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Anti-diabetic and hypolipidaemic effect of botanicals: a review of medicinal weeds on KNUST campus, Kumasi

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ABSTRACT

In recent times, weeds have been controlled by chemical means and other means because they are seen as plant pests as they compete with "useful" plants for shelter, sunlight, nutrients and water. However, these weeds can serve as medicines for the treatment of several diseases such as diabetes and hyperlipidaemic conditions. This review, therefore creates the awareness of some weeds on KNUST campus, Kumasi-Ghana, which are capable of treating diabetes and hyperlipidaemia. There were sixteen weeds from 11 different families identified with anti-hyperlipidaemic and anti-diabetic properties or both. These same plants are also effective against other ailments such as malaria, toothache, eye problems, among others. Conclusion can therefore be drawn that weeds are valuable medicinal plants and hence, must be preserved.

INTRODUCTION

The occurrence of weeds is a serious problem in agriculture and tremendously reduces the productivity of agricultural trends by competing with crops for water, mineral nutrients, space and light (Sahu, 1983). A weed, in a general sense, is a plant usually wild or feral that is commonly considered to be a nuisance in a garden, lawn, or other agricultural development. More specifically, the term is often used to describe plants that grow and reproduce aggressively (Ediriweera, 2007). Weeds are now widely regarded as pests of crop because they lower the yield and increase the cost of production in various ways. Weeds, however, are also helpful to human beings in several ways among which are food, erosion control, medicine, supply of organic matter and mineral nutrients to soil, among others (Maroyi, 2011).Recent developments have revealed the importance of weedy species in traditional medicine. For instance, in Kenya, 75 plant species from 34 families are used to cure 59 ailments in traditional medicine of Central Kenya (Lewu and Afolayan, 2009). According to the WHO, over 80% of the world's population relies on traditional forms of medicine, largely plant based to meet primary health care needs (Mazid *et al*., 2012).

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Weeds are capable of curing so many diseases due to the presence of phytochemicals, among these diseases are diabetes and hyperlipidaemia.

Hyperlipidaemia is a highly predictive risk factor for atherosclerosis, coronary artery diseases, cerebral vascular diseases and a primary cause of death. The characteristic expression of hyperlipidaemia is an elevation in the plasma concentration of cholesterol and/or triglycerides (Desu and Saileela, 2013).Diabetes mellitus (DM) is a metabolic disorder characterized by elevation of blood glucose level.

DM is found worldwide and becoming a serious threat to mankind. It is third killer of human beings after cancer, cardiovascular and cerebro-vascular diseases (Gupta *et al*., 2009). Recently, some medicinal plants have been reported to be useful in hyperlipidaemia and diabetes worldwide and have been used empirically as anti-hyperlipidaemic and antidiabetic remedies. According to Kim *et al*. (2008), more than 400 plant species having hyperlipidaemic and anti-diabetic activities are available in literature.

This review was undertaken to discuss medicinal weeds on KNUST campus with anti-hyperlipidaemic and anti-diabetic activities, to serve as a guide for further research and also to persuade the conservation of such weeds with due consideration and proper planning.

Table 1: Summary of medical plants on KNUST Campus with anti-diabetic and anti-hyperlipidaemic activities.

