manage circumcision wounds, and as dressing after circumcision to prevent serious inflammation are mainly (64.3%) members of Amaryllidaceae, Asparagaceae, Asteraceae, Euphorbiaceae and Fabaceae families. Three quarters (75.0%) of these species including *Acalypha ornata*, *Achyranthes aspera*, *Asparagus africanus*, *Boophone disticha*, *Brunsvigia grandiflora*, *Burkea africana*, *Colophospermum mopane*, *Datura stramonium*, *Dichrostachys cinerea*, *Helichrysum appendiculatum*, *H. foetidum*, *H. longifolium*, *H. nudifolium*, *H. pedunculatum*, *Lippia javanica*, *Maesa lanceolata*, *Ptaeroxylon obliquum*, *Ricinus communis*, *Searsia natalensis*, *Triumfetta rhomboidea* and *Vachellia nilotica* have shown antibacterial and anti-inflammatory effects in a set of *in vitro* models. Further studies are needed such as isolation of phytochemical compounds, *in vivo* activities, clinical and toxicological studies.

Introduction

Traditional male circumcision is an important cultural ritual in Eastern and Southern Africa. Male circumcision is carried out for cultural reasons, as an initiation ritual and a rite of passage or transition from boyhood to manhood (1-4). Generally, boys would be taken away from their homes with or without the permission of the head of the families and kept in a secluded place where they will be circumcised and kept for a period of two to four weeks to allow the healing process (1). In Eastern and Southern Africa, traditional male circumcision is seen as a sacred cultural practice, rationalised as a mechanism for the maintenance of social order, associated with ascribed cultural teachings and performance of sexual rites that are sanctioned by society (4, 6, 7). Approximately 15% of the males aged 15 years or older in Kenya, Namibia, South Africa and Tanzania are circumcised (8-10). However, an estimated 84% of all Kenyan men are circumcised but the percentage is much lower among the Luo and Turkana ethnic groups with 17% and 40%, respectively (10). In South Africa, several ethnic groups practice male circumcision as a rite of passage from boyhood to manhood and these include Ndebele, Pedi, Sotho, Tsonga, Venda and Xhosa (7, 11). The traditional male circumcision procedure is usually performed in a non-clinical setting by a traditional provider with no formal medical training. When carried out as a rite of passage into manhood, traditional male circumcision is mainly performed on adolescents or in early adult life as a shift to puberty, adulthood or marriage (12-15). Male circumcision is one of the oldest surgical procedures known, and ritual circumcision is the act of severance of the foreskin without anaesthesia (11, 16-18). Once the foreskin is cut off, the wound is not stitched but bound in traditional medicines to help in the healing process (19-23). Therefore, traditional male circumcision procedure relies heavily on traditional medicines to

prevent microbial infections, ameliorate swelling and pains, and accelerate wound healing.

Research into medicinal uses, phytochemistry and pharmacological properties of medicinal plants used to treat and manage circumcision wounds offers tremendous potential for developing new pharmaceutical health products and drugs. Although conventional medical circumcision is popular in some urban African cities as the World Health Organisation (WHO) recommended male circumcision as part of a comprehensive programme for preventing human immunodeficiency virus (HIV) transmission in areas with high endemic rates (24-31), traditional male circumcision is still widely practised in Eastern and Southern Africa (1-4). Studies are there (29) arguing that the emergency of HIV has brought the ancient traditional male circumcision on spot light as a result of recent studies which have demonstrated that it does not only reduce the rate of HIV infection but the ancient procedure also reduces penile cancer and cervical cancer. This has led to massive male circumcision campaigns in areas with low prevalence of circumcision. However, utilization of traditional medicines will continue to be an important approach to male circumcision in peri-urban, rural and marginalized areas characterized by limited conventional medical services. Moreover, research (32) revealed that medicinal plants are an important component of the daily lives of many people and an important part of the African cultural heritage, and 50% of pharmaceutical drugs and health products in clinical use in the world are derived from natural products isolated from plants. Some of these examples include aspirin derived from a compound called salicin isolated from *Salix alba* L., artemisin from *Artemisia annua* L., opium obtained from *Papaver somniferum* L., paclitaxel from *Taxus brevifolia* Nutt., quinine, an alkaloid obtained from *Cinchona pubescens* Vahl and silymarin from *Silybum marianum* (L.) Gaertn. (32). The ongoing screening of ethnopharmacological properties of Eastern and Southern African plants generated active principles that have great potential in the fight against several global health problems (33-38). This study, therefore, was aimed at reviewing the traditional usage of medicinal plants to treat and manage circumcision wounds in Eastern and Southern Africa focusing on Kenya, Namibia, South Africa and Tanzania.

