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Use of Topical Complementary and Alternative Medicines (CAM) in Diabetic Septic Foot Disease in Makkah Region, Western of Saudi Arabia, an Exploratory Study

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Abstract

Diabetes is a chronic condition that is significantly impacted daily by environment. At least one in five Saudis, suffer from diabetes. "Diabetes is a pandemic of unprecedented magnitude spiraling out of control" (Boulton). Saudi Arabia ranks the second highest in the Middle East, and is the seventh in the world for the prevalence of diabetes (WHO). Diabetes mellitus (DM) has been found to be related to high mortality, morbidity accompanied by poor general health and lower quality of life. Current Saudi diabetes patients' behaviors, practices, and beliefs regarding foot health problems such as ulcers, are not well investigated. Diabetic patients frequently utilize natural remedies and Herbs for self-medication as a part of complementary and alternative Medicine. Aim of study: To explore the widespread use of the alternative remedies in the local communities of the Western Saudi Arabia, the drives behind using and to focus on the potential adverse effects following their usage. Method: A descriptive, cross-sectional study of 386 diabetic patients with feet problems in Makkah Region, West of Saudi Arabia during the period April -June 2023. Results: Out of the 531 participants, only 386 participants reported diabetic foot disorder (DFD). Most of the participant were above 65 years of age group (24.61 %). Male (52.08%) more than female (47.92%) in the research group. All of the participants had diabetic foot disorders at least once. The prevalence of complementary and alternative medicines (CAM) use among them was 67.88%, as solitary or in combination with hospital medicines. Honey headed the list followed by myrrh and black seeds. Acquaintances advice (59.54%) was the most reason for using the alternative medi-

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cine. 60.30% of Diabetic foot patient complained of adverse effects during CAM remedies use. Conclusion: Consumption of CAM remedies among diabetic patients for Diabetic Foot Disorder (DFD) is common. Honey headed the list followed by myrrh and black seeds. Additional wide-scale research is required to establish their actual efficacy, safety and potential adverse out-comes and to generalize the outcomes.

Keywords

Diabetic Foot Ulcer, Diabetes, Complementary and Alternative Medicine CAM, West of Saudi Arabia

1. Background

Diabetes is a chronic disabling Health condition that is significantly affected by the diabetics' nutritional, activity, infection, and stress conditions [1]. At least one in five Saudis, or more than three million people in total, suffer from diabetes, [2]. "Diabetes is a pandemic of unprecedented magnitude spiraling out of control" Boulton [3]. Saudi Arabia ranks the second highest in the Middle East, and is the seventh in the world for the prevalence of diabetes according to the WHO [4] [5] [6] [7]. It has been found to be related to high mortality, morbidity and vascular complications, accompanied by poor general health and low quality of life [4], and economic burdens [5].

It is one of the leading causes of kidney failure, lower extremity amputations, and blindness (World Health Organization, 2016). Diabetic patients typically experience peripheral neuropathy, peripheral arterial disease, foot ulcers due to their susceptibility to infection and sepsis, and consequently end with amputations [8] [9] [10]. The overall mortality rate because of Diabetic foot ulcer is high, with nearly 50% mortality within 5 years. Cardiovascular disease and infection were the two leading causes of death [11].

Current Saudi diabetic patients' behaviors, practices, and beliefs regarding foot health problems such as ulcers, infected in-growing toe-nails, are not well investigated [12] [13]. These elements are typically influenced by the local culture and peoples' perceptions of the value of certain natural products like honey [14] [15]. Because they have fewer negative effects and are less expensive, natural products and herbal remedies are preferred in underdeveloped communities [16]. Often CAM products are used to heal chronic wounds with or without clinical consultation [17].

Many studies have shown widespread use of these alternative remedies as in Saudi Arabia [12] [17], and in Turkey [8] [13]. Since ancient times, honey has been utilized as a treatment for wounds. Animal studies and some clinical trials have provided evidence that honey may hasten wound healing [18] [19]. This study is meant to explore the magnitude of use and adverse effects of herbal and alternative medicine when used in diabetic foot sepsis.

2. Materials and Methods

2.1. Study Design, Setting and Time

A Cross sectional descriptive study, which was performed on diabetic patients in Makkah region, Western of Saudi Arabia. The study sample was collected over two month's period (April and May 2023).

2.2. Study Participants

All diabetic patients aged 15 and above in Makkah region, Western of Saudi Arabia who have diabetic foot. The study population was approached using emails, and social media (Wats-up, Telegram and facebook).