Plant	Family	Part used	Extract studied	Diabetic /hyperlipidaemic inducing agent	Biochemical /histopathologicalparameters studied
***Ageratum conyzoides* L.**	Asteraceae	Whole plant and leaves	Aqueous extract	Streptozotocin	Oral glucose tolerance
***Bauhinia rufescens* Lam.**	Fabaceae	Leaves	Methanolic extract	Alloxan	Blood glucose, lipid profile and body weight
***Cassia auriculata* L.**	Fabaceae	Flowers	Aqueous extract	Streptozotocin	Blood glucose, haemoglobin, glycosylated haemoglobin, serum and tissue lipids, hexokinase and glucose-6-phosphatase activity
Gongronema latifolium	Asclepiadaceae	Leaves	Aqueous and Methanolic extract	Alloxan	Phytochemicals and LD_{50}
***Hyptis suaveolens* (L.) Poit**	Lamiaceae	Leaves	Aqueous extract	Streptozotocin	Triglyceride, total cholesterol, low density lipoprotein, very low density lipoprotein
***Ipomoea sepiaria* Roxb.**	Convolvulaceae	Leaves	Aqueous extract	Streptozotocin	Serum glucose concentration
***Mimosa pudica* L.**	Fabaceae	Leaves	Ethanolic and petroleum ether extract	Alloxan	Plasma glucose level
***Mollugo nudicaulis* Lamk.**	Molluginaceae	Whole plant	Ethanolic extract	Alloxan	Blood glucose, cholesterol, triglycerides, LDL, lipid peroxidation, liver glycogen, serum creatinine, urea, uric acid and liver marker enzymes such as AST, ALT, ALP
***Pergularia daemia* (Forsk.) Chiov.**	Apocynaceae	Whole plant	Methanol and aqueous extract	Alloxan	Blood glucose
***Phyllantus amarus* Schum. &Thonn.**	Euphorbiaceae	Leaves	Ethanolic extract	Alloxan	Blood glucose, liver enzymes such as glucokinase, glucose -6-phosphatase and fructose -1- 6-diphosphatase
***Senna occidentalis* L.**	Fabaceae	Leaves	Methanol	Streptozotocin	Blood glucose, Haemoglobin, glycosylated haemoglobin, hepatic glycogen, lipid peroxidation, antioxidants enzymes (TBARS, HP, SOD, CAT, GPx, VitC, Vit E,GSH) and hepatic marker enzymes (ALT, AST,ALP,ACP)
***Sida acuta* Burm.f.**	Malvaceae	Leaves	Aqueous and methanol extracts	Alloxan	Blood glucose
***Vernonia amygdalina* Delile**	Asteraceae	Leaves	Ethanolic extracts	Streptozotocin	Glucose and activities of antioxidant enzymes, e.g., catalase (CAT), glutathione peroxidase (GPx) and superoxide dismutase (SOD)
***Catharanthus roseus* (L.) G. Don**	Apocynaceae	Leaves	Powder	Streptozotocin	Plasma glucose, plasma insulin
***Amaranthus viridis* L.**	Amaranthaceae	Leaves	Methanolic extract	Streptozotocin	Blood glucose, serum cholesterol, serum triglyceride, high density lipoprotein, low density lipoprotein, very low density lipoprotein
***Euphorbia prostrate* Aiton**	Euphorbiaceae	Whole plant	Ethanolic extract	Atherogenic diet + cholesterol powder supplement	HDL-cholesterol, lipid profile

Medicinal weeds with anti-diabetic and anti-hyperlipidaemic activity

Table 1 above gives the summary of 16 weed plants identified with anti-diabetic and anti-hyperlipidaemic on KNUST campus. Each plant is described in the remaining sections.

Ageratum conyzoides L. (Asteraceae)

Common names: Billygoat–weed, Goatweed, Whiteweed or Chickweed (Nyunai *et al*., 2010).

Description

It is an annual herb ramified and up to 1 m tall. Its stem and leaves are covered with tiny white hairs. Leaves are opposite, pubescent with long petioles and include glandular trichomes. The flowers are purple and white and the fruits are black and easily dispersed (Nyunai *et al*., 2010).

Parts used: Whole plant and leaves.

Medicinal uses: Pharmacological studies have revealed that the plant has anti-diarrhoeal and antibacterial, antiparasitic,

anti-inflammatory anticoagulant, myorelaxant, haemostatic, analgesic, antifungal and hypothermic properties. In traditional medicine, a decoction or infusion of *A. conyzoides* is used for the treatment of constipation, hepatitis, eczema, epilepsy, wounds, dizziness, diarrhoea, vomiting, fever, headaches, intestinal worms and filariasis. Fresh leaf aqueous extract is used in treating painful menstruation, itching of eye and against lice. An ethno-botanical study reported that, leaves, or entire plant decoction is useful for the treatment of diabetes (Nyunai *et al*., 2010).The hypo-glycaemic and anti-hyperglycaemic properties of the aqueous extracts of the leaves of *A.conyzoides* L. have being validated in normo- and hyperglycaemic rats (Nyunai *et al*., 2010).