Materials and Methods

A systematic search for medicinal plants used to treat and manage circumcision wounds in Kenya, Namibia, South Africa and Tanzania (Fig. 1) was undertaken using a variety ethnobotanical and ethnopharmacological books (32, 40-45) and other ethnobotanical pre-electronic sources such as book chapters, journal articles and scientific publications obtained from the University of Fort Hare library. The research articles were searched using Scopus, Science Direct, PubMed, SciFinder and Google Scholar using the following terms as filters, and were searched both alone and as combinations: “circumcision”, “circumcision wounds”, “ethnobotany”, “medicinal plant”, “Kenya”, “Namibia”, “South Africa”, “Tanzania” and “traditional medicine”. Each plant species identified by this initial search was subjected to a further literature review to establish its antibacterial and anti-inflammatory activities in *in vitro* studies. All filtered articles were appraised to determine whether they contain any validated *in vitro* antibacterial and anti-inflammatory models. Where possible, the common and vernacular names were collected, and all scientific names were confirmed or updated using the Plant List website (http://www.theplantlist.org/). A total of 176 articles published between 1938 and 2021 matched the inclusion criteria and were included in this review (Fig. 2).

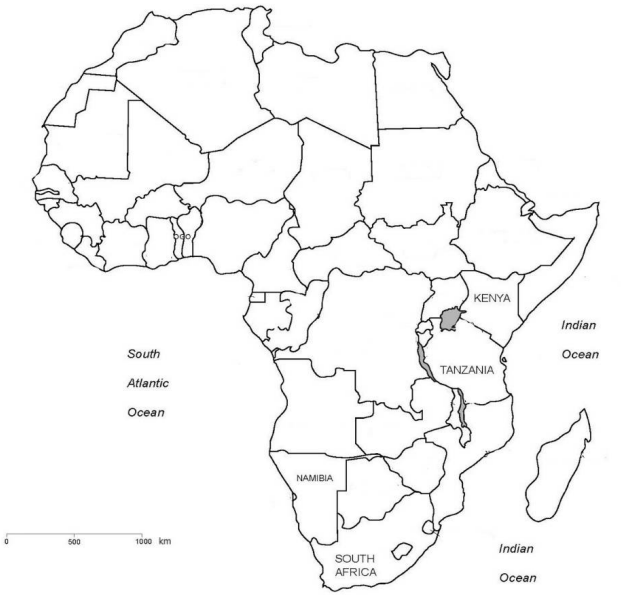

Fig. 1. Geographical location of the study area-Kenya, Namibia, South Africa and Tanzania.

Results and Discussion

Medicinal plant diversity

Twenty-eight medicinal plant species from 15 families are recorded as traditional therapies for circumcision wounds in Kenya, Namibia, South

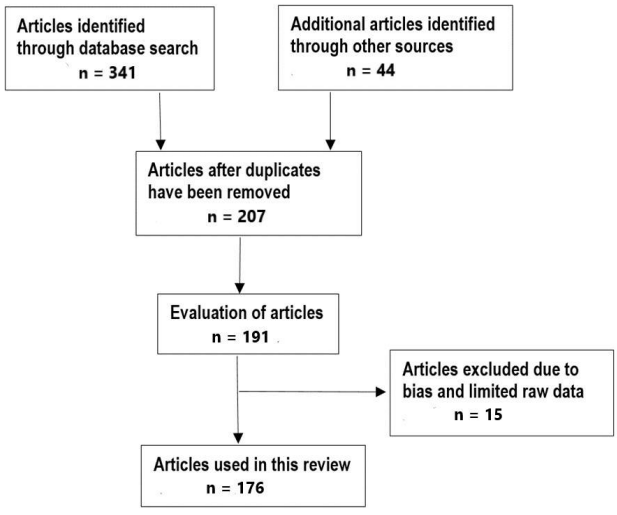

Fig. 2. Flow diagram with the number of selected articles.

