





Identification of medicinal plants used for chronic kidney disease: An update of reported literature in South Africa

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Background: Chronic kidney disease (CKD) is a debilitating condition that is becoming more common around the world, as well as a financial and social burden on healthcare systems. If not treated with kidney replacement therapies, kidney failure, the final stage of CKD, can be fatal. Chronic kidney disease patients are now seeking the use of alternative remedies, including medicinal plants, as the primary source of healthcare.

Aim: This review aimed to evaluate the use of medicinal plants in the treatment of CKD and other associated kidney diseases in South Africa.

Method: This article summarises previous research (2010–2021) on the impact of traditional plant-based medicine in CKD treatment and identifies the context between traditional and conventional medicines. Various scientific databases were used to source key literature.

Results: The findings of this study revealed 10 medicinal plant species from nine different botanical families that are commonly used for the treatment of CKD and other kidney-related diseases in South Africa. In addition, the study demonstrated that despite medicinal plants having toxic impacts, they were still the preferred choice of medication for CKD, especially in developing countries.

Conclusion: It is crucial to validate the balance between the risks and benefits of medicinal plants in CKD treatment to further enhance the credibility of medical plants in drug development.

Contribution: This study contributes to the existing knowledge of medicinal plants used in CKD treatment primarily in South Africa.

Keywords: medicinal plants; chronic kidney disease; traditional medicine; conventional medicine; renal therapies.

Introduction

Over the last two decades, there has been significant global population growth, ageing and an accelerated rate of epidemiologic transition, with lower communicable disease mortality and an increased burden of noncommunicable diseases (Piret & Boivin 2021). Chronic kidney disease (CKD), a well-known health problem worldwide (Herrera-Añazco et al. 2019), is a debilitating condition that is becoming more common around the world, as well as a financial and social burden on healthcare systems in developed and developing countries (Khan et al. 2022). Diabetes and hypertension are widely regarded as the two leading causes of CKD disease (Zhao et al. 2021). Although statistics vary by country, the prevalence of this disease has recently increased from year to year (Khan et al. 2022). Chronic kidney disease rates rise rapidly with age, with prevalence in those aged 75 years and up being twice as high as those aged 65–74 years, and nearly seven times higher than those aged 18–54 years (42%, 21% and 6%, respectively). The prevalence of CKD is generally higher in lower socio-economic groups (14% vs. 8% in higher socio-economic groups) (Khan et al. 2022). Indigenous populations are frequently at a higher risk of CKD than nonindigenous populations because of their limited access to hospitals and healthcare centres (Herrera-Añazco et al. 2019; Khan et al. 2022). Current therapies using commercially available drugs only delay the progression of CKD, ultimately creating a financial burden on healthcare systems and an expectation of a rise in hospitalisations and treatments. Therefore, poorer countries

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and disadvantaged people have adopted the use of medicinal plants as a major source of CKD treatment.

Medicinal plants have been recognised as potential drug candidates because they possess drug-like properties (Shakya 2016). The term 'medicinal plants' refers to a variety of plants used in herbalism, some of which have medicinal properties. These medicinal plants are regarded as a rich source of phytocompounds for drug development and synthesis. Furthermore, these plants play an important role in the development of human cultures all over the world (Mothibe & Sibanda 2019). Many patients, particularly in developing countries, continue to seek both traditional and allopathic treatments. People are increasingly turning to traditional medicine for a variety of reasons, including high costs of contemporary medicines, a lack of proper treatment options and allopathic treatment side effects that are frequently unpleasant and/or serious (Xego, Kambizi & Nchu 2021). A wide variety of medicinal plants are used in South African traditional medicine to treat CKD. This article focuses on the potential of South African traditional medicine and medicinal flora to supplement conventional medicine in the treatment of CKD for future research and development.

Methods

This article summarised previous research (2010–2022) on the impact of traditional herbal medicine in CKD management and generated a list of some species that have traditionally been used in South Africa to manage and treat CKD.

