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A Systematic Review of the Traditional and Medicinal Uses of *Petiveria alliacea* L. In The Treatment of Chronic Diseases

Review Article

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Abstract

Petiveria alliacea L. is a common medicinal plant that thrives naturally in tropical climates and has been used in traditional medicine for the treatment of cancer, diabetes, muscular pain, skin diseases, various central nervous system disorders, respiratory and pulmonary infections, malaria among other ailments. Published research findings have further validated the presence of biologically active compounds and therapeutic properties of the plant. Clinical research focused on its usage to prevent and treat tumours, as well as cancer cells have yielded successful results and consequently, the plant continues to gain significant recognition in the medical field for its potential application in the treatment of several ailments. This review seeks to collate the scientific evidence related to the traditional and medicinal uses of *Petiveria alliacea* L. in the treatment of chronic diseases.

Keywords: Cancer; Chronic diseases; Diabetes; Medicinal; Traditional; *Petiveria alliacea*; Therapeutic; Validated

Introduction

Therapeutic methods are often explored by patients to relieve symptoms of chronic illnesses and pharmacologic therapy is one such approach used in the treatment of severe pain. Research has demonstrated that 40 to 60% of patients who receive drug therapy do not respond well to the plethora of drugs that they are required to take to alleviate the discomfort of their ailments [1,2]. The most prevalent of these drugs include Nonsteroidal Anti-Inflammatory Drugs (NSAIDs), opioids, muscle-relaxing medications, peripheral antidepressants and painkillers [3], which often produce undesirable side effects. Consequently, there is a continuous search worldwide for new therapies [4].

Plants with medicinal properties continue to facilitate advances in novel therapeutic pathways involved in the treatment of various diseases and have resulted in the formulation of new drugs [5]. These medicinal properties are attributed to the presence of diverse phytochemicals, esteemed for their therapeutic traits [6]. However, despite the progress in the usage of medicinal plants and their by-products in the treatment of varying conditions [7], significant areas remain to be explored in the discovery of effective analgesic and curative agents [8]. In recent years, medical and other health professionals have demonstrated significant interest in the utilization of medicinal plants, but there is a need for clarity as it relates to identifying the plants, determining their effectiveness, dosage for therapeutic use, toxicity levels, as well as standardization and regulation.

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The World Health Organization (WHO) has reported that traditional medicine is popular worldwide and its use is growing even in developed countries. In China, traditional herbal preparations make up approximately 30-50% of the total medicinal consumption. Globally, the annual market for herbal medicine is over USD 60 billion [9]. Hence, there is tremendous thrust in the scientific community to unearth, elucidate and or validate the ethnobotanical relevance of many of these plants; particularly in a climate where some patients are desirous of alternative forms of medicine, given the harmful side-effects and burdensome costs affiliated with many pharmaceutical drugs.

Methods

A systematic web search review was conducted between August and November, 2017 on research literature pertaining to *Petiveria alliacea* and other medicinal plants used for traditional and medicinal treatment of various ailments. Information was collected from a total of 42 studies meeting specific inclusion criteria including research publications, unpublished thesis reports and various online articles.

Search strategy

The search strategy employed, involved a web-based systematic research literature review. Studies reporting on the importance of *P. alliacea* and other medicinal plants used for traditional and medicinal applications were obtained using two approaches, including: Search for MSc/PhD thesis research reports using Google search engine and search for published journal articles using international scientific databases including PubMed and Google Scholar. Literature search was performed using the following key terms*: Petiveria alliacea*; traditional and Medical uses of *P. alliacea*; Medicinal Plants and their uses; Plants of Ethnobotanical Relevance.

Screening and criteria

Screening of search outputs was performed by firstly reviewing the title and abstract of selected journal articles and theses available online. The relevant articles and theses were then downloaded and evaluated for inclusion in this review. Screening of the Literature was based on the following inclusion and exclusion criteria.

Inclusion criteria: Information collected and reviewed from the following were included in this review paper.

1. Published (open access) journals, on medicinal plants and plants of ethno-botanical relevance. 2. Review articles and historical documents.

Exclusion criteria: Information from non-open access journal articles and blogs were excluded from this review.

Results

History of medicinal plant use

The use of medicinal plants for their therapeutic capabilities is an age old tradition which continues to evolve with scientific research and new discoveries [9]. Generally, there is a strong association between medicinal plants and the local area within which they exist and this has resulted in several plant-based medicinal systems such as the Ayurvedic and Unani from India, the Chinese and Tibetan originating from other regions of Asia, the Native American and the Amazonian systems from North and South America, respectively; as well as others from Africa and the Caribbean [10].

