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The role of phytomedicine: Bridging the gap between the past, present, and future

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Background: Over the last two decades, medical healthcare has increased at an exponential rate. The discovery of new infectious diseases and the development of conventional new drugs have increased the health sector's reliance on alternative remedies such as holistic healing, Chinese traditional medicines, African traditional medicines, and Ayurvedic medicines. These traditional remedies have been around since time immemorial.

Aim: This study reviewed literature and discussed the historical role of phytomedicine in the development of synthetic treatments, the current state of phytomedicine research, and the future implication of such research.

Setting: This review provides a world overview of the use of phytomedicine.

Method: This paper summarises previous research on the use of phytomedicine as a source of healthcare over decades using scientific internet databases.

Results: Medicinal plants are heavily exploited for the therapeutic properties. Over the years, plants displayed a phenomenal benefit to human health problems worldwide. Advancement in plant research to combat multiple human ailments has drastically increased from the past to the present. Currently, researchers are using a computational platform to evaluate the potential of plant bioactive compounds towards novel, effective, and affordable drug development candidates to gain a better understanding of drug interactions with the body's biochemical pathways.

Conclusion: Medicinal plants are still important in global healthcare systems. Literature reveals that there is a resurgence of interest in plant-based medicines for the prevention and treatment of a variety of human ailments.

Contribution: This study contributes to the existing knowledge on the remarkable use of phytomedicine in modern times.

Keywords: medicinal plants; bioactive compounds; nanotechnology; traditional medicine; phytomedicine.

Introduction

Over the years, global population growth, aging, and an accelerated rate of epidemiologic transition have resulted in lower communicable disease mortality and an increased burden of non-communicable diseases (Piret & Boivin 2021). Emerging infectious diseases (EIDs) pose a significant economic and public health burden (Piret & Boivin 2021; Sohail et al. 2021). Their emergence is thought to have been primarily influenced by socioeconomic, environmental, and ecological factors. Developing, non-developed, and vulnerable countries are experiencing severe humanitarian disasters, and the declining economies of some developed countries have resulted in collapsed healthcare facilities. As a result, an increasing number of people are opting for a more traditional approach to meet some of their primary healthcare needs (Xego, Kambizi & Nchu 2021).

In recent years, the traditional knowledge associated with medicinal plants is gaining importance worldwide. This can be attributed to the emergence of new infectious diseases (Mothibe & Sibanda 2019). Recently coronavirus disease manifested itself in Wuhan, China, as unexplained pneumonia. The disease quickly became a pandemic and was called coronavirus disease 2019 (COVID-19) (Lim, Teh & Tan 2021; Piret & Boivin 2021). The International Committee on Virus Taxonomy has named the causative virus SARS-CoV-2 (Sohail et al. 2021). Pharmaceutical companies and researchers have been competing to develop a cure. Phytotherapy and phytomedicines have been recognised as effective immunity boosters with the potential to eliminate viral infection (Lim et al. 2021). Many medicinal compounds have been derived from

plant secondary metabolites such as alkaloids, flavonoids, phenolic acids, and terpenoids (Lim et al. 2021). For example, the well-known antimalarial chloroquine phosphate (analogue of quinine derived from the bark of the *Cinchona* tree) has broad-spectrum antiviral activity. Antiviral phytomedicines were already used in the previous two coronavirus studies (Lim et al. 2021).

Phytomedicine also referred to as 'alternate medicine' are mixtures of plant metabolites containing pharmacologically active compounds that exhibit therapeutic properties (Rashid et al. 2021). Plant parts utilised for phytomedicines are: roots, tubers, stems, barks, leaves, herbs, flowers, fruits, exudates, and plant extracts (Mothibe & Sibanda 2019; Zhao, Wu & Wang 2015). The last decade has seen a tremendous increase in interest and use of medicinal plant products. As a result, a plethora of plant peptides have been shown to have a beneficial and positive effect on human health. The beneficial medicinal effects of plant materials are typically caused by the combination of bioactive compounds found in the plant, and the medicinal properties of plants unique to specific plant species or groups (Chaachouay, Douira & Zidane 2022). As a result, despite advances in pharmacology, the therapeutic use of plants is still prevalent in some countries, particularly in developing countries. According to the World Health Organization (WHO), 80% of individuals in developed and developing countries rely on traditional medicines, particularly plant-based medicine, in primary healthcare (WHO 2013).

