

Medical Staff Performance and Patient Compliance are Important Factors for the Treatment of Diabetes Foot Infection

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Abstract

Many studies have shown a rampant increase in the number of diabetic patients around the world. This constitutes an economic burden on the resources of states and hence, has prompted many international organizations to devise awareness and educational programs about the dangers of this the disease and ways to deal with it. There are serious complications to diabetes which may include; high blood pressure, heart and kidney diseases, eye problems, neuropathy and diabetic foot. The most feared development of this disease is the diabetic foot as it may lead to amputation. This study examines the prevalence of diabetes and the prevalence of complementary alternative medicine CAM in the treatment. Questionnaires were distributed in the western region of Saudi Arabia. The sample size was 750. Responses were collected and proper descriptive statistical analysis was applied. An alarming 34% of respondents have diabetes, 74% of surveyed population has diabetes within family members, 40% of respondents have had a form of foot problem with highest incident of leg pain and numbness. The majority of examined population has chosen traditional medical intervention rather than herbal medicine in dealing with foot problems. The culture of inter-family marriages has to be overlooked to curb rampant increase of diabetes incidents amongst family members. Moreover, the role of diabetic centers has to be invigorated in spreading knowledge with regards to diabetes, and in devising proper follow-up procedures to diabetic patients after referral to other departments in hospitals. Collaboration between medical staff and patient is very important to cure the foot infection of patient.

Introduction

There is a rampant increase in the number of diabetic patients worldwide. According to World Health Organization (WHO), 2015 statistic, from year 1980 to 2014, the number of people with diabetes has risen from 108 to 422 millions [1]. According to 2012 statistic 29.1 million Americans, or 9.3% of the population have diabetes, 86 million Americans at the age of 20 and older have prediabetes [2]. There are 4.5 million people in the UK diagnosed with diabetes [3], and this number will rise to 5 million people by 2025 if trends continue [4]. The prevalence of diabetes in Saudi Arabia reveals that about 25% of Saudis over 40 years of age have diabetes [5]; more than 3 million individuals in Saudi Arabia are diagnosed with diabetes [6].

There are two types of diabetes; Type 1 diabetes develops when the body cannot produce any insulin. It usually appears before the age of 40, especially in childhood. It is the less common of the two types of diabetes. Type 2 diabetes develops if the body can still make some insulin, but not enough, or when the body's cells have a diminished ability to respond to the action of produced insulin which is known as insulin resistance syndrome. Type 1 diabetes is treated by daily insulin doses by injections or via an insulin pump, while in Type 2 diabetes tablets and/or insulin can be required. Table 1 summarizes the different methods used to treat diabetes which are classified into: medication, surgical intervention, physical exercises, diet control, homeopathic remedies and pharmaceutical food supplements.

Nonetheless, there is growing interest amongst diabetic patients to use oral natural products and herbs as part of complementary and alternative medicine (CAM) [7-9]. Traditional medicines derived from botanical source are used by about 60% of the world's population as it is believed to be safe, cheap and effective [9]. In a study carried out in

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Abbreviation:

WHO: World Health Organization.

CAM: Complementary alternative medicine.

RDA: Recommended Dietary Allowances.

DM: Diabetes mellitus.

CDP: Centers for Disease Control and Prevention.

IDF: International Diabetes Federation.

MOH: Ministry of Health.

Mecca by Al-saeedi et al., [10] has shown that 30% of diabetic patients are reported to have used herbal medicine to treat diabetes. The most commonly used herbs by patients were Fenugreek (6.1%), Chinaberry leaves (5.1%) and Herbal (Rhazya stricta, 4.9%). In a similar study conducted in Turkey [11] has shown that 25% of diabetic patients reported herb use. The herbs mostly used by the patient's were nettle (28%), thyme (27%), parsley (12%) and jujuba (12%). Therefore, there are wide varieties of herb species used for diabetes which are known demographically in each part of the world. In China, 200 special herbs were used to treat diabetes such as; pumpkin, wheat, lotus root and bitter melon [12]. In India, herbs like Momordica charantia Linn, Trigonella foenum-graecum were accepted scientifically to exert anti-diabetic effects [13].