Review findings

Conventional medicines in South Africa

South Africa's primary healthcare system is based on conventional medicine (Western, orthodox, allopathic or modern medicine) (Mothibe & Sibanda 2019). Conventional medicine is entirely based on biochemical reactions that occur within the body (Xego et al. 2021). Although conventional medicine is mostly used as a first line of defence for human ailments, it is often not a preferred choice by indigenous people (Mothibe & Sibanda 2019). Xego et al. (2021) highlighted the shortfalls in conventional medicine in South Africa and further emphasised the lack of proper healthcare facilities in rural areas being a driving force in deaths from treatable diseases. While there is no cure for CKD, there are prescribed treatments to help relieve symptoms and prevent it from getting worse. Lifestyle changes, preferably a healthy lifestyle and drugs used to control associated problems such as high blood pressure and high cholesterol, are often the initial prescribed treatment for kidney disease (Khan et al. 2022). Treatment with agents such as an angiotensin-converting enzyme inhibitor (ACEI) and angiotensin receptor blocker (ARB) remains the mainstay for retarding the progression towards end-stage renal disease (CKD5) (Zhao et al. 2021). Many studies have shown that despite treatment with ACEIs and ARBs, there is incomplete blockade of the renin-angiotensin cascade, as evidenced by persistent or increasing plasma aldosterone levels. This

phenomenon is known as 'aldosterone escape', and it is thought to be one of the primary causes of CKD progression (Lu, Ku & Campese 2010; Romagnani et al. 2017; Zhao et al. 2021). For a small proportion of people with CKD, the kidneys will eventually stop functioning. Therefore, as the disease gradually progresses, dialysis, which is known to replicate some of the kidney functions, is required to remove the waste products and excessive fluid from the blood (Vadakedath & Kandi 2017). According to Vadakedath and Kandi 2017, there are two main types of dialysis:

- Haemodialysis: Blood is diverted into an external machine, where it is filtered before being returned to the body. This is usually carried out three times per day at a hospital or at home.
- Peritoneal dialysis: This entails pumping dialysis fluid into a space inside the stomach to draw waste products from the blood as it passes through vessels lining the inside of the stomach. This process is often done at home several times a day or overnight.

Dialysis is often a lifelong treatment, especially if the patient has not received a kidney transplant. A kidney transplant is the most effective treatment for advanced kidney disease, but it requires major surgery and the use of medications (immunosuppressants) for the rest of one's life to prevent the body from attacking the donor organ (Vadakedath & Kandi 2017). However, there is still a donor shortage; an individual could wait months or years for a transplant. In developing countries, proper healthcare facilities and cost-effective treatment measures are often a challenge. Unfortunately, the African continent remains unable to deal with the ongoing CKD scourge because of a lack of resources, among other factors. In South Africa, the difficulties that poor and marginalised rural communities face in accessing healthcare cannot be overstated (Mothibe & Sibanda 2019). In addition, conventional treatments often have harsh side effects. Therefore, most underprivileged communities are seeking the use of medicinal plants as a more effective, easily accessible and safer treatment option (Khan et al. 2022).

Traditional medicines in South Africa

It has become clear in recent decades that there is a plethora of plants with medicinal potentials, and it is increasingly being accepted that medicinal plants may offer potential template molecules in the drug discovery process (Suntar et al. 2020). Traditional medicine is also known as phytomedicine, folk medicine, ethnomedicine and alternative medicine, and it is increasingly becoming one of the most important aspects of speedily flourishing global commercial health enterprise (Djordjevic 2017). Recognition of plant-based medicines is gaining momentum in most countries. From 1960 to 2019, more than 110 000 studies related to medicinal plants have been published, emphasising a list of over 70 000 medicinal plants (Ghirga et al. 2021). The safety and efficacy of traditional medicines are increasing and becoming a more preferred choice over conventional medicine, as plants are easily accessible and a cheaper alternative (Mothibe & Sibanda 2019). Based on estimates by