Africa and Tanzania following an extensive literature search (Table 1). The preparation methods and application of these species are well documented in the common ethnobotanical literature (32, 39, 40, 44, 45). Generally, the use of these medicinal plants in traditional medicine among ethnic groups in the region is well-known. Only two species, *Datura stramonium* L. and *Ricinus communis* L. are exotic in the region and naturalized as weeds (46). These results imply that local communities in Eastern and Southern Africa have enriched their indigenous pharmacopoeia through utilization of exotic and weedy plant species as traditional medicines for circumcision wounds. Previous research on exotic plant species showed that these species are utilized as medicinal plants throughout the world (47-52). Exotic plants are used as traditional medicines due to their use-versatility applications (53). The majority of medicinal plants (64.3%) used against circumcision wounds are from five families (Fig. 3), and these are

Table 1. Medicinal plants used traditionally to treat circumcision wounds in Kenya, Namibia, South Africa and Tanzania. An asterisk (*) indicates that the species is known or believed to be exotic and naturalized in the region (46).

Scientific name and family	Common name(s)	Country	Used for	Reference(s)
Acalypha ornata Hochst. ex A. Rich. (Euphorbiaceae)	Mfulwe (Bondei), mfulwe, msindo (Sambaa, Zigua), huhunga (Sukuma), mchacha (Swahili), lushete (Tongwe),	Tanzania	Leaf powder applied on circumcision wounds	(42)
Achyranthes aspera L. (Amaranthaceae)	Devil's horsewhip (English), kiandama (Sambaa), pulule, turura (Swahili)	Tanzania	Leaves used as dressing after circumcision	(54)
Aneilema pedunculosum C.B. Clarke (Commelinaceae)	Mukengeria (Kikuyu)	Kenya	Leaves used as dressing after circumcision	(43)
Anthoxanthum ecklonii (Nees ex Trin.) Stapf (Poaceae)	Sweet vernal and sweet vernal grass (English)	South Africa	Whole plant used as dressing after circumcision	(44)
Asparagus africanus Lam. (Asparagaceae)	Haakdoring, katdoring, wag-'n-bietjie (Afrikaans), African asparagus, bush asparagus, climbing asparagus fern, ornamental asparagus, sparrow grass, wild asparagus (English), empere-epapa, olomei (Maasai), lelala-tau-le-leholo, leunyeli (Sotho), ubulawu ubumhlope, umathunga, umthunzi (Xhosa), isigoba, isigobo (Zulu)	Kenya and South Africa	Root powder inserted into scarifications on legs to give strength and fearlessness while leaves and roots are used to clean circumcision wounds	(40,41,45, 55,56)