In recent years, there has been an increase in the search for and use of drugs and dietary supplements derived from plants. Pharmacologists, microbiologists, botanists, and phyto-chemists are surveying the Earth for phytochemicals and indigenous knowledge systems that could be developed into medicines for the treatment of various diseases (Singh et al. 2022). This research focuses on the use of phytomedicines, their historical role in the development of synthetic treatments, the current state of phytomedicine research, and the future implications of such research.

Methods

This article summarises previous research on the use of phytomedicine as a primary source of healthcare. All the information on phytomedicine was gathered using internet databases (Google Scholar, ScienceDirect, and PubMed) and library documents. With no date or language restrictions, a simple keyword search on medicinal plants was conducted. Articles relevant to phytomedicine were identified by screening all titles and abstracts. The Plant List database was used to validate the scientific name and distribution of the species.

Review findings

Origin of phytomedicine

The practice of using herbal supplements dates back thousands of years. Plant medicines were traditionally discovered through trial and error. People learned to use plants as medicine just as they learned to exploit plants for food (Djordjevic 2017). Angiosperms (flowering plants) were known as the original source of most plant medicines (Jyoti et al. 2011; Parkash et al. 2018). It has become clear in recent decades that there is a plethora of plants with medicinal potential (Shakya 2016). The development and use of phytomedicine has a very long historical background that corresponds to the Stone Age (Djordjevic 2017). They were depicted in cave paintings in France between 13 000 and 25 000 B.C. It is believed that through trial and error, early humans discovered a plethora of uses for wild plants (Djordjevic 2017). Plant samples from prehistoric burial sites are one of the lines of evidence indicating that Palaeolithic people were familiar with traditional medicine. In 15 000 B.C. Egyptians used garlic and juniper for medicinal purposes. In 1000 AD, 'The Leech Book of Bald' revealed the use of herbs to prevent infection in England. In 1864 'The National Association of Medical Herbalists' was established, and in 1927 'The Herb Society' was formed (Jyoti et al. 2011; Parkash et al. 2018).

Phytomedicine is a body of knowledge, skills, and practices based on different cultures' theories, beliefs, and experiences that are used to improve health by preventing and treating various disorders (Pranskuniene et al. 2022). Phytomedicine encompasses home-made medicines, rituals, and procedures, as well as forms of treatment used by the self-taught to alleviate disease symptoms and to prevent disease. Phytomedicine was the only way to combat various diseases and ailments prior to the development of the modern medical system, but a large portion of the world's population still uses traditional forms of treatments (Jyoti et al. 2011; Parkash et al. 2018). Most countries seeking to preserve their cultural history nurture and preserve phytomedicine knowledge, passing it down from generation to generation. Medicinal plants have played an important role in global healthcare, with approximately 80% of individuals in developed and developing countries relying on them for the treatment of diseases, particularly priority diseases (WHO 2013).

African traditional medicine

African phytomedicine commonly known as traditional or herbal medicine has been the primary source of healthcare in rural areas for centuries (Mothibe & Sibanda 2019). For example, our forefathers discovered that drinking tea made from the bark of a willow tree, *Salix sp*., relieved aches and pains. Scientists later discovered that willow bark contains salicylic acid, which is the active ingredient in aspirin. In addition, in 1897, Englishman Charles Henry Stevens discovered a crude herbal drug derived from *Pelargonium sidoides* roots as a treatment for tuberculosis (Bladt & Wagner 2007). Other medicinal plants such as *Aloe, Cannabis, Opium, Moringa, Hoodia, Hibiscus*, and *Artemisia* were selected for use based on empirical evidence gathered by traditional practitioners. Ethnobotanical research conducted throughout Africa confirms that native plants are the primary component of traditional African medicines (Xego et al. 2021). Kasilo

et al. (2019) highlighted that traditional health practitioners (THPs) and African traditional medicine (ATM) could make significant contributions to achieving universal health coverage (UHC).

Asian traditional medicine

The use of phytomedicine has also been a popular source of healthcare in Asian countries. Both traditional Chinese medicine (TCM) and the Indian Ayurveda system (IAS) were first documented around the first millennium BC (Atanasov et al. 2015). In India, phytomedicine is commonly known as Ayurveda and over 20 000 medicinal plant species are recorded (Pandey et al. 2011). The use of herbal drugs is increasing, and the market is expanding gradually. In recent years, India has exported a significant number of medicinal plants and herbs. Prasathkumar et al. (2021) noted that India is the world's second largest producer of castor seeds. In the review on the utilisation and pharmacological properties of prominent Indian plants, Prasathkumar et al. (2021) reported that many species were potential drug development candidates. Many Indian plants, in addition to their medicinal properties, are widely used as food sources. And have gained global recognition over the years (Atanasov et al. 2015).