the World Health Organization (2013), 80% of the world's population rely on plant-based medicines. The use of plants as medicinal remedies remains an integral and important part of the people's traditions and culture in South Africa, and this is expected to continue in the near future (Ayele 2018; Mothibe & Sibanda 2019; Xego et al. 2022). To corroborate this point, traditional medicine has been found to be highly concentrated in rural areas because of the rural population's preference for traditional ways of life such as health maintenance, as well as the prevention, diagnosis, treatment and improvement of physical and mental illness (Xego et al. 2022). However, the situation has changed in the 21st century, with traditional healthcare overlapping with conventional medicine. The report of Mothibe and Sibanda (2019) indicated that the affordability and accessibility of medicinal plants are the major driving forces for their exploration. Interestingly, although current advancements in modern medicine have provided remarkable outcomes in the treatment of various human ailments, many people in rural areas still depend on traditional medicine for their primary healthcare needs (Ayele 2018). New drug discoveries and syntheses of new and novel formulations are based on herbal medicines, as plants possess an array of bioactive compounds that have many pharmacological properties (Süntar 2020). Despite the success of drug development using medicinal plants over the past three decades, future endeavours face many challenges. The quality of the plant-based product is questionable (Shakya 2016). Plants can easily be contaminated during harvesting and processing. Heavy metal contamination is one of the major problems encountered in plant-based products (Shakya 2016). Therefore, it is of

paramount importance to improve the quantity and quality of plant-based products.

Use of medicinal plants in chronic kidney disease therapy

Until the 18th century, the therapeutic properties of many plants, their effect on human ailments and their method of treatment were known, but the bioactive compounds were unknown (Falaro & Tekle 2020). Plant bioactive compounds (phytocompounds) are known as the 'key' factor in the medicinal properties of plants (Falaro & Tekle 2020). Many human diseases, including cardiovascular disease, hepatorenal disease, diabetes, cancer and neurodegenerative disorders, have been reduced by phytocompounds (Shakya 2016). By use of traditional medicinal plants, several African plants have found their way to modern medicine. Medicinal plants date back centuries and have been an important source and component of modern drugs developed using cutting-edge scientific techniques (Majolo et al. 2019). It is estimated that 700 000 tonnes of plant materials are used in South Africa each year to produce herbal therapeutics worth 1.2–2.5 billion rands (Cock, Mavuso & Van Vuuren 2021).

Ethnomedicinal information of South African plants used in the treatment of CKD and associated ailments is shown in Table 1. A total of 10 species belonging to nine botanical families are used to treat CKD and related kidney ailments in South Africa, as documented between 2015 and 2020. A comprehensive review by Cock et al. (2021) revealed over 100 plant species used for the treatment of kidney, bladder and urinary tract ailments. Their findings show that the usage of

TABLE 1: Medicinal plants recommended for chronic kidney disease treatment and associated diseases in South Africa.