Toxicity

The plant has been reported to have hepatotoxic activities. It contains pyrrolizidine alkaloids and echinatine which form covalent bonds with nucleic acids of the hepatocytes to disrupt cellular protein synthesis and replication which cause liver lesions and tumours (Fu *et al.*, 2002).

***Bauhinia rufescens* Lam. (Fabaceae)**

Description

B.rufescens is a shrub usually 1-3 m high and sometimes reaching 8 m. The bark is ash-grey, smooth and very fibrous. The leaves are very small with greenish-yellow to white and pale pink flowers. Fruits aggregated with 4-10 seeds each (Muhammad and Sirat, 2013).

Parts used: Whole plant, roots and leaves.

Medicinal uses

The plant is used in the treatment of gout, gingivitis, diarrhoea, dysentery, diabetes, leprosy and malaria. The leaves and fruit are for the treatment of diarrhoea, dysentery and ophthalmic diseases. An extract of the root is used as an astringent or antipyretic. The bark of the roots and trunk is used to cure chest complaints, syphilis and other venereal diseases and to reduce fever (Muhammad and Sirat, 2013). An investigation carried out by Aguh *et al.* (2013), showed that methanolic leaf extracts of *Bauhinia rufescens* has beneficial effects on diabetic hyperlipidemia as such could be advanced in preventing the development of atherosclerosis and possible related cardiovascular pathologies associated with diabetes.

***Cassia auriculata* L. (Fabaceae)**

Common name: Tanner's cassia

Description

C.auriculata is a much branched shrub with smooth cinnamon brown bark and closely pubescent branchlets. The leaves are alternate, stipulate, paripinnate compound, very numerous, closely placed. Its flowers are irregular, bisexual, bright yellow and large. The fruit is a short legume, oblong, obtuse, tipped with long style base, flat, thin, papery, undulately crimpled, pilose, pale brown (Anushia *et al.*, 2009).

Parts used: Roots, leaves, flowers and seeds.

Medicinal uses: This plant is said to contain a cardiac glucoside (sennapicrin) and sap, leaves and bark yield anthraquinones, while the latter contains tannins. The root is used in decoctions against fevers, diabetes, diseases of urinary system and constipation. The leaves have laxative properties. The dried flowers and flower buds are used as a substitute for tea in case of diabetes patients. The powdered seed is also applied to the eye, in case of chronic purulent conjunctivitis. In Africa, the bark and seeds are said to give relief in rheumatism, eye diseases, gonorrhoea, diabetes and gout. The plant has been shown to have antibacterial activity in laboratory animals (Anushia *et al.*, 2009). A study conducted by Pari and Latha, (2002) on*Cassia auriculata* flower extract (CFEt), at doses of 0.15, 0.30 and 0.45 g/kg body weight for 30 days, observed the suppression of elevated blood glucose and lipid levels in diabetic rats. *C.auriculata* at 0.45 g/kg was found to be comparable to glibenclamide. These findings indicate that the *C.auriculata* flowers possess antihyperlipidaemic effect in addition to antidiabetic activity.

***Gongronema latifolium* (Asclepiadaceae)**

Description

This is a climbing shrub with hollow stems and fleshy roots, containing latex. Leaves are opposite, simple and entire with petioles. Its blade is broadly ovate, base deeply cordate, apex acuminate, papery. Inflorescence is terminal and axillary cymose panicle. Flowers are bisexual, small, 5-merous, regular, yellow-green, and fragrant; calyx lobes elliptical to rounded, hairy at apex (www.prota4u.org).