According to the WHO, about 70 percent of the global population is dependent on plants to supply their primary health care needs. Approximately 35,000 to 70,000 (14 to 28%) of the 250,000 plant species have been manipulated for their healing properties and to date [10-13], only about fifty major drugs have been developed from tropical plants [14]. This could possibly be attributed to the fact that of the 250,000 species of higher plants worldwide, only about 17% have been scientifically researched for their medical efficacy [15].

The chemical and biological diversity of plants represent a possible limitless renewable source for the use in the development of new pharmaceuticals. China and North America have similar numbers of flowering plants (35,000). However, of these, only about 5000 are utilized in traditional Chinese medicine, whereas, Native Americans used 2564 medicinal plants [15,16]. Herbal medicine in North America is potentially representative of a diverse source of phytopharmaceuticals, but a large number of plants remain unknown and little screening of medicinal plants in that region have been done [17]. The same observations have been made regarding the flora that exists in Jamaica and nearby countries. For the most part, many of the medicinal plants that have been used traditionally for the treatment of various conditions have remained unexplored or untapped.

Presently, a number of practitioners of "conventional" medicine are amenable to recommending herbs, herbal products, or Complementary and Alternative Medicine (CAM) therapy to their patients for the effective treatment of certain diseases [18]. Previous studies indicated that approximately 40% of adults and 11% of children utilize CAM Therapy (CAMT). The adult users were comprised of 43.1% whites and 25.5% blacks [19,20]. In addition, CAM and herbal medicines are more popular amongst people with higher education and income levels and particularly more noticeable in younger patients with breast cancer [21,22].

Research has shown that eighty-nine plant-derived drugs currently being utilised worldwide, were discovered by studying traditional herbal use [15,23]. For instance, the effectiveness of foxglove (*Digitalis purpurea*) was discovered from traditional European herbal medicine in the 18th century by William Withering, for treating dropsy [10]. The plant was also found to reduce retention of fluid. Subsequently, more than thirty cardiac glycosides including digitoxin and digoxin were separated from dried foxglove leaves [23]. Another herb referred to as the snakeroot plant (*Rauvolfia serpentine*) was traditionally used for treating insomnia in India, but in 1949, the alkaloid reserpine was isolated and is presently used for treating high blood pressure [23]. Another useful drug, artemisinin, used to treat malaria was extracted from the wormseed plant (*Artemisia annua*) based on Chinese traditional use of the plant [24]. In the U.S.A., ethno-botanical studies have resulted in the discovery of alkaloids from the Madagascar periwinkle (*Catharanthus roseus*), which is used in treating Hodgkin's disease and leukemia in children. Additionally, the anti-cancer compound taxol, was found in the bark of the Pacific yew tree (*Taxus brevifolia*), and subsequently approved for use in 1992 by the Food and Drug Administration (FDA).

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The identification of plants with compounds for possible use in modern medicine is intricately interwoven in unearthing and understanding the traditional knowledge and use of various medicinal plant systems. Research shows that the Native Americans and Chinese used plants from the same family and genus, in their respective traditional medicine systems [10]. For example, Asian ginseng (*Panax ginseng*) and American ginseng (*Panax quinquefolius*) were used as adaptogenic agents [16,25]. American licorice (*Glycyrrhiza lepidota*) and Asian licorice (*Glycyrrhiza glabra*) were utilized similarly for the treatment of asthma in both traditional medicine systems [16,17]. There is currently a plethora of medicinal plants being investigated for their ameliorative properties and well known amongst these plants, is *Petiveria alliacea*.

In light of the popular practice of using medicinal plants, herbs and herbal medicine for the treatment of various ailments [9], the research thrust in modern therapeutics and the increasing worldwide demand for natural products, the focus of this systematic review is to evaluate the traditional and medicinal uses of *Petiveria alliacea* through emphasis on treatment evidence and promising reports in the literature.

Distribution and description of *Petiveria alliacea*

Petiveria alliacea L. belongs to the Phytolaccaceae family which is considered to be the most primitive family of the Caryophyllales [26]. There are about 17 genera and 120 pan-tropical species in this group which are often found throughout North and South America [27,28]. The family is comprised mainly of shrubs and herbs and very few trees. *Alliacea* is the sole species within the *Petiveria* genus [29]. The plant is native to Florida and the Lower Rio Grande Valley of Texas in the United States [30], tropical areas of Central and South America and the Caribbean [31]. Introduced populations exist in Benin and Nigeria in Africa [32].

Petiveria alliacea is known by a wide range of common names based on where it grows. In the Dominican Republic, Puerto Rico and Brazil, it is referred to as anamu or guinea hen weed; whereas, in Guatemala it is known as apacin. In Peru, other areas of Latin America, Trinidad and Jamaica, the common names are mucura, guine, mapurite and guinea hen weed, respectively. The plant is also commonly referred to as apacina, apazote de zorro, aposin, ave, aveterinaryte, calauchin, chasser vermine, congo root, douvant-douvant, emeruaiuma, garlic weed, guinea hen weed, guine, guinea, guinea hen leaf, gully root, herbe aux poules, hierba de las gallinitas, huevo de gato, kojo root, kuan, kudjuruk, lemtewei, lemuru, mal pouri, mapurit, mapurite, mucura-caa, mucura, mucuracáa, ocano, payche, pipi, tipi, verbena hedionda, verveine puante and zorrillo [33].