2.3. Sample Size and Sampling Methodology

The sample size, calculated by using Rao soft sample size calculator, was an appropriate sample The estimated sample size was 386 diabetic foot patient with 90 percent power, 95 percent confidence interval (CI), and statistical significance level (*a*) at 5 percent. The total number of respondents was 531 and 386 out of them had diabetic foot at least once.

2.4. Data Collection

An electronic data collection format, which was distributed throughout social media platforms (Wats-up, Telegram, Facebook) and emails, for diabetics and carers of diabetics who are unable to participate in the questionnaire. An electronic informed consent for participation was obtained from all participants. The questionnaire was designed to capture patients' socio-demographic data; (age, gender, marital status, education status, residency province andfinancial status). Additionally, it contained more sixteen questions about diabetes and diabetic foot conditions (type of diabetes and time of diagnosis, presence of any co-morbidities, use of medications other than diabetes medications, compliance, and complications of diabetes, methods of treatment, types of CAM used, potential reasons of using CAM, source of information, recovery period, potential adverse effects of CAM).

2.5. Data Analysis

Data was analysed using Statistical Package for Social Sciences (SPSS) for Windows version 25.0 (SPSS Inc., Chicago, IL). For continuous variables, mean and standard deviation was calculated. For categorical variables, frequency and percentages were calculated. Demographic data, clinical data, and KAP characteristics were correlated with the use of CAM using Pearson's Chi-square test. P value ≤ 0.05 was taken as significant. Odds ratio (OR) along with confidence interval (CI) was considered as determinant of strength.

2.6. Ethical Approval

Ethical approval was obtained from the Biomedical Ethics Committee of Umm

Al-Qura University (Approval No: HAPO-02-K-012-2023-04-1554). The participants were informed about the purpose of the study and that the obtained data will be used for scientific purposes and their electronic consent was obtained.

3. Results

Table 1 shows a total of 531 diabetic patients who responded, 145 Participants were excluded because they have not suffered from diabetic foot disorder (DFD) and the study was conducted only on 386 participants. 52.08% of the Participants were male and 47.92% were female, ranging between 15 to more than 65 years of age, with the65 years old age group the majority (24.61%). More than half were married 58.54% and 23.83% were single. Only 9.32% participants were illiterate and the majority were educated with advantage for high school education level (30.6%), All patients were living in western region of Saudi Arabia, and their monthly income were almost spread equally in four levels with advantage for 6001 - 10000 SAR (29.80%).

Table 1. The demographic factors.

	Factor	N	%
Age	15 - 19 years old	16	4.19
	20 - 24 years old	48	12.43
	25 - 29 years old	25	6.47
	30 - 34 years old	25	6.47
	35 - 39 years old	27	6.99
	40 - 44 years old	39	10.1
	45 - 49 years old	27	6.99
	50 - 54 years old	21	5.44
	55 - 59 years old	27	6.99
	60 - 65 years old	36	9.32
	>65 years old	95	24.61
Gender	Female	185	47.92
	Male	201	52.08
Marital statues	Widowed	31	8.03
	Single	92	23.83
	Married	226	58.54
	Divorced	37	9.60
Education	Uneducated	36	9.32
	Elementary school	33	8.54
	Middle school	34	8.80
	Secondary (Highly) school	118	30.6
	Undergraduate	77	19.94
	Bachelor's degree	73	18.91
	Postgraduate	15	3.89

Continued

Residency	Aljumum	4	1.03
	Adham	25	6.48
	Alkurmah	13	3.37
	Taif	47	12.18
	Alardyat	59	15.28
	Alqufudhah	49	12.70
	Allaith	23	5.96
	Jeddah	86	22.28
	Rabigh	17	4.40
	Maysan	5	1.30
	Makkah	52	13.47
	Other	6	1.55
Monthly income	<3000 SAR	100	25.90
	3000 - 6000 SAR	78	20.21
	6001 - 10000 SAR	115	29.80
	>10000 SAR	93	24.09

Nearly two-thirds are type2 diabetics and the rest are type1 (**Table 2**). Almost half of them were compliant on taking their medications and visiting their doctors regularly, the others were fairly or non-compliant.

Most of the respondents were suffering from diabetes for more than ten years. A third of the study population were obese, other comorbidities were as shown on the tables.

Honey was the most commonly used alternative medicine remedy (39.31%), followed by Myrrh (29.77%), Nigella sativa (11.45%), olive oil (5.72%), fenugreek (4.60%) and coal (3.81%) (**Figure 1**).

Nearly a third had Neuropathy, followed by Retinopathy (19.43%), Cardiovascular (13.73%), Nephropathy (3.62%) and others (0.80%) (Figure 2).

