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A study on anti-diabetic and anti-hypertension herbs used in Lorestan province, Iran

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ABSTRACT

Introduction: Diabetes and hypertension are amongst the most prevalent diseases in the world, while they can be controlled and prevented, create many problems and complications for affected patients. This study was aimed to identify and report the most important and effective herbs for diabetes and high blood pressure treatment in Lorestan province (West of Iran).
Methods: By gathering and integrating indigenous data from local inhabitants of Lorestan, Iran, the goal of this study was accomplished. Data were gathered by cooperation of the agents of public health services network all over the towns of Dorud, Boroujerd, Khorramabad, Aleshtar, Poledokhtar, Aligoodarz, Nurabad and Kouhdasht.
Results: Results of this study showed that there were overall 17 medicinal plants which were used for treatment and controlling of diabetes and high blood pressure.
Conclusion: Medicinal plants reported in this study are indigenous to the Lorestan province. Some of the foresaid herbs seem to have some unknown therapeutic effects which are reported in this study for the first time, and some others have various known therapeutic effects mentioned in other similar studies. It is essential for researchers to find out the actuality of clinical effectiveness of the herbs and their active substances. Once the positive effects of these herbs proved, it would be possible to produce drugs which are useful in curing and controlling diabetes and hypertension.

Implication for health policy/practice/research/medical education:
Medicinal plants reported in this study are indigenous to the Lorestan province. If their effects are confirmed by researchers, it would be possible to produce drugs useful in curing and controlling diabetes and hypertension.

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Introduction

Diabetes is one of the most common chronic diseases in the world which is becoming increasingly prevalent. It is also the third leading cause of death in the most developed countries (1). Diabetes mellitus is a complex disorder with metabolic and vascular complications. This chronic disease causes hyperglycemia then it affects different body systems, including the kidneys, eyes and mucous membrane. 9.5% of U.S population is diagnosed to have diabetes (2).

Diabetes is the most common carbohydrate metabolism disorder in which blood glucose level rises due to a deficiency of Insulin secretion or its abnormal activity. Long-term complications of diabetes include heart disease, stroke, kidney failure, blindness, nerve damage and neuropathy, atherosclerosis, chronic infections, immune deficiency and peripheral vascular disease that may lead to ulcers, gangrene and amputation (3-5).

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In 2011, approximately 7% of world population was diagnosed with diabetes, while 80% of these people were living in developing countries (6). Studies conducted in Iran show a prevalence of approximately 4.2% to 15.9% (7). Hypertension is defined as a blood pressure more than 90/140 mmHg. In 95% of cases, the cause of hypertension is unknown, which is called primary hypertension. Some main causes of hypertension include oral contraceptive drugs, hyperaldosteronism, cushing's syndrome, renal artery stenosis and renal failure. Other possible causes of hypertension include genetic-related disorders of renal sodium secretion, genetic-related disorders of Na/Ca exchange in smooth muscles of arteries, changes in the genes coding angiotensin, other proteins of renin-angiotensin system, and hormonal-neurogenic vasoconstriction (8-17). Almost a quarter of deaths in elderly patients are resulted from hypertension and its complications (18).

Blood pressure is a common asymptomatic, identifiable and usually treatable disease but if left untreated the consequences of that could be fatal for the patient. Hypertension is the most common risk factor for acute myocardial infarction, stroke, peripheral vascular disease, and is the major known factor for cardiovascular disease and its mortality (19-21).

Regarding the importance of producing therapeutic agents and drugs from medicinal plants and preparing documentations about valuable indigenous information in the field of traditional medicine and finding cheap, safe and effective ways of preventing diabetes and hypertension, this ethnobotanical study was performed to collect the information about traditional medicine in Lorestan region and to identify medicinal plants claimed to be effective in treating diabetes and hypertension.

Materials and Methods

The study setting

Lorestan is a province of western Iran, located latitude and longitude of 33.4871° N, 48.3538°. Lorestan has four different climates (semi-dry, semi-moist temperate, semi-moist cold and altitude climate). Its area is approximately 28,300 square acres of land. Minimum height above sea level is 330 m in Pole-Zal and maximum height above sea level is 4050 m in Oshtoran-kooh.

This province has a varied climate and this variability is quite evident from the northeast to the southwest. Lorestan is a neighbor of Hamedan and Markazi provinces in north, Isfahan in east, Khuzestan in south and Ilam and Kermanshah in west.