Parts used: Whole plant, leaf and stem bark

Medicinal value: *G.latifolium* is reported to have anti-inflammatory, antibacterial, antioxidant, anti-asthmatic and antiplasmodal activities. The leaf extracts have analgesic effects, antipyreticand anti-sickling activities. The stem bark extracts have anti-ulcerative property. It is used to treat malaria, stomach disorders, diabetes, hypertension, muscular pains, arthritis and inflammation, cough and loss of appetite.

It has also been reported that the plant is used for the treatment of sore gums, colic, dyspepsia and anthelmintic, worm infections and for maintaining healthy blood glucose level. The plant contains phytochemicals such as polyphenols, alkaloids, glycosides, flavonoids, terpenes, tannins, saponins, alkaloids, β-sistosterol, lupenyl esters, pregnane ester and essential oils (Nnodim *et al.*, 2012).Work done by Akah *et al.*, (2011) showed the presence proteins, flavonoids, saponins, alkaloids, terpenoids, and steroids in methanol extract and fractions giving credence to the use of *G. latifolium* in the management of diabetes mellitus.

***Hyptis suaveolens* (L.) Poit (Lamiaceae)**

Common name: Pignut or Chan

Description

It is an annual to perennial subshrub which grows up to 2m high having branches and long white piliferous stems, its flowers are purple, the leaves are ovate with serrulate margins; the flowers are whorly arranged and the fruits are broadly obovoidal (Attawish *et al*., 2005; Deshmukh, 2012).

Part used: Leaves

Medicinal uses: The leaves serve as antiseptic, sudorific, galactagogue and antidiabetic. The essential oils have mild antifungal activity against *Candida albicans* and *Aspergillus niger*. Phytochemicals present are alkaloids, glycosides, phytosterols, saponins, phenolic compounds and tannins (Attawish *et al*., 2005; Deshmukh, 2012).

A significant reduction in blood glucose was observed in diabetic animals treated with *H. suaveolens* at different doses when compared with diabetic rats. Levels of triglyceride, total cholesterol, low density lipoprotein, very low density lipoprotein were decreased. The results therefore showed that *H. suaveolens* possesses significant antihyperglycemic activity which might be attributed to stimulating effects on glucose utilization and antioxidant enzyme (Mishra *et al.*,2011).

***Ipomoea sepiaria* Roxb. (Convolvulaceae)Synonym:** *Ipomoea aquatica*

Common name: Purple Heart Glory

Description

It is a perennial slender herb with hairy stems; the leaves are simple, alternate, petiolate, ovate to cordate in shape; the flowers pale purple and subumbellate axillary cymes and the fruits are void (Das *et al.*, 2011; Sayani *et al.*, 2012).

Parts used: Whole plant, leaves and roots.

Medicinal uses

The root is used in the treatment of leucorrhoea and infertility. Whole plant serves as a tonic, aphrodiasiac, antidiuretic, antidiabetic and hyperdipsia. The leaves have antibacterial activity. The phytochemicals reported to be present are carbohydrates, alkaloids, glycosides, flavonoids, phenolic compounds, tannin and saponin (Das *et al*., 2011; Sayani *et al*., 2012).

The antidiabetic effect has been studied in streptozotocin induced diabetic Wistar rats, and Type II diabetic patients. The results revealed that consumption of the shredded, fresh, edible portion of *I. aquatica* for one week, effectively reduced the fasting blood sugar level of streptozotocin-induced diabetic rats ($p = 0.01$). When subjected to a glucose challenge, the Type II diabetic subjects showed a significant reduction ($p = 0.001$) in the serum glucose concentration 2 h after the glucose load. However, it was not significantly reduced at 1 h ($p < 0.09$) post glucose load. There was a 29.4% decrease in the serum glucose concentration of the diabetic patients when treated with the plant extract (Malavidhane *et al.*, 2003).