Boophone disticha (L.f.) Herb. (Amaryllidaceae)	Boesmangif, gifbol, kopseerblom, perdespook, seeroogblom (Afrikaans), bushman poison bulb, century plant, poison bulb, sore-eye flower (English), kxutsana-yanaha, leshoma, motlatsisa (Sotho) leshoma Tswana), incwadi, incotho (Xhosa, Zulu), ibhade (Zulu)	South Africa	Outer scales of the bulb and leaves used as dressing after circumcision	(21,32,39, 40,57-63)
Brunsvigia grandiflora Lindl. (Amaryllidaceae)	Kandelaarblom (Afrikaans), giant candelabra flower (English), isichwe (Xhosa), umqhele-wenkunzi (Zulu)	South Africa	Leaves used as a bandage and outer bulb scales used for dressing after circumcision for rapid healing	(40,62,64-66)
Burkea africana Hook. (Fabaceae)	Wildesering (Afrikaans), wild seringa (English), mpulu (Tsonga), monato (Sotho, Tswana), mufhulu (Vemba)	South Africa	Leaf maceration applied on wounds	(67,68)
Colophospermum mopane (J. Kirk ex Benth.) J. Kirk ex J. Léonard (Fabaceae)	Mopani (Afrikaans, Silozi), //gais (Ju_Hoan), //gais, tsaurahais (Khoekhoegowab), pana (Kxoe), omutati (OtjiHerero), mupanyi (Thimbukushu)	Namibia	Leaf fibre chewed and applied on circumcision wounds	(69,70)
Crossyne guttata (L.) D. Müll.-Doblies & U. Müll.-Doblies (Amaryllidaceae)	Sambreelblom (Afrikaans), April fool lily, parasol lily (English)	South Africa	Bulb powder applied topically after circumcision rites, stitches deep cuts and draws out puss	(71)
**Datura stramonium* L. (Solanaceae)	Stinkblaar (Afrikaans), stinkweed, thorn apple (English), lechoe, lethsowe (Sotho), zaba-zaba (Tsonga), ijoyi, umhlabavuthwa (Xhosa), iloqi, iloyi (Zulu)	South Africa	Leaves used as a bandage and to sooth the pain and swelling and as antiseptic after circumcision	(72)
Dichrostachys cinerea (L.) Wight & Arn. (Fabaceae)	Sekelbos (Afrikaans), bastard Acacia, sickle bush (English), lereche, moretse, mtundulu (Kigogo), olmerumuri (Maasai), moselesele (Sotho), mkingiri, msigino (Swahili), keye, moselesele (Tswana), murenzhe, muunga (Venda), ugegane, umthezane (Zulu)	South Africa and Tanzania	Bark powder applied topically on circumcision wounds	(45,73)
Drimia capensis (Burm.f.) Wijnands (Asparagaceae)	Maerman (Afrikaans)	South Africa	Bulb powder applied topically after circumcision rites, stitches deep cuts and draws out puss.	(71)
Gymnosporia heterophylla (Eckl. & Zeyh.) Loes. (Celastraceae)	Common spike-thorn bush (English), muthuthi (Kikuyu), olaimoronyai, olaimurunyai (Maasai), mdungu-mdeewe (Swahili), ekalamoran (Turkana)	Kenya	Bark, roots, stems and twigs powder applied topically after circumcision rites	(41,56)
Helichrysum appendiculatum Less. (Asteraceae)	Skaapoorbossie (Afrikaans), sheep's ears everlasting (English), senkotoana (Sotho), ibode, indlebeyemvu (Zulu)	South Africa	Fresh leaves used as antiseptic to induce fast healing after circumcision to prevent external inflammation	(57,58,74-76)