With epidemiologic transition resulting in changing patterns of mortality and population dynamics, as well as the rise of 'return to nature' globally, TCM is increasingly being accepted by patients and attracting the attention of researchers (Li et al. 2015). Chinese herbal medicine (CHM) is one of the most widely practised complementary and alternative medicine therapies, particularly in Chinese culture (Wu et al. 2021; Zhao et al. 2021). The first written record of the use of CHM dates back to 2800 BC (Pandey et al. 2011) and approximately 400 known plant species in China are used in CHM. Chinese herbal medicine is currently used by 45% of the world's countries (regions), and global CHM trade has reached 40 billion USD per year, with a 10% annual increase (Wu et al. 2021). Traditional medicine systems in China are diverse and continue to play an important role in human global healthcare today.

European traditional medicine

The Greeks made significant contributions to the rational development of the use of herbal drugs in the ancient Western world (Ayele 2018; Petrovska 2012). The European traditional medicine on the other hand, originated with Hippocrates (460–377 BC) and Aristotle (384–322 BC), whose ideas were based on ancient beliefs from India and Egypt (Petrovska 2012). Herbal or folk medicine has remained integral and popular in many European countries as a sophisticated and rational method of treating ailments (Chandrasekara & Shahidi 2018; Ekor 2014; Gurib-Fakim 2006). This alternative practice is often considered to be more of a supportive than a curative measure. Herbal tea is still widely consumed in several European countries today (Chandrasekara & Shahidi 2018). Natural products taken in their raw form (unprocessed) as teas or decoctions, as well as sophisticated phytomedicines (standardised and formulated extracts of plants, often subjected to rigorous human testing) continue to be a popular alternative to medicinal products derived from pure synthetic chemicals (Chandrasekara & Shahidi 2018; Ghirga et al. 2021).

Phytomedicine utilisation

Phytomedicine, also known as traditional medicine, folk medicine, ethnomedicine, ayurveda, and alternative medicine, is becoming one of the most important aspects of the rapidly expanding global commercial health enterprise (Djordjevic 2017; Ghirga et al. 2022). From 1960 to 2019, over 110 000 studies on medicinal plants were published, highlighting a list of over 70 000 medicinal plants (Ghirga et al. 2021). Phytomedicines continue to be the primary source of healthcare for the populations of developing countries worldwide (Xego et al. 2021). Furthermore, an increasing reliance on the use of medicinal plants in industrialised societies can be traced back to the extraction and development of several drugs and chemotherapeutics from those plants (Shakya 2016).

The usage number of medicinal plants rapidly increased along with the development of the phytomedicine industry. Multiple pharmacological properties from a single plant are common in phytomedicine research. It is now widely accepted that a single plant can contain a diverse range of secondary metabolites that are rich in bioactive compounds such as: alkaloids, phenolics, sterols, terpenoids, coumarins, quinones, tannins, and flavonoids (Jyoti et al. 2011; Parkash et al. 2018). In some cases, bioactive compounds are regarded as a very interesting alternative for disease prevention and treatment (Pandey et al. 2011; Zhao et al. 2015). This is being aided by the growing demand for natural products among consumers, who want long-term solutions to improve their quality of life through personalised nutrition (Ghirga et al. 2021). These bioactive compounds, also known as phytochemicals or phytocompounds, are produced and stored in the plant roots, tubers, stems, barks, leaves, herbs, flowers, fruits, exudates, and plant extracts (Zhao et al. 2015). Bioactive compounds elicit many beneficial health effects, and research on the presence of phytochemicals suggests that they could be a valuable source of therapeutic and preventive agents against disease (Ghirga et al. 2021; Jyoti et al. 2011; Parkash et al. 2018; Zhao et al. 2015). More than 4000 phytochemicals have been catalogued and classified according to their protective function, physical and chemical properties, with 150 phytochemicals being studied (Bhat 2021; Chaachouay et al. 2022). Plant-derived drugs such as opiates, cocaine, and cannabis have both medical and recreational applications.