Scientific name	Family	Common name(s)	Plant part(s)	Usage	Therapeutic effect	References
Aloe vera and A. ferox	Xanthorrhoeaceae	Cape aloes	Gel, leaves, rind, stem	Gel extracts or decoctions	Kidney inefficiency	Christaki and Florou-Paneri, 2010; Nalimu et al. 2021
Lessertia frutescens	Fabaceae	Sutherlandia, cancer bush, turkey flower, balloon pea (English); <i>umnwele</i> , <i>unwele</i> (isiXhosa and isiZulu); <i>kankerbossie</i> , <i>blaasbossie</i> , <i>blaas-ertjie</i> , <i>eendjies</i> , <i>gansiekeurtjie</i> , <i>klappers</i> , <i>hoenderbelletjie</i> (Afrikaans); <i>phetola</i> , <i>mokakana</i> (Setswana); <i>lerumo-lamadi</i> (Sepedi); <i>musa-pelo</i> , <i>motlepele</i> (Sesotho)	Leaves and young stems	Decoctions	Kidney ailments	Aboyad et al. 2013
Harpagophytum procumbens	Pedaliaceae	Devil's claw (English); <i>sengaparile</i> (Setswana)	Root or tuber	Decoctions	Kidney and bladder disorders	Brendler 2021
Hypoxis hemerocallidea	Hypoxidaceae	African potato (English); <i>sterretjie</i> , <i>afrika-patat</i> (Afrikaans); <i>inkomfe</i> , <i>ilabatheka</i> (isiZulu); <i>inongwe</i> (isiXhosa); <i>moli kharatsa</i> , <i>lotsane</i> (Sesotho)	Tuber, leaves, bulbs	Decoctions	Urinary tract and kidney infections	Matyanga et al. 2020
Eucomis autumnalis	Hyacinthaceae	Pineapple flower, pineapple lily (English); <i>wildepynappele</i> , <i>krulkoppie</i> (Afrikaans); <i>umathunga</i> (isiZulu)	Bulb	Decoctions	Urinary tract and kidney infections	Alaribe et al. 2018
Plumbago auriculata	Plumbaginaceae	Cape leadwort, Blue plumbago, <i>blousyselbos</i> (Afrikaans); <i>umabophe</i> (isiXhosa and isiZulu); <i>umasheleshele</i> (isiZulu)	Leaves, stems	Decoctions	Kidney disease and urinary tract infections	Singh et al. 2018
Agathosma betulina	Rutaceae	<i>Buchu</i> (English); <i>boegoe</i> (Afrikaans); <i>bocho</i> (Sotho)	Leaves	Decoctions	Kidney ailments	Van Wyk and Gorelik 2017
A. capensis	Rutaceae	Spicy <i>buchu</i> (English); <i>anysoegoe</i> , <i>steenbokboegoe</i> (Afrikaans)	Leaves	Decoctions	Urinary and kidney ailments	Hulley and Van Wyk 2017
Solanum aculeastrum	Solanaceae	Soda apple, soda apple nightshade, goat apple, poison apple, bitter apple, <i>Gifappel</i> (Afrikaans); <i>umthuma</i> , <i>untumane</i> (isiZulu)	Fruit	Decoctions	Urinary tract infections and kidney ailments	Mhlongo and Van Wyk 2019

Note: Please see the full reference list of Govender, S., Singh, K., Coopposamy, R.M. & Adam, J., 2023, 'Identification of medicinal plants used for chronic kidney disease: An update of reported literature in South Africa', *Journal of Medicinal Plants for Economic Development* 7(1), a182. <https://doi.org/10.4102/jomped.v7i1.182> the article for more information.

medicinal plants for kidney and associated ailments dates to 1923. These records put into perspective the extraordinary value of medicinal plants against human ailments. Roots, stems, leaves, bulbs and gel exudates of plant species were administered as decoctions by local traditional communities. The results of their study revealed that decoctions made with medicinal plants were the common form of consumption. Decoctions are made by boiling desired plant parts in water, and the plant material used is frequently not weighed or measured. In some cases, administering the incorrect dosage can result in toxicity.

The ability of medicinal plants to boost the body's natural antioxidant defence mechanisms is often responsible for their beneficial effect on kidney disease (Khan et al. 2022). Previous studies conducted in patients with CKD in Tanzania, Peru and China found frequent use of medicinal plants (Herrera-Añazco et al. 2019; Stanifer et al. 2015; Wu et al. 2021). However, the characteristics of their use could be different in the South African population because of cultural differences between the countries. A brief description of plants utilised for CKD in South Africa follows.

Aloe vera Linn. (Figure 1a) and Aloe ferox Mill. (Figure 1b)

These species belong to the family Xanthorrhoeaceae. *Aloe vera* is widely distributed in tropical and subtropical regions, and *Aloe ferox* is indigenous to South Africa (Christaki & Florou-Paneri 2010; Nalimu et al. 2021). Both are succulent species in the *Aloe* genus and are often harvested for commercial products. While *A. vera* is the most utilised species, both species have pharmacological properties against various human ailments, such as antidiabetic, anti-inflammatory, antioxidant, respiratory disorders, antimicrobial and antiviral properties (Christaki & Florou-Paneri 2010; Nalimu et al. 2021). Furthermore, both plant species are also used in many consumer products, including beverages, skin lotion, cosmetics, ointments or gels for minor burns and sunburns (Christaki & Florou-Paneri 2010; Nalimu et al. 2021).