Helichrysum crispum D. Don (Asteraceae)	Hotnotskooigoed, hottentotskooigoed, hottentotskruie, kooigoed (Afrikaans), hottentot's bedding (English)	South Africa	Leaves used as a circumcision wound dressing	(40)
Helichrysum foetidum Moench (Asteraceae)	Geelsewejaartjie, muishondblaar, vleisewejaartjie (Afrikaans), stinking strawflower, stinking yellow everlasting (English), isicwe (Zulu)	South Africa	Leaves used as a circumcision wound dressing	(40,77-79)
Helichrysum longifolium DC. (Asteraceae)	Kooigoed (Afrikaans), Everlasting (English)	South Africa	Leaves used to treat circumcision wounds and as dressing after circumcision	(20,57)
Helichrysum nudifolium (L.) Less. (Asteraceae)	Hottentotsteebossie, kooigoed (Afrikaans), everlastings (English), isicwe, indlebe zebhokwe, undleni (Xhosa), icholocholo, imphepho, isidwaba-somkhovu (Zulu)	South Africa	Leaves used to treat circumcision wounds and as dressing after circumcision	(32,40,63, 64,66,80-82)
Helichrysum pedunculatum Hilliard & B.L. Burtt (Asteraceae)	Kooigoed (Afrikaans), everlastings (English), isicwe (Xhosa), imphepho (Zulu)	South Africa	Leaves used to treat circumcision wounds and as dressing after circumcision to prevent serious inflammation	(19-21,23,39,57,63,66,76, 77,81,83-88)
Lippia javanica (Burm. f.) Spreng. (Verbenaceae)	Beukesbossie, koorsbossie, lemoenbossie (Afrikaans), efurie (Chagga), fever tree, lemon bush, wild tea (English), olsinoni (Maasai), muthiriti (Kikuyu, Meru), mvuti (Swahili, Zigua), mvudi (Taita), bokhukhwane, musukudu (Tswana), inzinziniba (Xhosa), umswazi, umsuzwane (Zulu)	Kenya and South Africa	Whole plant placed on a patient's bed after the circumcision to prevent odours and freshen surrounding air	(55,89,90)
Maesa lanceolata Forssk. (Primulaceae)	Valsassegaai (Afrikaans), false assegai (English), intendekhane (Xhosa), muunguri (Venda), isidenda, ubhoqobhoqo, umagupu, umalunguzalazikhakhona, inhlavubele (Zulu)	South Africa	Leaves used for dressing circumcision wounds	(40,91)
Ptaeroxylon obliquum (Thunb.) Radlk. (Rutaceae)	Nieshout (Afrikaans), sneezewood (English), thate (Tswana), umthathi, umthote (Xhosa), mulari, munari, munukha-vhaloi (Venda), umthathe (Zulu)	South Africa	Leaves used as a bandage to sooth pain and swelling after circumcision	(92)
**Ricinus communis* L. (Euphorbiaceae)	Bloubottelboom, bosluisie, kasterolieboom (Afrikaans), castor bean, castor oil plant (English), mohlafotha, mokhura (Sotho), nhlampfura (Tswana), muplure (Venda), umhlakuva (Xhosa, Zulu)	South Africa	Leaves used as a bandage to sooth pain and swelling and as antiseptic after circumcision	(72)
Scadoxus multiflorus (Martyn) Raf. (Amaryllidaceae)	Bloedblom, gifwortel (Afrikaans), blood flower, fireball lily, katharine wheel, poison root (English), inkupulwane (Xhosa), idunjana, ubukhoswane (Zulu)	South Africa	Outer scales of the bulb and leaves used as dressing after circumcision	(21)
Searsia natalensis (Bernh. ex C. Krauss) F.A. Barkley (Anacardiaceae)	Natal karree, Natal rhus (English), muthigiyu, muthiigi (Kikuyu, Mbeere), ormisigiyioi, ormisigiyoi (Maasai), mhunguru (Sambaa, Sukuma), mkono chuma, mvunja kondo (Swahili), kitarika (Taita)	Kenya	Leaf powder applied on circumcision wounds	(39,55)
Triumfetta rhomboidea Jacq. (Tiliaceae)	Burbush, burweed, Chinese bur, diamond burbark, paroquet bur (English), mboshoko (Pare), mchokochole, mchokochore, mfyokochore (Swahili), mfungang'ombe (Zigua)	Kenya and Tanzania	Roots used for treating circumcision wounds	(43,93,94)
Vachellia nilotica (L.) P.J.H. Hurter & Mabb. (Fabaceae)	Egyptian thorn, scented-pod acacia (English), mgunga (Nyamwezi, Sukuma, Swahili), olkiloriti (Maasai)	Tanzania	Bark powder applied on circumcision wounds	(95)