The plant is often described as a weed-like, deeply rooted, erect herb or sub-herbaceous perennial that grows to a height of about 1 m. The stems of the plant are thin, angular and hairy to glabrous. The stipules are 1.5-2 mm and linear [34]. The leaves are alternate, simple, entire and oblong to elliptic, acute to acuminate at the tip and range in size from 5-20 cm x 2-8 cm. The inflorescence can be terminal or axillary, slender with nodding raceme between 10 - 40 cm long and sometimes branched. The bracts are usually 1.5-2.5 mm long. The flowers are bisexual, 4-merous and zygomorphic. Generally, the length of the pedicel ranges from 2-3 mm; whereas, the sepals are 3-4 mm long, free, oblong to rounded and greenish or white to pink in colour. There are no petals present. There are 4-8 irregularly inserted stamens and the filament is about 2 mm long. The 4 hooked ovaries is superior, oblong, shortly hairy and single-celled with a lateral, sessile stigma. The fruit is a narrow, oblong achene, about 6-8 mm long. It is striated, apex 2-lobed, with recurved hooks and has a single seed [34].

Properties

All parts of the *P. alliacea* plant appear to be useful and to date several biologically active compounds have been isolated. Most prominent among these constituents are sulphur compounds (similar to allicin, found in garlic and onion), flavonoids, triterpenes, steroids, saponins, polyphenols, fredelinol, pinitol and allantoin [35]. Crude extracts of *P. alliacea* have been shown to exhibit various neuropharmacological benefits including cognitive enhancing activity, as well as anxiolytic, antidepressant, antinociceptive and anti-seizure properties [36]. Pentane extracts of the roots have revealed the presence of several volatile constituents such as benzaldehyde (48.3%), dibenzyl-disulfide (23.3%), dibenzyl-trisulfide (9.4%) and stilbene (8.1%). Whereas, benzaldehyde (54.8%), benzyl-thiol (20.3%) and dibenzyl-disulfide (18.0%) have been found in the inflorescences. Compounds isolated from extracts (water, methanol, ethanol) of the entire plant include dibenzyl-trisulfide, benzaldehyde, the benzopyran astilbin, and coumarin which, based on *in vitro* studies, have retarded the growth of leukaemia cells and several other strains of cancerous tumour cells. Based on *in vivo* and *in vitro* studies, water extracts appeared to enhance lymphocyte, interferon and interleukin production. Conversely, toxic responses to leukaemia, lymphoma and several other cancer cell lines were noticed. Elevations in the phagocytotic index of human granulocytes was observed with leaf and stem extracts of hexane and cyclohexane, and may have been due to the presence of the immunomodulatory constituent Dibenzyl-Trisulfide (DTS) [37]. Additionally, a protective effect on the blood cells of mice infected with the pathogenic bacterium *Listeria monocytogenes* was detected when treated with a crude (whole plant) water extract [38]. On examination of the root extracts, significant anti-inflammatory effects in rats and mice using various models, as well as a significant pain-relieving effect in rats was noticed. Inhibitory actions of Cyclooxygenase-1 (COX-1) were also documented with some of the plant extracts [32]. Methanol extracts of the seeds induced contractions of the uterus in rat models. Other studies, using ethanolic, aqueous and chloroform fractions of leaf extracts, resulted in adverse effects on intestinal motility and secretion, as well as antihistamine activity *in vitro*. An initial test of leaf and stem powder extracts yielded significantly decreased levels of blood sugar in mice [32].

Many clinical reports and studies confirm that the extracts of the aerial parts and roots of *P. alliacea* have significant broad-spectrum antimicrobial properties (*in vitro* and *in vivo*) against numerous strains of bacteria, viruses, protozoa, fungi and yeast. The crude water and alcohol extracts perform similarly. A total of eighteen (18) organosulfur compounds from the roots have been tested for their antibacterial and antifungal activities. The most active compounds were shown to be the thiosulfinates, trisulfides and benzylsulfinic

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acid. The benzyl-containing thiosulfinates had the broadest spectrum of antimicrobial activity. Antibacterial and antifungal activities were also observed with fresh root extracts which contain (Z)-thiobenzaldehyde S-oxide. Acaricidal activity against *Boophilus microplus* was documented when an extract of the leaf and dibenzyl-trisulfide from the roots, were applied topically. The activity was noticeably higher than commercial acaricides including dimethoate, lindane and carbaryl [32].