***Mimosa pudica* L. (Fabaceae)**

Common Name: Touch- Me-Not

Description

It is a prickly perennial herb that grows up between 0.5-0.9m high; leaves are bi-pinnate, opposite, compound in nature and sensitive to touch; flowers are axillary positioned, clustered in fluffy balls, radially symmetrical and campanulate; fruits occur in aggregate of 2-8 pods (Srivastava *et al.*, 2012).

Parts used: Root, leaf and whole plant

Medicinal uses

The root extract is used to treat leprosy, dysentery, asthma, insomnia, premenstrual syndrome, menorrhagia, jaundice, impotence and haemorrhoid. The leaves are used to treat type-I diabetes. The whole plant is used to treat asthma (Srivastava *et al.*, 2012). In a study conducted by Sutar *et al*. (2009), attempts were made to study anti-diabetic activity ofthe leaves of *Mimosa pudica* Linn. ethanolic extract showedsignificant decrease in blood glucose level whichcompared well with metformin as standard drug (500mg/kg)in alloxan-induced (150mg/kg) diabetic rats.

***Mollugo nudicaulis*Lamk.(Molluginaceae)**

Common name: Daisey-leaved chickweed

Description

It is an annual plant which grows up to 22 cm tall. Leaves are broad, spathulate to oblanceolate, glabrous, and attenuate. Flowers are in dichasial cymes; scapes slender, glabrous; involucral bracts ovate-oblong, scarious; sepals oblong, mucronate, imbricate persistent. Filaments are persistent. Ovary is sub-globose. Seeds are muricate, minutely strophiolate, black and shiny (Sindhu *et al.*, 2010).

Parts used: Whole plant.

Medicinal value

*Mollugo nudicaulis*is a medicinal herb, used by traditional practitioners to cure whooping cough, jaundice, cold, cough, fever, body pain and wounds. It is useful mainly in preventing small ring worms in stomach, to control diabetes and to increase the life energy of blood cells (Sindhu *et al.*, 2010). The antidiabetic and antioxidant potential of *M. nudicaulis* whole plant ethanol extract has been demonstrated in alloxan-induced diabetic rats. At a dose200mg/kg administered orally to the diabetic rats for 21 days, significant decreases in the level of blood glucose, cholesterol, triglycerides, low densitylipoprotein (LDL), lipid peroxidation, liver glycogen, serum creatinine, urea, uric acidand liver marker enzymes such as AST, ALT, ALP were observed. It also produced significant increasein high density lipoprotein (HDL), superoxide dismutase (SOD), catalase (CAT),glutathione peroxidase (GPx), glutathione-S-transferase (GST), reduced glutathione(GSH), and Vitamin C, which clearly showed the antioxidant property of extract(Sindhu *et al.*, 2010).

***Pergularia daemia*(Forsk.) Chiov. (Apocynaceae)**

Description

It is a perennial herbaceous plant; the leaves are opposite, simple and broadly ovate to cordate with petioles (www.plants.jstor.org).

Part used: Whole plant

Medicinal uses: The whole plant serves as antidiabetic, laxative, antimalarial, anthelmintic, anti-pyretic and analgesic (Suresh Kumar and Mishra, 2008). Phytochemicals reported to be present are alkaloids, steroids, saponins, terpenoids and flavonoids (www.plants.jstor.org).

A study to evaluate the antidiabetic activities of methanol and aqueous extracts of *P.daemia*in alloxan induced diabetic rats showed that oral administration of alcoholic extract of *P. daemia*leaves to diabetic rats for 21 days significantly reduced the levels of blood glucose levels in both acute and sub-acute study. The results were suggestive that the methanol extract of *P. daemia*possess antidiabetic effect on alloxan induced diabetic rats and it can be recommended for the prevention of diabetes mellitus (Doss and Anand, 2014).