One out-of-five diabetics uses alternative medicines, while less than half use both hospital and CAM medicines. Friends' advice was the most common reason for using the alternative medicine (59.54%) (Table 3, Figure 3). Other reasons to use CAM are, cheaper, not satisfied with the hospital care, and easier to use the CAM.

Half of the respondents reported to have had diabetic foot for once, twice in (30.05%), three times in (10.10%) and more than three in (7.25%).

More than a third of respondents reported an equal recovery period compare to hospital care. Others reported better recovery compared to hospital care and a minority with slower recovery.

More than a third reported no side effects on using CAM while others reported skin hyper pigmentation (13.36%), burning sensation on skin (12.21%),

Table 2. The background of diabetes.

1	Factor	N	%
	Diabetes Mellitus Type 1	139	36.01
What type of diabetes do you have?	Diabetes Mellitus Type 2	246	63.73
	Gestational diabetes	1	0.26
Do you take diabetes medication regularly and keep visiting your	Yes	192	49.74
	No	32	8.30
doctor?	Fairly regular	162	41.96
	<2 years	28	7.25
	2 - 5 years	62	16.06
When did you diagnose with di-	6 - 10 years	92	23.83
abetes?	11 - 15 years	78	20.21
	16 - 20 years	77	19.95
	>20 years	49	12.70
	None	135	34.97
	Obesity	116	30.05
	Hypertension	37	9.60
	Cardiovascular disease	26	6.73
	Vitamin deficiency (B12)	24	6.21
Do you have any other diseases?	Polycystic ovary syndrome (PCOS)	17	4.40
	acute or chronic Limb ischemia	6	1.55
	Asthma	5	1.29
	liver Cirrhosis	3	0.80
	Other	17	4.40
Do you take any other medication	Yes	167	43.26
beside the diatribe's medication?	No	219	56.74
	Diuretic—thiazides (Co-Diovan)	54	13.98
	Beta blocker—Propranolol (Inderal)	36	9.32
What are these medications that you use to treat a oter disease	Beta agonist—salbutamol (Ventolin)	20	5.18
	Second generation antipsychotics SGAs —Clozapine (Leponex)	10	2.59
beside diabetes?	Anti hypertension medication	8	2.10
	Vitamin pills	6	1.55
	Aspirin	7	1.81
	Other	26	6.73

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	None	129	33.41
Do you have any of the following	Neuropathy	112	29.01
diabetes complications?	Retinopathy	75	19.43
	Cardiovascular	53	13.73
	Nephropathy	14	3.62
	Other	3	0.80
Do you know what the diabetic foot	Yes	386	100
is?	No	145	Excluded
	Yes	386	100
Have you ever had diabetic foot be- fore?	No	135	Excluded
Tote:	IDK	10	Excluded
	None	145	Excluded
How many times have you had di- abetic foot?	Once	203	52.60
	Twice	116	30.05
	Three times	39	10.10
	More than three	28	7.25

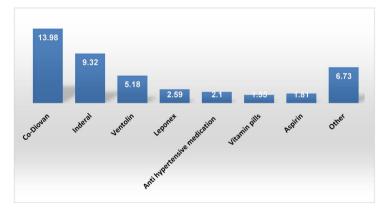


Figure 1. Other medications taken beside the diabetic.

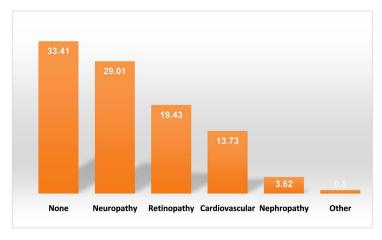


Figure 2. Diabetes complications.

Table 3. Alternative medication.

Factor		N	%
I used them both		174	45.08
How did you treat it?	I went to health care services	124	32.12
	I used alternative medicine	88	22.80
If you didn't go to health care. What was the reason for using the alternative medicine?	My acquaintances advised me to use alternative medicine preparations	156	59.54
	Less expensive than health care services	31	11.83
	Internet information about the benefits of alternative medicine	30	11.45
	I am not satisfied with the health services provided by health care services	22	8.40
	Easier to use	12	4.58
	I did not find appropriate health care	7	2.67
	Other	4	1.53
	Honey	103	39.31
	Myrrh	78	29.77
	Nigella sativa	30	11.45
If you used alternative medicine, what did you use?	Olive oil	15	5.72
William did you doo!	coffee	14	5.34
	Fenugreek	13	4.60
	Coal	10	3.81
	I don't know	106	40.45
low long did the recovery period take sing alternative medicine compared to	Same duration	99	37.79
the recovery period while receiving	Faster than healthcare medications	35	13.36
health care?	Slower than healthcare medications	22	8.4
	There're no side effects	104	39.70
	Pigmentation in the skin	35	13.36
	Burning sensation in skin	32	12.21
	Itching in the skin	28	10.70
ave you noticed any side effects when	Redness skin	26	9.92
using alternative medicine?	Swelling in the skin	12	4.58
	That got worse	11	4.20
	Delayed recovery	10	3.81
	A high fever	2	0.76
	Bleeding from the skin	2	0.76