Asparagaceae and Euphorbiaceae (2 species each), Amaryllidaceae and Fabaceae *sensu lato* (4 species each) and Asteraceae (6 species). The rest of the families are represented by only one species (Fig. 3).

The plant parts used for making herbal preparations used against circumcision wounds are the bark, bulbs, bulb scales, leaf fibre, leaves, roots, stems, twigs and whole plant (Fig. 4). The leaves are the most frequently used (51.0%), followed by bark and roots (9.0% each), bulbs and bulb scales (8.0% each), whole plant (6.0%), leaf fibre, stems and twigs (3.0% each) (Fig. 4). Based on literature review (19-21), *Helichrysum pedunculatum* Hilliard & B.L. Burtt, commonly known as Everlastings in English is the most popular medicinal plant used against circumcision wounds in South Africa (Fig. 5) with 18 literature citations, followed by *Boophone disticha* (L.f.) Herb. and *H. nudifolium* (L.) Less. with 11 and eight literature citations respectively.

More than half (60.7%) of the species used to treat and manage circumcision wounds are traded as herbal medicines in local, regional and international

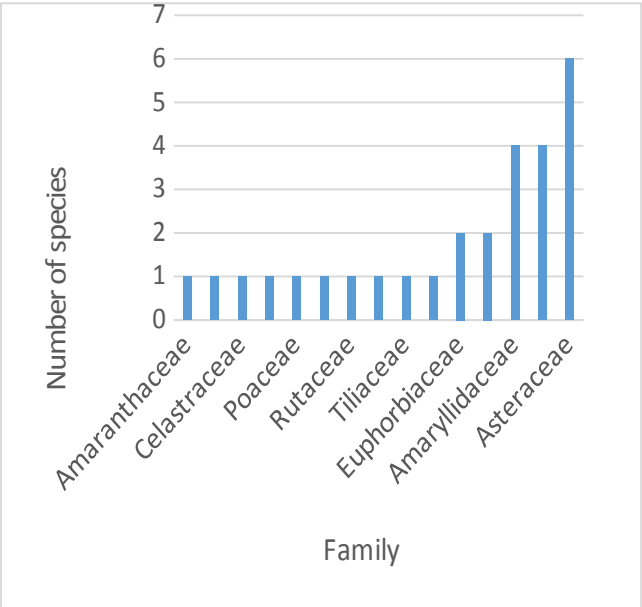

Fig. 3. The number of Eastern and Southern African plant species per family used to treat and manage circumcision wounds.

markets and these include *Achyranthes aspera* L., *Asparagus africanus* Lam., *B. disticha*, *Burkea africana* Hook., *Colophospermum mopane* (J. Kirk ex Benth.) J. Kirk ex J. Léonard, *D. stramonium*, *Dichrostachys cinerea* (L.) Wight & Arn., *Drimia capensis* (Burm.f.) Wijnands, *Gymnosporia heterophylla* (Eckl. & Zeyh.) Loes., *H. nudifolium*,

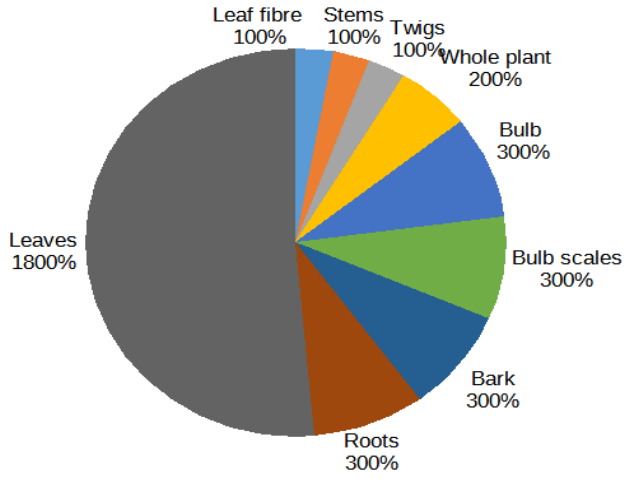

Fig. 4. Frequency of use of different Eastern and Southern African plant parts used to treat and manage circumcision wounds.

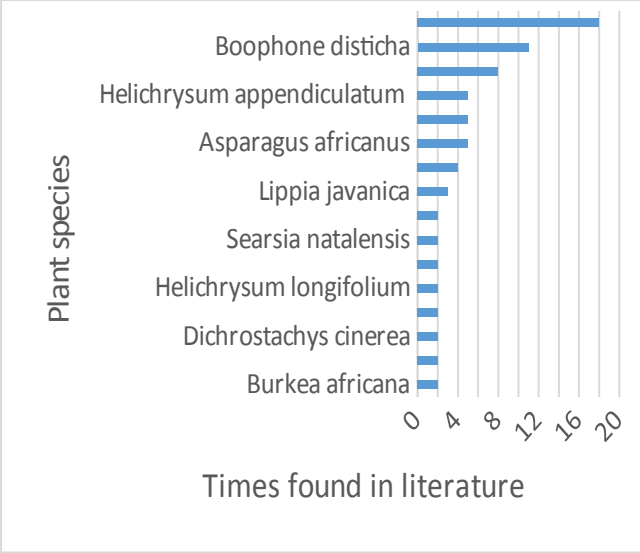

Fig. 5. Plant species used to treat and manage circumcision wounds in Eastern and Southern Africa.