***Phyllantus amarus*Schum. &Thonn. (Euphobiaceae)**

Common names: Stonebreaker or seed-under-leaf

Description

P. amarus is a small pantropical herb that grows to about 50 cm. Leaf is in one plane. Flowers are all pendent from one side of the branch, separate male and female. Fruits globular-depressed, splits into 3 seeds ribbed (Khan *et al*., 2012). .

Part used: Whole plant

Medicinal uses

P. amarus is a potential diabetic and hypotensive drug for humans (Khan *et al*., 2012). Whole plant is used in the traditional and folk medicines for the treatment of jaundice, asthma, hepatitis, tuberculosis, ulcer and urinary diseases. It is also used in stomach ailments like dyspepsia, colic, diarrhoea, dysentery, dropsy, urinogenital problems, kidney stones, gall stones and for external application in case of swelling and inflammation (Xavier *et al*., 2012).

Oral administration of ethanolic leaf extract (400 mg/kg body weight) for 45 days resulted in a significant ($P<0.05$) decline in blood glucose from 310.20 to 141.0 mg/dl and significant recovery in body weight of diabetic mice. There was also a significant ($P<0.05$) reduction in the activities of glucose-6-phosphatase and fructose-1-6-bisphosphatase in liver, significant ($P<0.05$) increase in the activity of glucokinase in liver of diabetic mice when compared with that of diabetic control. The study clearly shows that the ethanolic leaf extract of *P.amarus* possesses potent antidiabetic activity (Shetti *et al.*, 2012).

***Senna occidentalis* L. (Fabaceae)** Synonym**: *Cassia occidentalis*L.**

Common Name: Coffee weed

Description

It is a slightly branched half wood annual herb that can grow up to a height of 8 m. The leaves are compound alternate, pinnate, ovate at the top; the inflorescences are axillary raceme with yellow-coloured flowers (petals). The fruit exist as pod containing the seeds (Vashishtha *et al.*, 2009).

Parts used: Whole plants, root, flower.

Medicinal uses

The roots treat ringworm, and snake bites. The leave/root extracts are used to treat jaundice, hepatitis, cirrhosis, and diabetes. The seed is used to treat asthma. Flower is used to treat bronchitis. The plant is used to inhibit bacteria, fungi and expel worms (Yadava and Satnami, 2011; Sadiq *et al*., 2012; Vashishtha *et al.*, 2009).

In a study,methanol fraction of *C.occidentalis*leaves (*COLMF)* was tested against streptozotocin-induceddiabetic rats and the levels of haemoglobin, glycosylated haemoglobin, hepatic glycogen, lipid peroxidation,antioxidants enzymes (TBARS, HP, SOD, CAT, GPx,VitC,VitE,GSH) and hepatic marker enzymes(ALT, AST,ALP,ACP) evaluated in normal and diabetic experimental rats.

Oral administration of *COLMF*significantly and dose-dependently normalized the above mentioned parameters near to normal inSTZ-diabetic rats ($p<0.05$). Histopathological examination also showed that *COLMF* extract protected the pancreatic tissue from STZ-induced damage (Emmanuel *et al*., 2010).

Toxicity

Vashishtha *et al*. (2009) showed that the beans and pods are toxic to farm animals. The extent of the toxin depends largely on the dose of the bean consumed.

***Sida acuta*Burm.f. (Malvaceae)**

Common name: Horn beam-leafed tree

Description

This plant grows up to 0.7m high, branchlets erect, numerous; obovate, dentate broad, and pubescent. Flowers are axillary, solitary or geminate sometimes with a terminal pauciflorousglomerule; fruits more or less globular, covered on top with golden hair; seeds are obovoid and blackish. The plant is a pan tropical wild species, that growing at road sides and on wastelands (Mshana *et al.*, 2000).

Parts used: Whole plant, leaves, roots and shoot.