Lessertia frutescens (syn. Sutherlandia frutescens) (L.) Goldblatt & J.C. Manning (Figure 1c)

Belonging to the Fabaceae family, *Lessertia frutescens* is a long-used medicinal and ornamental plant (The Plant List 2022). This species is found in the dry parts of southern Africa, including the Western Cape and up the west coast as far north as Namibia and into Botswana, as well as the western Karoo and the Eastern Cape (Lei et al. 2015). It is also found in Mpumalanga and KwaZulu-Natal. It has a wide range of variations within its distribution. The common name 'cancer bush' derives from its reputation as a cancer cure. *L. frutescens* is also used as a therapeutic to treat heartburn, gastrointestinal disorders, backache, diabetes, inflammation, kidney disease, emotional stress and liver problems (Lei et al. 2015).

Harpagophytum procumbens (Burch.) DC ex Meisn. (Figure 1d)

This species is commonly known as devil's claw in the family Pedaliaceae; it is one of the chief medicinal plants in southern Africa (Brendler 2021). It is widely distributed in North West,

the Free State region and the Northern Cape. Devil's claw is a miracle cure-all, but only whole extracts, not isolated parts, have therapeutic properties such as being useful for kidney and bladder disorders, as well as anti-arrhythmic, antibacterial, anti-inflammatory, antirheumatic, diuretic, hypotensive, laxative, purgative, sedative and bitter tonic properties (Brendler 2021).

Hypoxis hemerocallidea Fisch., C.A. Mey. & Avé-Lall. (Figure 1e)

Hailed as a 'miracle muti' and 'wonder potato', this species is in the family Hypoxidaceae. *Hypoxis hemerocallidea* is distributed in KwaZulu-Natal, the Free State, the Eastern Cape, North West, Limpopo, Gauteng and Mpumalanga, where it is used for its many medicinal benefits (Matyanga et al. 2020). These include its use as a laxative and to expel intestinal worms; it is used to treat prostate hypertrophy, urinary tract infections and testicular tumours (Matyanga et al. 2020). The plant is also used to treat anxiety, palpitations, depression and rheumatoid arthritis. Although the plant derivatives are sold in many multimarkets, the raw products can be toxic and need to be administered with caution (Matyanga et al. 2020).

Eucomis autumnalis (Mill.) Chitt. (Figure 1f)