Lippia javanica (Burm. f.) Spreng., *Maesa lanceolata* Forssk., *Ptaeroxylon obliquum* (Thunb.) Radlk., *R. communis*, *Searsia natalensis* (Bernh. ex C. Krauss) F.A. Barkley, *Triumfetta rhomboidea* Jacq. and *Vachellia nilotica* (L.) P.J.H. Hurter & Mabb. (Table 2). Selling of the bark, bulbs, fruits, leaves, rhizomes, roots, seed oil, stems and whole plant parts of these species in Algeria, Botswana, Burundi, Eswatini, Ethiopia, Lesotho, Malawi, Mozambique, Nigeria, Rwanda, South Africa, South Sudan, Tanzania, Zambia and Zimbabwe generates economic opportunities for vulnerable groups living in peri-urban, rural and marginalized areas (38, 96-98, 107-110). It was observed that there is an increased trade both at domestic and international levels for medicinal plants with known phytopharmaceutical, nutraceutical and cosmeceutical properties (111).

Antibacterial and anti-inflammatory activities

Many of the ethnobotanical books and primary studies published in journal articles showed that different plant parts are used to treat circumcision wounds and also used as dressing after circumcision to prevent serious inflammation (Table 1). Three quarters (75.0%) of these species including *Acalypha ornata* Hochst. ex A. Rich., *Achyranthes aspera* L., *A. africanus*, *B. distica*, *Brunsvigia grandiflora* Lindl., *B. africana*, *C. mopane*, *D. cinerea*, *D. stramonium*, *H. appendiculatum*, *H. foetidum*, *H. longifolium*, *H. nudifolium*, *H. pedunculatum*, *L. javanica*, *M. lanceolata*, *P. obliquum*, *R. communis*, *S. natalensis*, *T. rhomboidea* and *V. nilotica* have shown antibacterial and anti-inflammatory effects in a set of *in vitro* models (Supplementary Table 1). All of these species were reported to be effective against one or more bacterial pathogens and also exhibited *in vito* anti-inflammatory activities. It was argued that any medicinal plant species or natural pharmaceutical product to be classified as a good wound healing agent, it should possess antibacterial and anti-inflammatory properties among other pharmacological properties (112, 113). The wound healing process begins with the polarisation of cells towards the wound, initiation of protrusion and cell migration, which culminate in closure of the wound area (114, 115). Most of these plant species used to treat and manage circumcision appear to accelerate the wound healing process. Majority of these species have been as bandages and to sooth the pain and swelling after circumcision for a long time now and are within reasonable reach of the traditional medical practitioners (39). The remaining 25.0% are yet to be evaluated for *in vitro* antibacterial and anti-inflammatory properties. However, these species which demonstrated promising activities *in vitro*, should be re-evaluated using appropriate *in vivo* models. It is thus a future challenge to translate the basic ethnopharmacological knowledge gained from antibacterial and anti-inflammatory assays into meaningful data that can be used to further enhance Eastern and Southern African plants used against circumcision wounds.

Traditional male circumcision is an ancient and common surgical procedure in Eastern and Southern Africa

Circumcision has existed since time immemorial and is the oldest surgical procedure performed since before recorded history (15). In South Africa, traditional male circumcision ritual dates back to at least 1886 (14). Scholars distinguished three phases of the circumcision rites which include the preparation of the ritual, followed by a process of seclusion and reintegration (7, 161). In the Xhosa cultural circumcision ritual in South Africa, these three stages are clearly identifiable with the initiate (one who undergoes the cultural circumcision ritual) translocated to a temporary hut built which is isolated from the community. Here, the initiate is circumcised and stays for substantial period, during which he heals and is taught about manhood

Table 2. Eastern and Southern African plant species traded in local, regional and international markets