Dibenzyl-trisulfide also had a toxic effect on the adult sweet potato weevil (*Cylas formicarius elegantulus*) and adult coffee borer beetle (*Hypothenemus hampei*) [32]. Antifeedant activity of leaf extracts was documented against the grasshopper *Zonocerus variegatus*, and an allelopathic effect on germinating seeds was also observed. Dibenzyl-trisulfide was generally inactive on *Bacillus subtilis* and had little inhibitory effect on *Cladosporium cucumerinum*. However, when DTS was transformed to methyl-benzyl-sulfonic anhydride it was found to be effective in preventing the growth of *Bacillus subtilis*, *Pseudomonas fluorescens* and *Cladosporium cucumerinum*. *In vitro* studies of the growth of seeds of several crops revealed that methanol and dichloromethanol leaf extracts had an allelopathic effect. Seeds sown in the soil were not affected. Additionally, *Petiveria alliacea* has been shown to accumulate nitrates and has caused nitrate poisoning in cattle [32]. Hence, it is not encouraged as feeding material for animals.

Traditional uses and application

Traditional uses of *P. alliacea* as a medicinal plant date back to the Mayan era where it was commonly used to bolster the immune system and treat respiratory ailments including symptoms associated with the cold and influenza [39]. Various conditions including nervous spasms, paralysis, hysteria, asthma, whooping cough, pneumonia, bronchitis, hoarseness, fevers, headaches, influenza, cystitis, venereal diseases and menstrual complaints have been treated when the plant is taken internally [40]. External applications include treatment for ear-aches, fever and headaches [40]. Additionally, it is believed that vapours from the plant can stimulate movement in the limbs of paralyzed individuals. The roots have been used to treat toothaches, as well as induce abortions [41]. Macerated leaves are generally applied to the belly to induce contractions in case of difficult delivery [42]. The liquid from the leaves is instilled as nose or eye drops to cure headache, and as nose drops to cure sinusitis [42]. A bath or vapour bath with a leaf decoction is taken in case of oedema [42]. A leaf decoction is applied to abscesses, and is used as an analgesic against muscular pain and to treat skin diseases [42]. An infusion of pounded bark is consumed for treatment of colic, rheumatism, cancer, syphilis, colds, fever, bronchitis and asthma. Colombians coat their teeth and prevent caries by chewing the leaves [42]. In general, slight variations in the use of the plant may be observed depending on where it grows.

Petiveria alliacea has medicinal and ritual significance in southern Florida, Central America and the Caribbean, especially in the Santería religion. The entire plant, leaves and roots are often used in decoctions to calm the nerves, control diarrhoea, lower fever, stimulate the uterus, and relax spasms. The plant is also used in the treatment of hysteria, paralysis, bronchial problems (asthma, whooping cough, pneumonia, and bronchitis), hoarseness, influenza, cystitis, venereal disease, menstrual conditions and abortion. Headaches are cured by binding fresh leaves around the head and earaches are alleviated by juicing the leaves and applying directly to the ear [43].

In Brazil, *P. alliacea* is used as an antispasmodic agent, diuretic, menstrual and sweat promoter and stimulant. Natural health practitioners also use it for the treatment of arthritis, malaria, oedema, poor memory and rheumatism. It is also used as a topical analgesic and anti-inflammatory for skin conditions. In Central America, the herb is either used to provide relief during childbirth or to promote abortions. Decoctions of the leaves are ingested to alleviate digestive problems, fever and flatulence. Additionally, in major areas of Central and South America, it is used as a natural remedy for treating coughs, influenza, colds, pulmonary and respiratory infections, treatment of cancer and to support the immune system. Historically, the Caribs in Guatemala were known to crush the plant root (which is believed to be more potent than the leaves) and inhale it as treatment for sinusitis; whereas, the Ese'Ejas Indians in the Peruvian Amazon prepared a leaf infusion for alleviating flu and cold symptoms. It is also often used in herbal baths in the Amazon forests. The Garifuna natives in Nicaragua also use an infusion or decoction for coughs, cold, pains and aches and in the performance of specific rituals. In India, some indigenous groups make a paste from the leaves and use it externally for rheumatic pain, headache, and other types of pain. The paste is also used as an insecticide.

In South West Nigeria, *P. alliacea* has been used by traditional healers for the management of sickle cell disease. Laboratory studies further validated this use when extracts of the plant at concentrations of 1.0 and 0.1 mg/ml were shown to exhibit significant anti-sickling activity [44].

Medicinal application in the treatment of chronic illnesses

Published studies on *P. alliacea* indicate that the plant has a broad range of anti-leukemic, anti-tumour and anti-cancer properties against several types of cancer cells (including liver, brain, breast and prostate). Additionally, the entire plant is a pungent herb that is believed to be abortifacient, antiseptic, antispasmodic, diuretic and febrifuge. It is perceived to calm the nerves, control diarrhoea and stimulate the uterus [40].