Method of identifying and collecting the plants

Data of traditional medications were provided through interviews and questionnaires, with assistance of Management and Planning Organization of Lorestan province and Lorestan University of Medical Sciences. Local inhabitants data were also collected through cooperation with Health Networks of Dorud, Burujird, Khorramabad, Aleshtar Poldokhtar, Aligoodarz, Nurabad and Kouhdasht.

Results

After collecting and classifying the data, a total number of 17 medicinal plants effective for controlling and treating of diabetes and hypertension were identified, which were marked in Table 1.

Discussion

Despite the presence of anti-diabetic drugs in pharmacies, diabetes and its complications are still a major medical problem. So, many studies and efforts have been done to manage clinical treatment of diabetes by applying medicinal plants. Hence, ethnobotanical studies are necessary for identifying anti-diabetic herbs and providing information for researchers. The World Health Organization (WHO) has declared about the use of herbal agents in controlling diabetes and conducting researches in this direction as a necessity (27).

In traditional medicine, berries are used as antidiabetic agents in lowering blood glucose, diuretic, laxative, effective in smallpox and typhoid, fattening agent, aphrodisiac, relieve coughing, asthma, effective in rheumatism, mucokinetic, anti-phlegmatic, treatment of hypotension and bactericidal and virucidal effects (28-32). Berry is introduced as one of the anti-diabetic plants in Lorestan province in traditional medicine which is effective in reducing blood sugar.

Berries are important sources of antioxidant and phenolic compounds. Flavones, hydroxycinamic acid and cyanidin 3-glucoside are other compounds found in the berries (33-35). Berry lowers blood glucose and increases glucose uptake by the cells (36). Given the known mechanisms of berry in treatment and prevention of diabetes and hyperglycemia and its complications, it can be used as an alternative to sugar to sweeten tea in diabetic persons.

Barberries are used in treating infectious fevers, typhus and diarrhea. Experimental studies performed on animals reportedly show anti-inflammatory effects of barberry (37,38). Flavonoids aglycones inhibit facilitated diffusion of glucose and flavonoids glycosides inhibit glucose uptake through active transport. In addition, certain polyphenols such as catechin and gallic acid have no effect on insulin-mediated glucose uptake, whereas quercetin, myristin and catechin gallate inhibit glucose uptake in a dose-dependent manner (39,40). Another study proved that barberry has a depressing effect on blood pressure (41). Other studies have also shown the arterial blood pressure lowering effects of barberry. Barberry fruits contain bioactive substances such as malic acid, pectic substances, glycoside substances and berberine. Most properties of Barberries can be attributed to berberine (42-44).

Citrullus colocynthis has been mentioned as a healing drug of diabetes in traditional medicine (45). Acute

Table 1. Complete information of ethnobotany, route of use and therapeutic effects of herbs effective in diabetes and high blood pressure in Lorestan province.