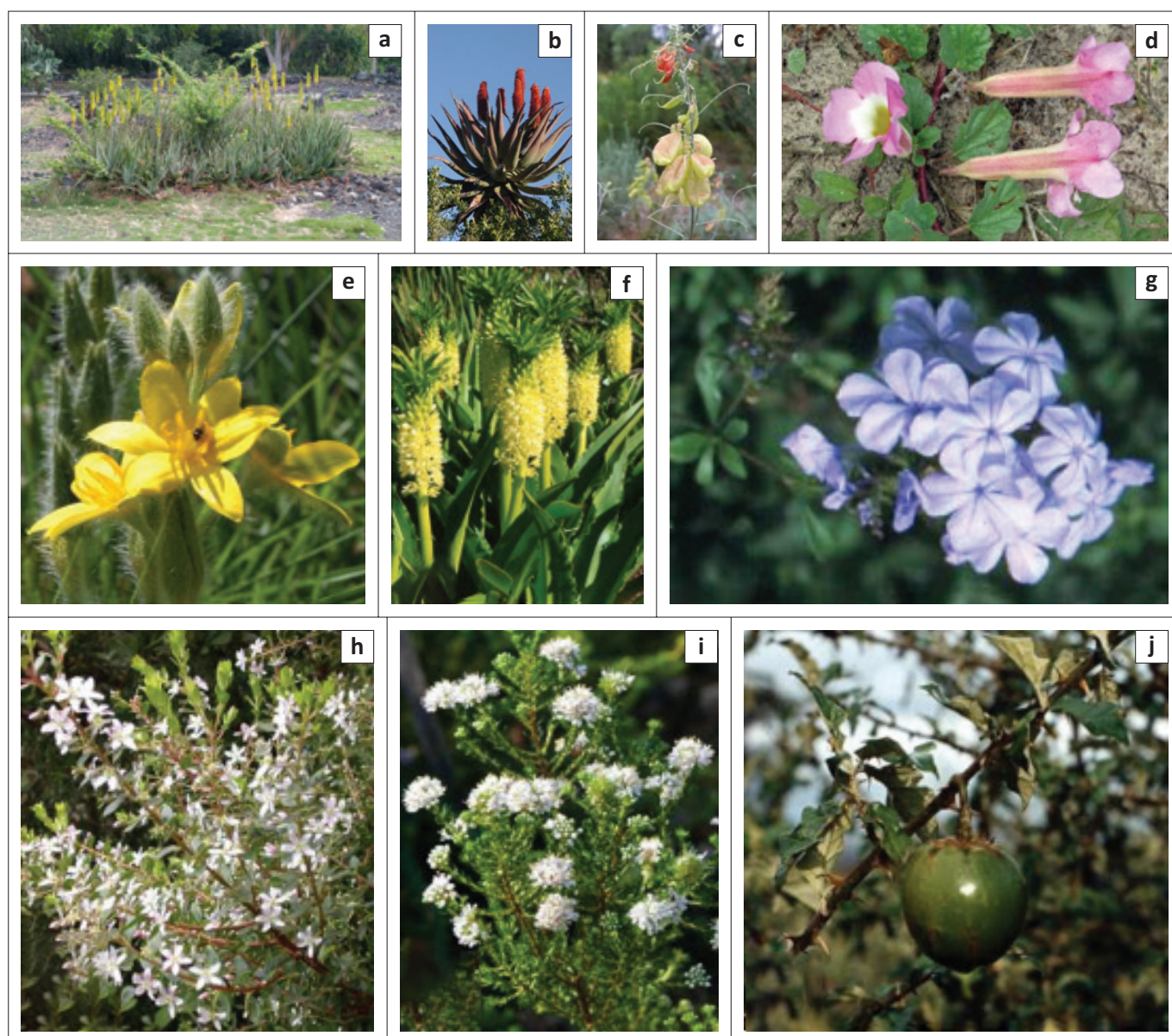
Commonly known as the 'pineapple flower', this species, belonging to the family Hyacinthaceae are distributed in open grasslands and forest margins in Limpopo, the Eastern Cape, KwaZulu-Natal, Zimbabwe and Malawi (Alaribe et al. 2018). *Eucomis autumnalis* is used medicinally in South Africa even though the bulb is toxic. Decoctions are also used to treat urinary diseases, stomach aches, fevers, colic, diabetes, inflammation, viral and bacterial infections, flatulence, hangovers and syphilis, as well as to aid in childbirth (Alaribe et al. 2018).

Plumbago auriculata Lam. (Figure 1g)

Common in South Africa, *Plumbago auriculata*, in the family Plumbaginaceae, is distributed in KwaZulu-Natal, the Southern and Eastern Cape, the Free State, Gauteng and North West provinces (Singh et al. 2018). This species is used traditionally to treat various human illnesses including diabetes, cardiovascular disease, kidney infections, gastrointestinal disorders, respiratory disorders, warts, skin disease, wounds, cancer therapy, microbial infections and inflammation (Singh et al. 2018). Plumbagin, also known as the *Plumbago* genus' marker compound, is toxic (Singh, Naidoo & Baijnath 2018). Therefore, the use of the plant for medicinal purposes needs to be administered cautiously.

Agathosma betulina (L.) Pillans (Figure 1h)

Agathosma betulina is a flowering plant in the Rutaceae family native to western South Africa's lower-elevation mountains, where it grows near streams in fynbos habitats (Van Wyk & Gorelik 2017). *Buchu* is a part of the Khoi and San people's cultural heritage, and they used the dried and powdered leaves mixed with sheep fat to anoint their bodies. To alleviate



Source: The Plant List, 2022, viewed 10 September 2022 from <http://www.theplantlist.org/> and iNaturalist, 2022, viewed 10 September 2022 from <https://www.inaturalist.org/home>.