Plant species	Countries involved in trade	Reference(s)
Achyranthes aspera	Whole plant traded in many countries including South Africa	(38,106)
Asparagus africanus	Leaves, rhizomes, roots and stems are traded in Botswana and South Africa	(98,99,103,106)
Boophone disticha	Bulbs traded in Eswatini, Lesotho, Malawi and South Africa	(38,96,98,99,101,102,106,108,109)
Burkea africana	Bark and roots traded in tropical Africa	(105)
Colophospermum mopane	Bark and seeds traded in Namibia	(38,108)
Datura stramonium	Leaves and fruits traded in South Africa and Tanzania	(98,106,107)
Dichrostachys cinerea	Fruits and roots traded in Mozambique, South Africa, Tanzania, Zambia and Zimbabwe	(38,96,107,108)
Drimia capensis	Bulbs traded in South Africa	(106)
Gymnosporia heterophylla	Roots and thorns traded in South Africa	(101)
Helichrysum nudifolium	Leaves, roots and stems traded in South Africa	(98,101,104)
Lippia javanica	Whole plant traded in Mozambique, South Africa, Tanzania and Zimbabwe	(38,96,98,102,104,108,110)
Maesa lanceolata	Bark and roots traded in South Africa	(97,98)
Ptaeroxylon obliquum	Bark traded in South Africa	(98,100)
Ricinus communis	Cold-pressed oil and fruits traded in Burundi, Ethiopia, Mozambique, Nigeria, Rwanda and South Africa	(38,96)
Searsia natalensis	Roots traded in Tanzania	(110)
Triumfetta rhomboidea	Roots traded in South Africa	(98)
Vachellia nilotica	Bark, leaves and roots traded in Algeria, Mozambique, South Sudan and Tanzania	(38,96,108,110)

according to the Xhosa tradition. The initiate is welcomed back to the community and the ritual concludes with a celebration of his newly acquired manhood (7). In some ethnic communities in Kenya, South Africa and Tanzania, the ritual is an integral part to many black customs and cultures (2, 8, 14, 162, 163). Circumcision is often associated with factors such as masculinity, social cohesion with boys of the same age being circumcised at the same time, self-identity and spirituality (164). Traditional male circumcision also aims at imparting strength and bravery since anaesthetics are not used, therefore, it is expected that during the act of circumcision, the initiate is expected to show that he is not feeling any pain (165). The educational sessions carried out during the ritual are aimed at disseminating traditional knowledge to the initiates, and therefore, passage of ethnic traditions to succeeding generations. Some scholars are of the view that traditional male circumcision rituals have a purpose of moulding individuals into productive and community oriented adults by guiding young people through the important stages of life (166, 167). It is only after circumcision that the boy can marry, own property and speak in public gatherings (4, 6, 7, 14, 168, 169).

In Eastern and Southern Africa, male circumcision appears to be a common practice for a variety of reasons ranging from being an initiation ritual into adulthood, the belief that it enhances sexual pleasure to claims that it lowers the risk of HIV infection, prevents penile and cervical cancer and lowers the risk of urinary tract infection (4, 170, 171). Studies conducted in sub-Saharan Africa show that there is high acceptability of medical circumcision even among the traditionally non-circumcising communities for health and hygiene reasons (163, 172-175). Factors associated with the increase of medical circumcision practices amongst the traditionally non-circumcising communities include education, personal health and hygiene, religion and ethnic mixing (172). However, among the Xhosa people in South Africa, traditional circumcision is more highly valued than medical circumcision for reasons of cultural meaning and identity (7, 168, 169). Similar research carried out in Tanzania, revealed that traditional male circumcision is important to the social organisation and cultural identity of Kurya clans (2). According to an observation (176), traditional male circumcision is a holistic concept characterized by multiple and interconnected dimensions such as religious, spiritual, social, biomedical, aesthetic and cultural. Literature studies revealed that there is increasing demand for male circumcision in Eastern and Southern Africa and future expansion of circumcision services must be embedded within safe, affordable male circumcision procedures, socio-cultural and medical determinants of circumcision.

Conclusion

This review highlights some Eastern and Southern African plant species that are widely used to treat and manage circumcision wounds. The documented plant species are therefore, an important aspect of the daily lives of many people and an important part of the Eastern and Southern African cultural heritage. The documented plant species are part of the indigenous or traditional pharmacopoeia which have ancient origins. Studies have reported that some of the species used against circumcision wounds exhibited antibacterial and anti-inflammatory properties *in vitro* which are the main mechanisms contributing to wound healing. However, further studies are needed such as isolation of phytochemical compounds, *in vivo* activities, clinical and toxicological studies to evaluate the suitability of these plant species for therapeutic use. Therefore, there is a need to subject these plant species to

clinical studies aimed at corroborating the wound healing properties associated with management of circumcision wounds.

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Conflict of interests

The author declares no conflict of interest.

Supplementary files

Table 1. Antibacterial and anti-inflammatory activities of Eastern and Southern African plants.

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