Hernández, et al. validated the biological activity of *P. alliacea* using metastatic breast adenocarcinoma model (4T1) [43]. *In vitro* results revealed that a plant fraction induced apoptosis of 4T1 cells, caused activation of caspase-3, DNA fragmentation (without mitochondria membrane depolarization), and decreased growth capacity of cell colony. The fraction also resulted in changes in the expression of glycolytic enzymes which caused a decrease in glucose uptake and lactate production. Additionally there was enhanced regression of breast primary tumour in BALB/c mice transplanted with GFP-tagged 4T1 cells.

In a study conducted by Urueña, et al. it was revealed that a fraction of *P. alliacea* used multiple molecular targets to exert its antitumor activities against human (K562, A375) and mouse (Mel Rel) tumour cells [45]. Observations also indicated that the fraction exerted G2 cell cycle arrest, induced actin cytoskeleton reorganization, affected cell morphology, caused DNA fragmentation and decreased clonogenicity.

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Petiveria alliacea was previously identified (at the University of Illinois at Chicago) as one of only 34 plants (out of 1,400) with active properties specifically against cancer [33]. Several phytochemicals in *P. alliacea* like astilbin and dibenzyl trisulphide have been documented to directly kill cancer cells [46]. Williams, et al. demonstrated that DTS and its derivatives exhibited potent anti-proliferation/cytotoxic activity on a wide range of cancer cell lines [47]. The research further showed that the compounds in *P. alliacea* were able to target the cancerous cells, leaving healthy, normal cells unharmed. In addition, other substances in the herb stimulate the body's natural defences.

The plant has also been verified to have immunostimulant properties [48]. It stimulates the immune system to increase its production of lymphocytes and natural disease-destroying cells. At the same time, it increases the production of interferon and interleukins which are produced naturally by the immune system in fighting cancers and infections.

It is commonly perceived that infection plays a major role in many cancers. *P. alliacea* is widely used in folk medicine for treating infections. Many clinical reports and studies document that the plant shows broad-spectrum antimicrobial properties against numerous strains of bacteria, viruses, fungi, and yeast. Ruffa, et al. revealed that extracts of *P. alliacea* inhibited the replication of the bovine diarrhoea virus; (test model for hepatitis C virus) [49]. The antimicrobial properties of the plant have been documented by Cuban scientists who conducted *in vitro* studies of extracts against numerous pathogens, including *Escherichia coli, Staphylococcus, Pseudomonas* and *Shigella* [50]. Crude water extracts of the plant, outperformed the alcohol extracts. The antimicrobial activity was attributed to the presence of phenolic [51,52], and sulphur compounds [53], which were previously found to display antimicrobial action. A German group documented good activity against several bacteria, *Mycobacterium tuberculosis*, several strains of fungi and *Candida*. Anamu's antifungal properties were documented by one research group in 1991, and again by a separate research group in 2001. Its antimicrobial activity was further demonstrated by researchers from Guatemala and Austria who, in separate studies in 1998, confirmed its activity *in vitro* and *in vivo* studies against several strains of protozoa, bacteria, and fungi.

Its traditional use as a remedy for arthritis and rheumatism has been validated by clinical research that confirms its pain relieving and anti-inflammatory effect. Researchers in Sweden demonstrated its COX-1 inhibitory properties (cyclooxogenase-1 inhibitors are a new class of popular and profitable arthritis drugs). *Petiveria alliacea* extracts have been found to relieve pain and inflammation even when applied topically to the skin. Oluwa, et al. in their study on the "Chemical Constituents and Anti-inflammatory Activity of Essential Oil of *Petiveria alliacea* L." revealed that phytol was the major constituent of the essential oil of *P. alliaceae* from Nigeria [54]. Furthermore, the potent anti-inflammatory activity of the essential oil may be attributed to its high content of citronellol, (*Z,Z*)-α-farnesol and phytol.

There is little scientific data available on the use of *P. alliacea* for treating diabetes; however, it had been shown in mice to decrease blood sugar levels by over 60 per cent. The inhibitory effects of the leaf extracts of *Petiveria alliacea* L. on alpha-amylase enzyme was researched and the findings revealed that leaf extracts of *Petiveria alliacea* showed alpha-amylase inhibitory properties with higher activities than the control drug, acarbose [55]. There by suggesting that the plant contains phytochemicals that could effectively reduce post-prandial glucose levels in diabetics. This strengthens herbal medical practice in Cuba where *P. alliacea* has long been used to help in the treatment of diabetes. However, Christie, et al. evaluated the effect of aerial parts of the plant in normoglycaemic and diabetic rats for hypoglycaemic activity and discovered that the aqueous extract of *P. alliacea* had no hypoglycaemic effect in diabetic rats, but showed hyperglycaemic activity in normoglycaemic rats [56]. Given the variations in research findings, the implications for the use of the plant in ethno-traditional medicine is important and needs further investigation.