Medicinal uses

The whole plant is used for prenatal care and dystocia, while the leaves are for dystocia, diabetes mellitus, lumbago and ringworm. The roots are used to treat dysentery, dystocia, male sexual impotence while the shoot is used for gonorrhoea and male sexual impotence. The leaves are also used to treat abdominal pain, haemorrhoids, azoospermia and oligospermia (Mshana *et al.*, 2000). The effect of the aqueous and methanol extracts of *S.acuta* on blood glucoselevels in both normal and diabetic rabbits was studied in glucose overloaded rabbits. Extracts have also tested for anti-diabetic activity in alloxan-induced diabeticrabbits.Results showed that both the aqueous extracts of *S.acuta* (AESA) and the methanol extracts (MESA) at 400 mg/kg significantly increased the tolerance forglucose in glucose fed normal rabbits. Blood glucose levels were reduced significantly at1/2 hrs post-glucose load ($p<0.05$).

This reduction was consistent and persisted to2 1/2 hrs. The positive control drug (glibenclamide, 0.5 mg/kg body weight, p.o)produced significant reduction on glycemia at 2 hours post glucose load ($p<0.01$).The methanol extract produced a significantly lower glucose concentration(mg.min/dl), as calculated from the area under the curve (AUC) of the glucosetolerance test, than AESA, glibenclamide and negative

control respectively in thetime periods 30-60 minutes, 60-90minutes and 90-150minutes ($p<0.05$; $p<0.01$).Both extracts (AESA and MESA) reduced blood glucose level in alloxanized rabbitssignificantly ($p<0.05$).

The AESA and MESA (400mg/kg p.o) produced significantdecreases in blood sugar at 4hours with percentage glycemic change of 30% and20% respectively. The anti-hyperglycemic action of AESA and MESA weresustained up to 8hours with significant percentage glycemic change of 46% and45% respectively ($p<0.01$). The crude leaf extracts of *Sida acuta*therefore possess anti-hyperglycemic activity (Okwuosa *et al*., 2011).

***Vernoniaamygdalina*Delile (Asteraceae)**

Common name*:* Bitter leaf

Description

A shrub of 2-5m high, leaves are elliptic with characteristic bitter taste.

Part Used: Leaves

Medicinal Uses

The bitter leaf is used in local medicine to cure fever, cough and as a laxative. Leaf decoction is taken to treat pneumonia, increase breast milk in nursing mothers and to cure cough. The leaf juice treats ring worm and other skin infections. When drunk, it treats diabetes. Leaf extract is drunk to cure malaria, fever and intestinal complaints. The infusion of the leaf treats loss of appetite (Obute and Adubor, 2007). A decoction from a combination of herbs is commonly used in Traditional African Medicine for the management of chronic ailments. In Nigeria, the leaves of *V.amygdalina* Del. (VA) and *Azadirachtaindica* A. Juss (AI) are used traditionally as a remedy against diabetes mellitus for which empirical evidence attests to its efficacy(Atangwho *et al*., 2012).

***Catharanthus roseus* (L.) G. Don (Apocynaceae)**

Common name: Madagascar periwinkle

Description

It is a procumbent herb that can grow up to a height of 1 m. The leaves are opposite, oval to oblong, green and have short petiole. The flowers are white to dark pink, with five petals lobed together and the fruit exist as a pair of follicles (Gajalakshmi *et al*., 2013).

Parts used: Whole plant, leaf and root.

Medicinal uses

The whole plants treats muscle pains, sore throat, gastritis, raised blood sugar level, malaria and has anticancer properties. The leaves are used traditionally to treat Hodgkin's lymphoma, and leukaemia. The roots are used to treat high blood sugar (Gajalakshmi *et al.*, 2013).In a study to evaluate the possible antidiabetic and hypolipidemic effect of *C. roseus* leaf powder in diabetic rats, decreased plasma glucose and an increase in plasma insulin were observed after 15 days in diabetes-treated rats and by the end of the experimental period the plasma glucose had almost reached the normal level, but insulin had not. The significant enhancement in plasma total cholesterol, triglycerides, LDL and VLDL-cholesterol, and the atherogenic index of diabetic rats were also normalized in diabetic-treated rats (Rasineni *et al.,* 2010)

***Amaranthus viridis* L. (Amaranthaceae)**

Common names: Slender Amaranth or Green Amaranth (Krishnamurthy *et al.,* 2011).