In 2006, Gurib-Fakim reported on the botanical derivatives from phytomedicine that resulted in the discovery and development of useful modern drugs. There is a wealth of information available on phytochemicals and the pharmacological activity of medicinal plants (Aye et al. 2019;

Bhat 2021; Chaachouay et al. 2022). Many effective drugs derived from higher plants are used in the treatment of cancers, diabetes, microbial infections, malaria, arthritis, viral infections, respiratory infections, among others (Aye et al. 2019; Bhat 2021; Chaachouay et al. 2022). More than 35 000 plant species have been studied, leading to the discovery of anticancer drugs (Hassan 2019). According to the literature, there are approximately 410 experimentally proven medicinal plants with anti-diabetic properties, with only 109 plants having the complete mechanism studied (Jacob & Narendhirakannan 2019). Ray and Saini (2021) reported in their study that 128 different medicinal plants can cure various types of heart disease or ailment. Plant studies in various cultures for the treatment of malaria have yielded important findings that are critical to modern medicine. Two of the most effective malaria drugs come from traditional medicine: quinine, derived from the bark of the Peruvian *Cinchona* tree, and artemisinin, derived from the Chinese antipyretic *Artemisia annua* (Ceravolo et al. 2021). Medicinal plants and herbs have demonstrated promising anti-viral properties as well as numerous health benefits (Sohail et al. 2021) Several medicinal plant extracts, phytochemicals, and herbs have been revised and considered to be potential anti-CoV agents, particularly for SARS-CoV-2 infection for effective COVID-19 control and future drug development with medicinal plant formulations for preventing or curing COVID-19 and other highly infectious viral diseases (Gupta, Gupta & Bhargava 2020; Jahan & Onay 2020; Ul Qamar et al. 2020). There are numerous medicinal plants that have been shown to have antimicrobial activity *in vitro* and *in vivo*. Castronovo et al. (2021) reported in their study the antimicrobial activity of medicinal plants and this was further highlighted by Vaou et al. (2021), who discussed in their review the role of medicinal plants in combatting microbial infections.

The current review highlights the most popular medicinal plants with therapeutic benefits used globally against various human ailments (Table 1).

Medicinal plants are often tough and fibrous, necessitating some form of preparation to make them easy to administer. According to the Institute for Traditional Medicine, common methods for preparing herbal medicines include: decoction, powdering, teas or infusions, maceration, poultice, medicinal essence, and solvent and/or alcohol extraction, all of which result in a mixture of substances as elaborated below (Gurib-Fakim 2006):

- Decoction is the process of crushing and boiling plant material in water to create a liquid extract that can be consumed or applied topically.
- Powdering is the process of drying and crushing plant material to produce a powder that can be compressed into tablets. To make an alcohol tincture, the plant material is soaked in cold wine or distilled spirit.

TABLE 1: Popular medicinal plants used in phytotherapy.

Family	Species name	Common name or names	Distribution	Plant part or plants used	Uses in phytomedicine	Reference
Xanthorrhoeaceae	*Aloe vera* (L.) Burm.f.	Chinese aloe, Cape aloe or Barbados aloe	South-east, North America, Asia, Europe, Africa	Gel	Anticancer, antioxidant, antidiabetic, and antihyperlipidemic, skin disease	Sánchez et al. (2020)
Cannabaceae	*Cannabis sativa* L.	Hemp, dagga, marijuana, weed.	Africa, Asia, America, Europe	Roots, stems, leaves, flowers	Anticancer, antioxidant, antidiabetic, and antihyperlipidemic, antimicrobial, skin disease, anti-inflammatory	Odieka et al. (2022)
Moringaceae	*Moringa olifera* Lam.	Drumstick tree	Asia, Africa, Madagascar	root, bark, gum, leaf, fruit (pods), flowers, seeds and seed oil	Antidiabetic, asthma, rheumatism, gout, epilepsy, eye and skin diseases, fever and, haemorrhoids	Milla, Penalver and Nieto (2021)
Apocynaceae	*Catharanthus roseus* (L.) G. Don	Bright eyes, Cape periwinkle, graveyard plant, Madagascar periwinkle, old maid, pink periwinkle, rose periwinkle	Madagascar	Roots and shoots	Anticancer and antidiabetic	Kumar, Singh and Singh (2022)
Papaveraceae	*Papaver somniferous* L.	Poppy, opium poppy	Asia, Europe.	Fruits, seeds, latex	Pain management, headache, cough, insomnia, cardiac asthma, and biliary colic	Jafri, Siddiqui and Chaudhary (2018)
Asteraceae (Compositae)	*Artemisia annua* L.	Annual mugwort	Asia. America, Australia, Europe	Roots, stems and leaves	Antimalaria, jaundice and bacterial dysentery, fever, tuberculosis, wounds, haemorrhoids, various viral and bacterial diseases, and autoimmune diseases, anticancer, antioxidant, Nephroprotective effect, and anti-obesity	Ekiert et al. (2021)
Cucurbitaceae	*Momordica charantia* L.	Bitter melon	Asia, and Africa	All parts	Anti-inflammatory, antidiabetic, anticancer, hypotensive, anti-obesity, antimicrobial, antihyperlipidemic, antioxidant, immuno-modulatory, anthelmintic, neuro-protective, and hepato-protective	Pehliven (2020)
Taxaceae	*Taxus brevifolia* Nutt.	Pacific yew	Pacific Northwest	Juicy red cup around the seeds	Anticancer	Mamadalieva and Mamedov (2020)
Ranunculaceae	*Nigella sativa* L.	Black caraway, black cumin	Europe, Asia, Africa	Seeds	Antidiabetic, heart disease, immune booster, antihistamine, infertility	Yimer (2019)
Plumbaginaceae	*Plumbago zeylanica* L.	Wild white leadwort, Ceylon plumbago	Africa	All parts	Diarrhoea, anti-inflammatory, antidiabetic, anticancer, antimicrobial, antioxidant, and gastrointestinal disorders	Shukla et al. (2021)
Liliaceae	*Allium sativum* L.	Garlic	Asia, Africa, Latin America	Leaves, flowers, and cloves	Antioxidant, cardiovascular protective, anticancer, anti-inflammatory, immunomodulatory, anti-diabetic, anti-obesity, and antibacterial	Shang et al. (2019)