The anti-viral activity of *P. alliacea* was previously demonstrated with bovine viral diarrhea virus [49]. Recently, Lowe, et al. investigated the anti HIV-1 activity of *Petiveria alliacea* and its metabolites [57], and the results suggest that *P. alliacea* may have therapeutic potential against HIV-1, although additional work is required to demonstrate the extent of its activity.

In South America, *P. alliacea* is being used for its immune stimulant and anticancerous properties as a support aid for cancer and leukemia patients. In the United States, *P. alliacea* is now available in capsules and tablets under various labels. It is also being incorporated in several formulations for its antimicrobial properties against bacteria, viruses, yeast, and fungi, as well as in other formulations that support the immune system.

Adverse effects of *Petiveria alliacea*

Petiveria alliacea has been found to have several adverse effects. Notably, studies have demonstrated that use of the plant could stimulate contractions of the uterus which may result in miscarriage. Therefore, pregnant women and those trying to conceive should avoid its use. Additionally, low concentrations of a blood thinner known as coumadin has been found in the plant. Hence, its use may result in thinning of the blood and should not be taken by persons with pre-existing blood conditions such as hemophilia or those on blood thinning medications such as warfarin. Animal studies have also shown that *P. alliacea* has a hypoglycemic effect, so individuals with hypoglycemia or diabetes should avoid its use. *In vitro* and *in vivo* studies of *Petiveria alliacea* extracts on behavioural stress in animal models revealed a pro-oxidant effect which resulted in inhibition of the antioxidant level and increased methemoglobin levels in human plasma [35], which may have important implications for anxiety-like behaviour.

Conclusion

The ethnobotanical and medicinal characteristics of plants have become relevant investigations in recent scientific studies worldwide, primarily because of the therapeutic potency, antioxidant functions, no adverse effects and economic benefits [58]. Medicinal plants serve as raw materials for drugs that are effective and cost efficient for people, particularly those from developing nations. All plants synthesize phytochemicals, which are beneficial for our health as they cannot be synthesized in the human body [59]. Plants are also

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rich dietary sources of bio-molecules, vitamins and minerals which are crucial for maintaining a healthy body. Medicinal plants are the natural resources in the development of new drugs [58,60-62].