On the other hand, magnesium deficiency has been linked with chronic diseases, amongst them, diabetes mellitus [14]. The average ingestion of magnesium worldwide is frequently below the Recommended Dietary Allowances (RDA), which induces the development of magnesium deficiency [15]. Studies had shown relation between the ingestion of food rich in magnesium and the reduction of risk of diabetes and its complications [16]. Hypomagnesaemia is usually observed in diabetic patients with deficient metabolic control,

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Treatment	Action
Diet, exercise and weight control	Controls blood sugar and complications of diabetes.
Medications: oral medications such as Sulfonylureas,	Stimulate insulin secretion.
Biguanides: Metformin Alpha-glucosidase inhibitors: acarbose and miglitol Thiazolidinediones: pioglitazone Meglitinides: Repaglinide. D-phenylalanine derivative: nateglinide DPP-4 inhibitors: DPP-4 (dipeptidyl-peptidase 4) inhibitors such as, Saxagliptin and injectable drug: Exenatide. Combination medications: Glyburide combined with metformin.	Biguanides Control liver glucose , improve blood fat and cholesterol levels and enhance glucose utilization by muscles . Helps the pancreas to make more insulin quickly and for a short time. Control blood sugar levels and increases insulin when blood sugar is high.
Insulin: Regular, NPH insulin, ultra-lente insulin	Regulation glucose metabolism.
Aspirin	Inhibiting the enzyme cyclo-oxygenase-1
Surgery: - Pancreas transplant - Islet transplantation	Insulin secretion Increases synthesis and releases insulin
Integrative therapie- Strong evidence	
Alpha-lipoic acid (ALA)	Decreases blood sugar levels and diabetics neuropathy
Good scientific evidence	
Beta-glucan, Ginseng: Panax quinquefolius	Decreases blood glucose
Chromium	Treatment of hypoglycemia
Gymnema: (Gymnema sylvestre)	Increases the effects of medications
Magnesium	Control blood sugar.
Whey protein	Improves the body's insulin response.
Conflicting scientific evidence	
Acupuncture	Promising effects on diabetes.
Alfalfa: (Medicago sativa).	Unclear if it controls of sugar.
Aloe	Useful in diabetes leg wounds and ulcers.
Amylase inhibitors	Decreases levels of blood glucose.
Arabinogalactan	Affects blood sugar and insulin levels.
Arabinoxylan: MGN-3	Preliminary research is positive.
Arginine, or L-arginine	May decrease the severity of diabetes
Ashwagandha	May decrease blood sugar levels
Astragalus	Hypoglycemic effect
Atkin's diet	Carbohydrate-restricted diets
Various herbs treatments	
The traditional Cocciniaindica remedy	May improve glucose tolerance
herbal tea containing Salacia reticulata	Improves glycemic control
Momordicacharantia: Karolla	May reduce serum glucose levels
Pancreas Tonic	Control glucose (high levels of HbA(1c).
Herb Vijayasar also called Bijaka,	Modulates blood glucose levels
Banaba: (Lagerstroemia speciosa)	Preliminary effects on diabetes
Barley: (Hordeum vulgare)	Glucose tolerance and hyperglycemia.
Beets	Affect secretion of gastric hormones
Berberine	Aids glycemic regulation.
Bilberry: (Vacciniummyrtillus)	May lower blood sugar levels.
Biotin	Decreases insulin resistance.
Bitter melon: (Momordicacharantia)	Decrease serum glucose levels.
Black tea	Decreases blood sugar
Burdock:(Arctiumlappa) root or fruit	Blood sugar-lowering effects.
Chrysanthemum: Jiangtanggang	May increase sensitivity to insulin.

Table 1: Continued...

Cinnamon	Conversion of glucose to glycogen.
Dandelion	Controls blood sugar.
Devil's club	Has hypoglycemic effect.
Evening primrose oil, Fenugreek, Fig, Garlic, Maitake	Decreases blood sugar.
Flaxseed	Improves insulin sensitivity
Green tea	Reduces carbohydrate absorption.
Holy basil	May have blood sugar lowering effects.
Honey	Helps decrease blood sugar level.
Hydrotherapy	Diabetes mellitus support.
Jackfruit	insulin intolerance, high blood sugar
Kudzu	Improves insulin resistance.
L-Carnitine	May increases insulin sensitivity.
Lutein	There is insufficient available evidence.
Massage	Benefit blood sugar levels injection in sites massage increase insulin absorption.
Supplements: Mycra, Nopal, Onion, Psychotherapy, Soy, Spirulina, Tai chi, Vitamin E, White horehound, Yoga, Selenium	Has hypoglycemic properties
Niacin	Protective for pancreatic cell function.
Pycnogenol	Decreases glucose levels
Qi gong	benefit diabetics patients.
Red clover	Beneficial in diabetic complications.
Reflexology	May help manage type 2 diabetes.
Seaweed	Useful for hyperglycemia.
Stevia	Increases the effects of blood sugar
Thymus extract	Increased remission.
Vitamin D	Improves insulin sensitivity
Zinc	Glycemic control.
Psyllium	Helps modulate blood sugar