Note: For more reference details view Coopoosamy, R., Singh, K., Naidoo, K. & Nadasan, D.S., 2023, 'The role of phytomedicine: Bridging the gap between the past, present, and future', *Journal of Medicinal Plants for Economic Development* 7(1), a197. https://doi.org/10.4102/jomped.v7i1.197 for full reference list.

- Poultices were traditionally made by boiling medicinal plants, wrapping them in cloth, and applying the resulting parcel to the affected part of the body.
- Teas or infusions are made by seeping herbs in boiling water.
- Maceration is a preparation made by adding cold water to the required amount of the drug and allowing it to soak at room temperature for 6–8 hours before straining.
- Medicinal essences are volatile compounds that have been dissolved in alcohol or a mixture of alcohol and water.
- Medicinal spirits are made by combining aromatic herbs with alcohols and then steam distilling the alcohol and volatile components.

Phytomedicine is administered orally, through the nasal cavity, as a topical cream, as an enema or added to the bath water depending on the nature of the disease.

Phytomedicine research

Pharmaceutical industries worldwide have advanced to a higher level of development because of this growth. Currently, the primary focus of research on many of the medicinal plants of interest has been in the areas of phytochemistry, pharmacognosy, and horticulture. Medicinal plants have been characterised for their potential bioactive compounds, which have been separated and subjected to detailed structural analysis in the field of phytochemistry (Jyoti et al. 2011). Pharmacognosy of medicinal plants research has also included bio-activity assays, identification of potential modes of action, and target sites for active phytomedicinal compounds (Pandey et al. 2011; Yadav & Agarwala 2011). Horticultural research on medicinal plants has primarily focused on improving cultivation capacity (Djordjevic 2017). This is especially important because many medicinal plants are still harvested in the wild, and growing conditions in cultivation have not been optimised. Wild harvesting of medicinal plants can be problematic due to biodiversity loss, potential variation in medicinal plant quality, and, on rare occasions, incorrect plant identification with potentially tragic consequences (Djordjevic 2017). There are numerous opportunities for basic research on medicinal plants and the study of their phytomedicinal chemical production from the standpoint of plant physiology (Süntar 2020).

Plant biotechnology (PBT) refers to a wide range of scientific tools and techniques for screening and genetically manipulating plants to create beneficial or useful plant/plant products. These include, *in vitro* and *in vivo* assays, nanotechnology, phytochemical analysis, microscopy, and computational modelling. Until the 18th century, the therapeutic properties of many plants, their effect on human ailments, and their method of treatment were known, but the active compound/s was unknown (Süntar 2020). Technologies such as Gas chromatography–mass spectrometry (GC-MS), High Performance Liquid Chromatography (HPLC), Thin-Layer Chromatography, and phytochemical assays are applied to plant material and/or extracts to determine the presence and locality of the various phytocompounds (Süntar 2020; Yadav & Agarwala 2011).