Scientific name	Family	Local Name	Persian Name	Usable Part	Method of application	Gathering Season	Traditional Therapeutic Effect
Morus alba	Moraceae	Ti	Toot	Fruit	Raw berry or dried berry is eaten as sugar	Spring	Lowers blood pressure
Berberis integrima	Berberidaceae	Zereshk	zereshk	Leaf and stem	Cooked and sodden	Spring	Diabetes treatment
Pistacia atlantica	Anacardiaceae	Zhevi	baneh (peste koohi)	Juice	After softened by drenching, it is applied on the ulcer and covered with fabric ,to be replaced each day	Spring, Summer	Diabetic ulcers and hyperglycemia
Capparis spinosa	Capparaceae	Shomi-sheytoni	Hendevaneh aboujahl	Fruit and leaf	Raw fruit or dry leaf distillate is eaten	Spring, Summer	Lowers blood glucose
Urtica dioica	Urticaceae	gezgezo	gazaneh	Twig	The leaf is tied on muscles, sodden stems is eaten with soup	Spring, Summer, Autumn	Lowers blood glucose
Valeriana officinalis L	Valerianaceae	Midareh	sonbol-el-tib	Fruit	Ripe fruit is eaten raw, unripe fruit is used to provide distillate	Spring	Lowers blood glucose
Melilotus officinalis	Leguminosae	Yonje	yonje	Flower, leaf, stem	Distillate or infusion is drunk after eating food. Raw leaves and stem is used	Any season	Lowers blood glucose
Nectaroscordeum tripedale Nectaroscordeum coelzi	Amaryllidaceae	Aneshk	Piaz tabestani lorestan	Twig	Raw or through sauces, with beverages like dough, infusions is eaten	Spring	Lowers blood glucose
Falcaria vulgaris	Apiaceae	Paghazou	ghaziaghi	Flower, leaf, stem	Leaves are cooked and eaten with food, a glass of infusion once a day	Spring and Winter	Lowers blood pressure
Smyrnium cordifolium	Umbelliferae	Pinomeh	andool	Seed	Squeezed seeds	Spring	Lowers blood pressure
Crocus hasskenechtii	Iridaceae	Pishok	soffron	Root	Raw and cooked	Spring	Lowers blood pressure
Berberis integrima	Berberidaceae	Zereshk	zereshk	Leaf and stem	Cooked or sodden	Spring	Lowers blood pressure
Ziziphus spina-christi Ziziphus nummularia	Rhamnaceae	Konar	sedr	Flower, leaf, fruit	Sodden leaves and flower	Spring, midsummer	Lowers blood pressure
Allium ursinum	Liliaceae	Sir kohi	Sir	Scallion	Raw or with food	Spring	Lowers blood pressure
Tragapogon caricifolius	Compositae	Sheng	shang	Whole parts	Raw, dried or infusion	Spring	Lowers blood pressure
Anethum graveolens	Umbelliferae	shevit	shevid	Whole parts	Dried or fresh with food	Summer	Lowers blood pressure
Amygdalus scoparia	Rosaceae	Badam	badam	Fruit	Sodden peel	Spring	Lowers blood pressure

hypoglycaemic and anti-hyperglycaemic effects of various root extracts of this plant have been shown in vivo models of normal and diabetic rabbits (46). Another study has shown the mechanism of action of the fruit of Citrullus colocynthis. This means that the fruit extract immediately and in a stable way stimulates secretion of insulin from pancreatic beta cells of rats (47). It also contains colocynthin, colocynthilin, citrulline, citronellol, resinous substances, pectin and various salts (48).

Valerian has blood pressure lowering effects in animals (49). Garlic has anti-parasitic, anti-viral, anti-fungal and anti-oxidant effects, improves peripheral blood flow and reduces blood lipids. These effects are attributed to its antioxidant activity (50-53).

Tragopogon dubius treats dysentery and bile flows. Its extract is used for healing gastric ulcer and known to be beneficial as stomach tonic. Its sodden is effective in liver disorders, gastric burning pains and regurgitation. Zakaryia al-Razi has recommended the use of sheng for excreting toxins (54). Sheng has been used for reducing blood lipids, increasing appetite, stomach and liver tonic in traditional medicine and is known to be beneficial in liver disorders and kidney stones (55,56). Sheng is one of the main sources of inulin (57). It seems that inulin is the main ingredient of sheng to have hypotensive effects.

Dill in traditional medicine is used to treat flatulence, indigestion and gastric ulcers. Dill has a strong antibacterial effect (58-60). Dill extract is used as cholestero-lowering drug in Iran. Furocoumarins can reduce total triglyceride and total cholesterol in hyperlipidemic rats (61). Dill seed contains D-carvone, D-limonene, α-phellandrene and dihydrocarvone (62). Dill Lowers blood glucose and reduces the blood lipids and cholesterol (63,64). Bioactive substances of dill may be a source of herbal medicines effective against hypertension and diabetes. Almonds play an important role in reducing the risk of heart disease in diabetic patients (65).

Besides predicating traditionally believed effects of

these herbs, it is essential for researchers to find out the actuality of clinical effectiveness of the herbs and their active substances. Once the positive effects of these herbs proved, it is possible to produce drugs which are useful in curing and controlling diabetes and hypertension (66-70). Moreover, it has a great significance to make documented records of traditional medical information to prevent them from shrinking.

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Authors' contributions

All the authors wrote the manuscript equally.

Conflict of interests

The authors declared no competing interests.

Ethical considerations

Ethical issues (including plagiarism, misconduct, data fabrication, falsification, double publication or submission, redundancy) have been completely observed by the authors.

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