FIGURE 1: Medicinal plants used in chronic kidney disease treatment in South Africa: (a) *Aloe vera*; (b) *A. ferox*; (c) *Lessertia frutescens*; (d) *Harpagophytum procumbens*; (e) *Hypoxis hemerocallidea*; (f) *Eucomis autumnalis*; (g) *Plumbago auriculata*; (h) *Agathosma betulina*; (i) *A. capensis*; (j) *Solanum aculeastrum*.

stomach discomfort, the leaves were also chewed. *A. betulina* leaves steeped in vinegar or brandy were an important part of the early Cape colonists' medicine cabinet (Van Wyk & Gorelik 2017). They used it to treat stomach problems, worms, indigestion, kidney and bladder problems, among other things (Van Wyk & Gorelik 2017).

Agathosma capensis (L.) Dummer (Figure 1i)

Like *A. betulina*, this species is also part of the Rutaceae family and distributed in Western Cape, Eastern Cape and Northern Cape (Hulley & Van Wyk 2017). The common characteristic of the Rutaceae (*buchu*) family is the presence of translucent cavities (glands) containing aromatic oils found on the leaves and fruit. The medical properties of *A. capensis* are the same as *A. betulina*. However, *A. betulina* was the preferred choice for medicinal use in the Rutaceae family (Hulley & Van Wyk 2017).

Solanum aculeastrum Dunal. (Figure 1j)

Soda apple, goat apple, poison apple or, more ambiguously, 'bitter-apple' are all names for *Solanum aculeastrum*. It is a poisonous nightshade species native to Africa that is unrelated to true apples (Mhlongo & Van Wyk 2019). Belonging to the family Solanaceae, *S. aculeastrum*'s extremely bitter fruit is used medicinally (fresh, boiled or burned) in a variety of ways for humans and domestic animals. The poisonous alkaloid, solanine, is found in both mature and immature fruits and hence needs to be administered with caution (Mhlongo & Van Wyk 2019).

Herbal medicine toxicity and kidney injury

Herbal remedies' nephrotoxic potential is becoming more widely recognised. Causality is suspected when there is a temporal relationship between the ingestion of an agent and

the injury. Herbal toxicity can develop in any of the following situations (Jha 2010):

- Consumption of a plant with unknown toxicity.
- Incorrect identification leading to the substitution of a nontoxic plant with a toxic one.
- Contamination with nephrotoxic nonherbal drugs (e.g. nonsteroidal anti-inflammatory agents), pesticides or chemicals (e.g. heavy metal contamination from soil or water) can occur intentionally or inadvertently.
- Enhancing the toxic effect of a conventional drug because of interaction with a compound(s) present in the medicinal plant.
- Consumption of meat from an animal that has grazed on a toxic or poisonous plant.

As the kidneys are the main route of excretion from the body, renal involvement with the use of medicinal plants can take several forms, such as tubular function defects, CKD, acute kidney injury, renal papillary necrosis, urolithiasis and urothelial cancer and systemic hypertension (Jha 2010). Furthermore, patients with existing CKD can develop complications because of prolonged use of herbal medicines. Jha (2010) has provided a compelling report on the impact of certain plant species on CKD, but the precise mechanism of renal injury was unknown. His study further highlighted that nephrotoxicity is a direct effect of aristolochic acid, which is found in most leaves, stems, fruits and roots of certain plant species such as plants in the genera *Aristolochia* and *Asarum*. However, the exact mechanism of nephrotoxicity remains unknown. Although the nephrotoxicity of some Chinese medicinal plants containing aristolochic acid is well known, other nephrotoxic elements in medicinal plants have been identified, including oxalic acid, djenkolic acid and arabinogalactans (Herrera-Añazco et al. 2019). Nevertheless, medicinal plants are not screened for the presence of these toxic substances prior to administration, especially when administered by a traditional practitioner (Xego et al. 2021).