References

1. Xu D, Trajkovic V, Hunter D, Leung BP, Schulz K, et al. (2000) IL-18 induces the differentiation of Th1 or Th2 cells depending upon cytokine milieu and genetic background. Eur J Immunol 30: 3147-3156.
2. Clauw DJ, Arnold LM, McCarberg BH (2011) The science of fibromyalgia. Mayo Clin Proc 86: 907-911.
3. Dionne RA (1997) Pharmacologic treatments for temporomandibular disorders. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 83: 134-142.
4. Srinivasan K, Muruganandan S, Lal J, Chandra S, Tandan SK, et al. (2001) Evaluation of anti-inflammatory activity of *Pongamia pinnata* leaves in rats. J Ethnopharmacol 78: 151-157.
5. Newman DJ, Cragg GM (2007) Natural products as sources of new drugs over the last 25 years. J Nat Prod 70: 461-477.
6. Aiyelaagbe OO, Osamudiamen PM (2009) Phytochemical screening for active compounds in *Mangifera indica* Leaves from Ibadan, Oyo State. Plant Sci Res 2: 11-13.
7. Vieira SCH, Sólon S, Vieira MC, Heredia Zárate NA (2010) Levantamento de fitoterápicos manipulados em farmácias magistrais de Dourados-MS. Braz J Pharmacog 20: 28-34.
8. Calixto JB, Beirith A, Ferreira J, Santos AR, Filho VC, et al. (2000) Naturally occurring antinociceptive substances from plants. Phytother Res 14: 401-418.
9. Eddouks M, Chattopadhyay D, De Feo V, Cho WC (2012) Medicinal Plants in the Prevention and Treatment of Chronic Diseases. Evid Based Complement Alternat Med 2012: 458274.
10. Mamedov N (2012) Medicinal Plants Studies: History, Challenges and Prospective. Med Aromat Plants 1: 8.
11. Farnsworth N, Soejarto D (1991) Global importance of medicinal plants. In: Conservation of Medicinal Plants. Cambridge University Press, UK pp: 25-52.
12. Akerele O (1992) Importance of medicinal plants: WHO's programme. In: Natural Resources and Human Health: plants of medicinal and nutritional value. Elsevier, Amsterdam, Netherlands.
13. Padulosi S, Leaman D, Quek P (2002) Challenges and opportunities in enhancing the conservation and use of medicinal and aromatic plants. J Herbs Spices Med Plants 9: 243-267.
14. De Padula L, Bunyapraphatsara N, Lemmens, R (1999) Plant Resources of South East Asia. Medicinal and poisonous plant 1. Backhuy Publishers, Leiden, the Netherlands.
15. Farnsworth N (1992) Preclinical assessment of medicinal plants. Natural Resources and Human Health. Elsevier Science Publishers BV.
16. Moerman DE (2009) Native American Medicinal Plants: An ethnobotanical dictionary. Timber Press, Inc, Portland, USA.
17. Moerman D (1986) Medicinal Plants of Native America. Research Reports in Ethnobotany, Ann Arbor: Museum of Anthropology, University of Michigan. Technical Reports No. 19.
18. Suzuki N (2004) Complementary and alternative medicine: a Japanese perspective. Evid Based Complement Alternat Med 1: 113-118.
19. Barnes PM, Bloom B, Nahin RL (2008) Complementary and alternative medicine use among adults and children: United States, 2007. Natl Health Stat Report 12: 1-23.
20. Pan S, Litscher G, Gao S, Zhou S, Yu Z, et al. (2014) Historical perspective of traditional indigenous medical practices: The current renaissance and conservation of herbal resources. Evidence-Based Complementary and Alternative Medicine pp: 1-20.
21. Wanchai A, Armer JM, Stewart BR (2010) Complementary and alternative medicine use among women with breast cancer: a systematic review. Clin J Oncol Nurs 14: E45-E55.
22. Bishop FL, Lewith GT (2010) Who uses CAM? A narrative review of demographic characteristics and health factors associated with CAM use. Evid Based Complement Alternat Med 7: 11-28.
23. Balick MJ, Cox PA (1997) Plants, People and Culture: The science of ethnobotany. Scientific American Library pp: 228.
24. Mamedov N, Craker L (2008) Endemic species of *Artemisia* L. (Asteraceae) from Caspian Sea region as alternative sources for malaria treatment. Proceedings of the First International Medicinal and Aromatic Plants Conference on Culinary Herbs, Antalya, Turkey.
25. Zhu Y (1998) Chinese Materia Medica Chemistry, Pharmacology and Applications. CRC Press, Taylor & Francis Group pp: 714.
26. Cronquist A (1988) The evolution and classification of flowering plants. Bronx: New York Botanical Garden.
27. Barroso G (1978) Sistematica de angiospermas do Brasil. Livros Técnicos e Científicos Editora 1.
28. Joly A (1998) Botanica 12 (eds). Sao Paulo7 Nacional.
29. Sherwin C (1998) Wood and stem anatomy of *Petiveria* and *Rivina* (Caryophyllales); Systematic implications. IAWA J 19: 383-391.
30. Mild C (2004) Smelly weed is strong medicine. Rio Delta Wild.
31. USDA (United States Department of Agriculture) (2008) *Petiveria alliacea* L. Germplasm Resources Information Network.
32. Schmelzer G, Gurib-Fakim A (2008) Medicinal Plants. Plant Resources of Tropical Africa. pp: 412-415.
33. Taylor L (2004) The Healing Power of Rainforest Herbs: A guide to understanding and using herbal medicinals. Square One Publishers, NY.
34. (2017) *Petiveria alliacea*.
35. de Andrade TM, de Melo AS, Dias RG, Varela EL, de Oliveira FR, et al. (2012) Potential behavioural and pro-oxidant effects of *Petiveria alliacea* L. extract in adult rats. J Ethnopharmacol 143: 604-610.
36. Luz DA, Pinheiro AM, Silva ML, Monteiro MC, Prediger RD, et al. (2016) Ethnobotany, phytochemistry and neuropharmacological effects of *Petiveria alliacea* L. (Phytolaccaceae): A review. J Ethnopharmacol 185: 182-201.
37. Alegre JC, Clavo M (2007) *Petiveria alliacea* L. [Internet] Record from PROTA4U. Schmelzer GH, Gurib-Fakim A (Editors). PROTA (Plant Resources of Tropical Africa/Ressources végétales de l'Afrique tropicale), Wageningen, Netherlands.
38. Queiroz ML, Quadros MR, Santos LM (2000) Cytokine profile and natural killer cell activity in listeria monocytogenes infected mice treated orally with *Petiveria alliacea* extract. Immunopharmacol Immunotoxicol 22: 501-518.
39. Illnait J (2007) Principales referencias etnomédicas sobre el anamú. Revista CENIC /Ciencias Biológicas 38: 27-30.
40. Brown D (1995) Encyclopaedia of herbs and their uses. Dorling Kindersley pp: 424.
41. Lindley J (1838) Lindley's flora medica. Longman, Orme, Brown, Green and Liongmans, London.
42. Gentry A (1993) A Field Guide to the Families and Genera of Woody Plants of Northwest South America (Colombia, Ecuador, Peru). Illustrations by R. Vasquez Martinez. Conservation International. Washington, DC.
43. Hernández JF, Urueña CP, Cifuentes MC, Sandoval TA, Pombo LM, et al. (2014) A *Petiveria alliacea* standardized fraction induces breast adenocarcinoma cell death by modulating glycolytic metabolism. J Ethnopharmacol 153: 641-649.
44. Adejumo OE, Owa-Agbanah IS, Kolapo AL, Marcus A (2011) Phytochemical and antisickling activities of Entandrophragma utile, Chenopodium ambrosioides and *Petiveria alliacea*. J Med Plants Res 5: 1531-1535.