A growing trend in PBT is the use of computational methods with known bioactive compounds for effective drug development for the treatment of various ailments. These methods allow for *in silico* screening of known phytocompounds against a designated target protein to evaluate the effectiveness of the compound before proceeding with wet lab experiments (Süntar 2020). Molecular docking (MD) and Molecular Dynamics Simulations (MDS) are the most used computational methods in drug discovery. With an increasing understanding of the structure and function of compounds, a series of MD and MDS have been applied to the development of medicinal plants in recent years. The aim of such methods is to develop a quick and convenient method for accurately predicting many chemical compounds and then performing *in vivo* and *in vitro* experiments for verification, which will significantly improve the efficiency of evaluating the chemical activities of medicinal plants (Seukep et al. 2020). The main objective of incorporating these computational methods into PBT is to develop novel drugs that have minimal side effects compared to western antibiotics. The binding affinity of the phytocompound is higher than that of the antibiotic and directs the research towards a novel drug design provided the *in vitro* and *in vivo* experiments produce the same results (Seukep et al. 2020). Aside from its low cost, this technique can be used for high-throughput screening of druggable targets and compounds (up to 10 000 compounds per day), which can help characterise drug side effects, reduce the need for animal models, and predict potential drug resistance. This method may be useful to guide the development of novel therapeutic agents for future global pandemics.

Biotechnological tools are essential for selecting, multiplying, improving, and analysing medicinal plants. Adopting various biotechnological methods in the preparation and processing of medicinal plants can result in successful drug candidates as therapeutics against an array of human ailments. In the light of modern science, significant efforts should be geared to identify and characterise the bioactive constituents of those plants.

The future of phytomedicine: Potential and limitations

Phytomedicines are now as important as antibiotics and chemical medicines; both are accepted in public and private healthcare systems, and are integrated in clinical practices. The data obtained through scientific validation can be used to investigate the pharmacological activity of phytomedicine and their administration in the modern era (Ghirga et al. 2021). The number of patients seeking phytotherapy is growing exponentially. Interestingly, despite recent advances in modern medicine producing remarkable results in the treatment of various human ailments, many people in rural areas continue to rely on traditional medicine for their primary healthcare needs (Ayele 2018). However, in the 21st

century, traditional healthcare has begun to overlap with conventional medicine. According to Mothibe and Sibanda's (2019) report, the affordability and accessibility of medicinal plants are the primary motivators for their exploration. Nonetheless, documentation of medicinal uses of plants and traditional systems is becoming a pressing need due to the rapid loss of some of these plants' natural habitats as a result of anthropogenic activities, as well as the erosion of valuable traditional knowledge. Therefore, there is a need to develop protocols that promote more sustainable use of medicinal plants in order to conserve our biodiversity.

Despite the success of medicinal plant drug development over the last three decades, future endeavours face numerous challenges. The plant-based product's quality is being questioned (Shakya 2016). This is often due to the quality of the literature in the field. Many erroneous and unreproducible results have appeared in the medical literature because the clinicians accept at face value the quality of a herb that was adulterated or misidentified. Often bioactive compounds in the product tested, as well as the precise dosage administered is not identified by the proper scientific name. The public should be better protected and informed on phytomedicines. In addition, while the use of medicinal plants appears to be promising, a reasonable balance of risks and benefits are yet to be established.

Conclusion

Throughout history, infectious diseases with pandemic potential have emerged and spread on a regular basis. The world is now shifting toward phytomedicines that repair and strengthen bodily systems (particularly the immune system, which can then properly fight foreign invaders) and aid in the destruction of offending pathogens with minimal toxic side effects. The scientific literature has seen an increase in the number of publications aimed at evaluating the efficacy of medicinal plants, which are thought to play an important role in health maintenance and the development of new treatments. According to literature, there is currently a renewed interest in plant-based medicines for the prevention and treatment of various ailments. Medicinal plants continue to play an important role in global healthcare systems. Nonetheless, there is a scarcity of current comprehensive compilations of promising African medicinal plants. Furthermore, many major challenges must be overcome and addressed before their full potential can be realised, as the effective treatment of diseases with plant products is yet to be thoroughly validated using rigorous scientific criteria to compete with existing conventional therapies.

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Competing interests

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Authors' contributions

All authors contributed to conceptualising and writing the manuscript. Each author was tasked with acquiring literature and further editing the manuscript.

Ethical considerations

This article followed all ethical standards for research without direct contact with human or animal subjects.

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Data availability

The authors confirm that the data supporting the findings of this study are available within the article and/or its supplementary materials.

Disclaimer

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