Table 1: Summary of different treatment methods used for diabetes.

or associated with the DM chronic complications [17]. Therefore, metabolic studies have suggested that magnesium supplementation has a beneficial effect on insulin action and glucose metabolism [18, 19]. It is thought that Magnesium supplementation can correct the deficit in intracellular free magnesium levels, decrease platelet reactivity, improve insulin sensitivity, protect against diabetes and its complications and reduce blood pressure.

Diabetes can affect many parts of the body and is associated with serious complications such as; heart disease and stroke, neuropathy, nephropathy, retinopathy and the diabetic foot syndrome. Foot disorders are among the most feared complications of diabetes [20] as it may lead to lower-limb amputation if not well treated. The most common cause of hospitalizations among persons with diabetes is diabetic foot syndrome, including ulcerations, infections, and gangrene [21]. The risk of such complications increases in the geriatric population as older adults with diabetes are more likely to have multiple chronic diseases and morbidities [22]. Diabetes is estimated to be the primary causative factor in 45% of all lower extremity amputations and 60% of non-traumatic amputations due to long-term complications of diabetes [23]. The incidence of open wounds in patients with diabetes is very high and affects 1 of every 6 patients [23]. These non-healing “diabetic ulcers” are the major cause of leg, foot, and toe amputations. In the UK, more than 125

amputations are carried out weekly, up to 80 per cent of these are potentially preventable if people receive the correct management [24].

Diabetes mellitus is one of the most common chronic diseases in the UK and its prevalence is increasing. By 2025, it is estimated that more than 4 million people will have diabetes. In 2009 in UK, the number of people estimated to have either type 1 or type 2 diabetes was 2.6 million, a prevalence of 4%, with 1.9 million actually being registered as having diabetes. Type 2 diabetes is up to six times more common in people of South Asian descent, and up to three times more common in people of African and African-Caribbean origin. The annual incidence of diabetic foot ulceration in the UK varies from 1.0 to 3.6%, with a prevalence of 5%. After a first amputation, people with diabetes are twice as likely to have a subsequent amputation as people without diabetes. Mortality rates after diabetic foot ulceration and amputation are high, with up to 70% of people dying within 5 years of having an amputation [25]. In 2012 in USA, nearly \$245 billion was spent annually in direct and indirect medical costs related to diabetes care [26].

A study in Saudi Arabia concluded that patients with diabetic foot ulcers require intensive care management to reduce morbidity and mortality associated with major amputations in patients with diabetes [27]. In 2002, the diabetic foot care program was implemented at King

Abdulaziz Medical City in Riyadh as comprehensive approach for diabetes foot care in order to reduce the lower limb amputation rate and hence reduce the cost to patients, society, and the health care system. In a study by Al-Wahbi [28] evaluating the program has concluded that it has increased the awareness of both patients and health care staff concerning the prevention and management of diabetic foot disease, and decreased the rate of lower extremity amputation [29,30]. Alias gharpour et al., [31] has concluded that self-management of diabetic foot syndrome is influenced by patients' experience, awareness and attitudes. On the other hand, in order to attain wound healing and thus circumventing amputation, correct disease management, patient's knowledge and continuity of care have to interplay.

In this study, knowledge about complications of diabetes and methods of preventing these risks is assessed. The prevalence of using herbal medicine as a part of CAM is also investigated to assess the perception around their claimed use in reducing glycemic index and mitigating diabetes complications. Furthermore, self-management of diabetic foot syndrome amongst diabetic patients in Taif Area will be also evaluated, while focusing on the role of foot diabetic centers in disseminating knowledge about the prognoses, follow up and preventive measures with regard to diabetic foot ulcers. Also, the various methods and pharmaceutical product used for the treatment of diabetic's patient's foot is highlighted. The relationship between physicians, pharmacists and other healthcare professions is also investigated to better estimate the problematic of diabetics patient foot.

Competing Interests

The authors declare that they have no competing interests.

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