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

Majed Isa1* and Hosni Farah2
1Pharmacology and Toxicology Department, pharmacy Faculty, Taif University, Taif, Saudi Arabia
2Clinical Biochemistry Department, Faculty of medicine, Taif University, Saudi Arabia

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 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 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 (Rhzyastricta, 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 werenettle (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 Momardica-charantia Linn, Trigonellafoenu-mgraecum 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 has 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, 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 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 (Rhzyastricta, 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 werenettle (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 Momardica-charantia Linn, Trigonellafoenu-mgraecum were accepted scientifically to exert anti-diabetic effects [13].

Corresponding Author: Prof. Majed Isa, Pharmacology and Toxicology Department. College of pharmacy. Taif university. P.O Box888. Zip Code 21974. Alhaweiah, Taif, Saudi Arabia; E-mail: isa_majed@hotmail.com

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| Treatment |
|-----------|
| **Diet, exercise and weight control** |
| **Medications**: oral medications such as Sulfonylureas, |
| 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. |
| Insulin: Regular, NPH insulin, ultra-lente insulin |
| Aspirin |
| **Surgery**: - Pancreas transplant - Islet transplantation |
| **Integrative therapy- Strong evidence** |
| Alpha-lipoic acid (ALA) |
| Good scientific evidence |
| Beta-glucan, Ginseng: Panax quinquefolius |
| Chromium |
| Gymnema: (Gymnema sylvestre) |
| Magnesium |
| Whey protein |
| **Conflicting scientific evidence** |
| Acupuncture |
| Alfalfa: (Medicago sativa). |
| Aloe |
| Amylase inhibitors |
| Arabinogalactan |
| Arabinosylxylan: MGN-3 |
| Arginine, or L-arginine |
| Ashwagandha |
| Astragalus |
| Atkin's diet |
| **Various herbs treatments** |
| The traditional Coccinia indica remedy |
| herbal tea containing Salacia reticulata |
| Momordica charantia: Karolla |
| Pancreas Tonic |
| Herb Vijaysar also called Bijaka, |
| Banaba: (Lagerstroemia speciosa) |
| Barley: (Hordeum vulgare) |
| Beets |
| Berberine |
| Bilberry: (Vacciniummyrtillus) |
| Biotin |
| Bitter melon: (Momordica charantia) |
| Black tea |
| Burdock: (Arctium lappa) root or fruit |
| Chrysanthemum: Jiangtangkang |

| Action |
|--------|
| Controls blood sugar and complications of diabetes. |
| Stimulate insulin secretion. |
| 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. |
| Regulation glucose metabolism. |
| Inhibiting the enzyme cyclo-oxygenase-1 |
| Insulin secretion |
| Increases synthesis and releases insulin |
| Decreases blood sugar levels and diabetics neuropathy |
| Decreases blood glucose |
| Treatment of hypoglycemia |
| Increases the effects of medications |
| Control blood sugar. |
| Improves the body's insulin response. |
| Promising effects on diabetes. |
| Unclear if it controls of sugar. |
| Useful in diabetes leg wounds and ulcers. |
| Decreases levels of blood glucose. |
| Affects blood sugar and insulin levels. |
| Preliminary research is positive. |
| May decrease the severity of diabetes |
| May decrease blood sugar levels |
| Hypoglycemic effect |
| Carbohydrate-restricted diets |
| May improve glucose tolerance |
| Improves glycemic control |
| May reduce serum glucose levels |
| Control glucose (high levels of HbA1c). |
| Modulates blood glucose levels |
| Preliminary effects on diabetes |
| Glucose tolerance and hyperglycemia. |
| Affect secretion of gastric hormones |
| Aids glycemic regulation. |
| May lower blood sugar levels. |
| Decreases insulin resistance. |
| Decrease serum glucose levels. |
| Decreases blood sugar |
| Blood sugar-lowering effects. |
| May increase sensitivity to insulin. |

Table 1: Continued...
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

| 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. |
| **Supplements** | Benefit blood sugar levels injection in sites massage increase insulin absorption. |
| Mycria, 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.
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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