The limited information provided in the previous investigation reveals that not all medicinal plants are toxic as CKD treatment. This was further emphasised by Stanifer et al. (2015), who reported the use of medicinal plants for CKD in Tanzania. In their study, most of the participants were from urban areas and were above 45 years old, with underlying conditions such as diabetes, heart disease, hypertension and HIV. Their findings showed that 70% of the participants made use of traditional medicine for CKD, while the remaining 30% used a combination of traditional and conventional medicine. Patients did exhibit adverse side effects such as increased bleeding risk, diarrhoea, nephrotoxicity and hepatotoxicity from the use of medicinal plants; however, their findings agreed that not all medicinal plants are toxic, as CKD treatment and nephrotoxicity are dose dependent. As with most medication (traditional or conventional), the higher the recommended dosage, the greater the risk of side effects. Therefore, traditional medication needs to be administered cautiously.

This coincides with a more recent study by Herrera-Añazco et al. (2019) on the use of medicinal plants to treat CKD in Peru. They reported that more than 50% of their CKD patients preferred the use of medicinal plants as a source of treatment, as they found it to be less harmful than typical CKD drugs. Patients also divulged that they stopped using their prescribed conventional medication to switch over to traditional medicine.

In another study, Wu et al. (2021) reported on the use of Chinese traditional medicine (CTM) as CKD treatment. The findings of their study revealed that the administering of CTM in a clinical practice had beneficial effects on CKD, which included slowing down disease progression, improving patients' clinical symptoms, reducing certain complications, lower risk of mortality, improving overall health and delaying the onset of dialysis and kidney transplantation. However, there is still a lack of high-quality evidence-based research that supports the use of medicinal plants for CKD treatment. Most of the medicinal plants recommended by traditional practitioners have not been investigated in animal and human models of renal stones, which provides a new area of research. They can be refined and processed to produce natural drugs in terms of safety and effectiveness.

Interactions between herbal medicines and Western medicines

Although a sizeable number of CKD patients use both traditional and conventional medicine, reports indicate that a greater number of these patients use traditional herbal medicines after diagnosis (Zhao et al. 2021; Khan et al. 2022). According to studies (2015–2021), CKD patients use traditional medicine alone or in conjunction with conventional medicine (Zhao et al. 2021). Current therapies using commercially available drugs, such as ACEIs, angiotensin II receptor blockers and calcium channel blockers, generally only delay the progression of CKD (Wu et al. 2021). Therefore, conventional doctors rely on plant-based medicines as a supplementary option to conventional medicine for an array of human ailments (Xego et al. 2021). Many studies have aimed to evaluate the synergistic effect of traditional medicine and conventional medicine. Zhao et al. (2021), demonstrated that Chinese herbal medicines as an adjuvant to conventional medicines may benefit patients with CKD. In addition, the plant species listed in their study also displayed a renoprotective role in various ways rather than a single target such as anti-inflammatory, antioxidative, anti-apoptotic, antifibrotic and antidiabetic. Furthermore, when compared with conventional medicine, treatment with Chinese medicine combined with conventional medicine resulted in a significantly lower risk of dialysis.

Despite most traditional medicines needing to be thoroughly investigated and scientifically validated, integrating traditional and conventional medicine has the potential to play a major role in the healthcare delivery system of South Africa and other developing countries.

Conclusion

Chronic kidney disease has a significant health impact on the South African population and is predicted to increase over the years. Modern healthcare systems have become a challenge in South Africa as the majority of the underprivileged find it difficult to access conventional medicine, and it is often too expensive. Many patients seek out traditional plant-based medicine as their primary healthcare.

The development and use of medicinal plants as phytomedicine against various human ailments have a very long historical background. Plants are easily accessible and are often a cheaper option than conventional drugs. The biologically active compounds found within these plants are the major source of the plant's medicinal properties. This review highlighted the use of medicinal plants used to treat CKD in South Africa. Traditional medicine has become a preferred choice of treatment for most patients in rural and urban areas.

Although some previous research has suggested that certain medicinal plants have beneficial effects in patients with CKD (such as slowing disease progression with traditional medicine), these studies also acknowledge the potentially toxic effects of medicinal plants. As a result, while the use of medicinal plants may be promising, a fair balance of risks and benefits is yet to be established. This is important because, in the South African population, one out of every three CKD patients discontinues conventional medicine in order to use medicinal plants. Therefore, better screening methods for plants and other natural sources are required to advance research for the development and characterisation of new natural drugs.

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Data availability

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Disclaimer

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