Description

A. viridis grows annually as an erect, monoecious herb, and is around 100-300 cm tall (Krishnamurthy *et al*., 2011).

Parts used: Whole plant.

Medicinal uses

A. viridis has been reported to have anti-inflammatory, antipyretic, antirheumatic, antiulcer, antiemetic, antidiabetic, diuretic, analgetic, laxative, antileprotic and hypolipidemic properties. The plant has been used in India traditionally to reduce labour pain, treat respiratory and eye problems, asthma and used for the improvement of appetite (Krishnamurthy *et al*., 2011).A study was conducted to investigate the antihyperglycemic and hypolipidemic effects of methanolic extract of leaves of*A. viridis* (MEAV) in normal and streptozotocin (STZ) induced diabetic rats.

The statistical data indicated a significant increase in the body weight, decrease in the blood glucose, total cholesterol and serum triglycerides after treatment with MEAV. High density lipoprotein (HDL) cholesterol level was significantly increased when treated with extract. Histologically, focal necrosis was observed in the diabetic rat pancreas, however, was less obvious in treated groups. The MEAV has beneficial effects in reducing the elevated blood glucose level and body weight changes, and improves the lipid profile of STZ induced rats (Krishnamurthy *et al.,* 2011).

Toxicity

The pollen grains from this plant are known to be highly allergenic and a potential cause of respiratory allergic diseases (Hasnain *et al*., 2007).

***Euphorbia prostrata*Aiton (Euphobeaceae)**

Common name: Prostrate sandmat, red euphorbia, prostrate spurge (www.flowersofindia.net).

Description

E. prostrata (L) is an annual herb with slender prostrate, purple-tinted stems up to about 20 cm long. The oval-shaped leaves are up to 1 cm long with finely toothed edges. The inflorescence is a cyathium with white petal-like appendages surrounding the actual flowers. There are four male flowers and a single female flower, the latter developing into a lobed, hairy fruit (www.flowersofindia.net).

Parts used: Whole plant.

Medicinal value

E. prostrate has been reported to have antihemorrhoidal, anti-inflammatory, analgesic, hypolipidemic, antidiabetic, antidiarrheal, antiasthmatic and astringent properties. It also has antioxidant, haemostatic, antithrombotic and vasoprotective

actions for various skin diseases and used traditionally as snake bite remedy. It is effective against various signs and symptoms of haemorrhoids including bleeding, anal discomfort, anal itching, pain at prolapse and proctitis in haemorrhoids (Sharma *et al*., 2011).

The active constituents of *Euphorbia prostrata* include tannins, flavonoids such as apigenin, luteolin and quercetin. It also contains phenolic acids such as ellagic acid, gallic acid (Sharma *et al*., 2011). Hypolipidaemic evaluations of *E. prostate* observed a deduction to near normal increased cholesterol levels; from 940.7 to 230.41 (75.55%) and further to 119.2 (87.32%) by the end of the experiment. Similarly, phospholipids and triglycerides levels were reduced. The tissues lipids profiles of liver and heart muscle showed similar changes in those noticed in serum lipids. (Shahwan *et al*., 2009).

CONCLUSION

Sixteen plants which are considered as weeds have medicinal values. These plants belong to about 10 families. The whole plant or different parts of the plants such as roots, stem, flowers, leaves, fruits and seeds are used as medicine. Apart from serving as anti-diabetic and anti-hyperlipidaemic, they are used in the treatment of other various diseases such as dysuria, wounds, jaundice, diarrhoea, skin diseases, malaria, gonorrhoea, toothaches, eye problems, asthma, among others. Most of these weeds are edible and are used as vegetables. It can finally be concluded that weeds are valuable medicines and should be protected.

The awareness of the medicinal values of weeds should be made in order to help in the conservation of these plants.

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