Citation: Randle MM, Riley CK, Williams LAD, Watson CT. A Systematic Review of the Traditional and Medicinal Uses of *Petiveria alliacea* L. In The Treatment of Chronic Diseases. J Plant Sci Res. 2018;5(1): 179.

45. Urueña C, Cifuentes C, Castañeda D, Arango A, Kaur P, et al. (2008) *Petiveria alliacea* extracts uses multiple mechanisms to inhibit growth of human and mouse tumoral cells. BMC Complement Altern Med 8: 60.

46. (2011) Guinea hen weed: A powerful Jamaican herb.

47. Williams LA, Rosner H, Levy HG, Barton EN (2007) A critical review of the therapeutic potential of dibenzyl trisulphide isolated from *Petiveria alliacea* L. (guinea hen weed, anamu). West Indian Med J 56: 17-21.

48. Lemus-Rodrıguez Z, Garcia-Perez ME, Batista-Duharte A (2004) The anamu tablet: an immunostimulant herbal medicine. MEDISAN 8: 57-64.

49. Ruffa MJ, Perusina M, Alfonso V, Wagner ML, Suriano M, et al. (2002) Antiviral activity of *Petiveria alliacea* against the bovine viral diarrhea virus. Chemotherapy 48: 144-147.

50. Pacheco AO, Morán JM, Giro ZG, Rodríguez AH, Mujawimana RJ, et al. (2013) *In vitro* antimicrobial activity of total extracts of the leaves of *Petiveria alliacea* L. (Anamu). Braz J Pharm Sci 49.

51. Scalona JC (2005) Pharmaceutical chemical study of the leaves of *Tamarindus indica* L. theoretical evaluation of the activity of flavonoids. ISCM, Santiago de Cuba.

52. Ogunleye D, Ibioteye SF (2003) Studies of antimicrobial activity and chemical constituents of *Ximenia Americana*. Trop J Pharm Res 2: 239-241.

53. Kim S, Kubec R, Musah RA (2006) Antibacterial and antifungal activity of sulfur-containing compounds from *Petiveria alliacea* L. J Ethnopharmacol 104: 188-192.

54. Oluwa AA, Avoseh ON, Omikorede O, Ogunwande I, Lawal OA (2017) Study on the chemical constituents and Anti-inflammatory activity of essential oil of *Petiveria alliacea* L. Br J Pharm Res 15: 1-8.

55. Akoro S, Omotayo M, Ajibaye S, Dada F (2017) Comparative Alpha-amylase inhibitory properties of the leaf extracts of *Petiveria alliacea* L. Chem Sci Int J 19: 1-9.

56. Christie SL, Levy A (2013) Evaluation of the hypoglycaemic activity of *Petiveria alliacea* (Guinea Hen Weed) extracts in normoglycaemic and diabetic rat models. West Indian Med J 62: 685-691.

57. Lowe H, Toyang N, Heredia A, Ayeah K, Watson C, et al. (2015) *Petiveria alliacea* L (Guinea Hen Weed) and its major metabolite dibenzyl trisulfide demonstrate HIV-1 reverse transcriptase inhibitory activity. European J Med Plants 5: 88-94.

58. Shakya AK (2016) Medicinal plants: Future source of new drugs. Int J Herbal Med 4: 59-64.

59. Martinez M, Lazaro R, Del Olmo L, Benito P (2008) Anti-infectious activity in the anthemideae tribe. Studies in Natural Products Chemistry 35: 445-516.

60. (2008) World Health Organization Media Centre, Traditional Medicine.

61. Heinrich M (2000) Ethnobotany and its role in drug development. Phytother Res 14: 479-488.

62. Shakya AK, Sharma N, Saxena M, Shrivastava S, Shukla S (2012) Evaluation of the antioxidant and hepatoprotective effect of Majoon-e-Dabeed-ul-ward against carbon tetrachloride induced liver injury. Exp Toxicol Pathol 64: 767-773.

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