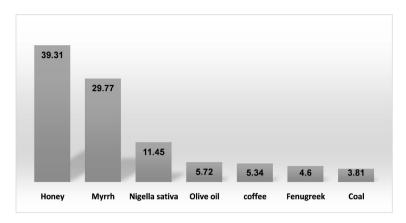


Figure 3. Alternative medicines.

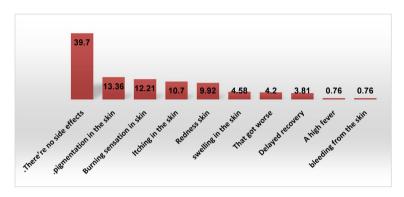


Figure 4. Alternative medicine side effects.

itching (10.70%), redness (9.92%), swollen skin (4.58%), disease got worse (4.20%), delayed recovery (3.81%), high temperature (0.76%) and bleeding from the skin (0.76%) (Figure 4).

4. Discussion

The number of diabetics in Saudi Arabia is rapidly rising. Many government organizations are working to educate the public about the disease, with emphasis on prevention and treatment [4]. A study was conducted in Jeddah, Makkah region in 2010, with total of 1634 Saudi diabetic patients, found more than two thirds of them (71.2%) with a history of diabetic foot disorder (DFD) [17]. A study in turkey showed, two out of every five people had diabetes for less than ten years (40%); three out of every four had previously undergone foot ulcer therapy (72.2%) [8].

Use of CAMin Saudi Arabia as a method for treatment of various diseases has been part of their culture for centuries [20]. Saudi Arabia is blessed with an abundance of medicinal herbs that have been used by many herbalists and CAM practitioners for hundreds of years. These herbs are found in different parts of the country. The use and benefits of (CAM) is being passed down from one generation to the next. Similar attitudes toward CAM are shared by city dwellers and those who reside in rural areas [21] [22]. Saydah *et al.* reported in their

study regarding CAM use, that persons with chronic illnesses including diabetes are more likely to utilize CAM compared to those without such illnesses. They found the prevalence of CAM use among diabetic patients was 41.4% [23]. In another study in Pakistan, (57.8%) of diabetic patients reported using CAM [24]. Despite the CAM being widely disregarded by healthcare professionals, unfortunately it is becoming a common component in the management of chronic diseases [25]. In developing countries 80% depend on (CAM) products and/or traditional healing practices, including herbal medicines [14] [16] [26] [27]. Almost all patients in a KAP study from Saudi Arabia were aware of CAM, and 27% thought they were safe and 26% thought they were effective. 90% of respondents said they would first talk to their doctors about using CAM, and 44% said they preferred combining CAM with traditional medicine. Herbs (31%), wet cupping (20.5%), and nutritional supplements (18%) were the most popular CAM methods [28]. In Jeddah study, out of 1006 diabetic patients with foot disorders, 653 reported using some form of topical treatment. Of those treated, 307 patients (47.1%) used conventional medical treatment alone, 142 (21.7%) used alternative topical medications, and 204 (31.2%) used both types of treatment in combination [17]. Furthermore, in the Turkish study they found that 35% of the participants used conventional and alternative treatments to treat their diabetic foot ulcers [8]. In a Jordanian study, 68 out of 1100reported the use of complementary therapies as a topical treatment for diabetic foot ulcers [10]. Most of the local studies in Saudi Arabia showed more or less similar results to our study with the exception of only one who ended with amputation [10]. In the Turkish study, the participants utilized "St. John's wort" (85%), "olive oil extract" (16.1%), "aloe veraextract" (3.2%), "pine extract" (3.2%), "onion" (3.2%), and other herbal methods (12.8%). The patients' chosen methods of mind-body medicine and manipulation included applying ice to the wound (3.2%), applying Vaseline topically (4.8%), and praying (4.8%) [8]. In Jeddah study, honey was the most often (56.6%) used treatment for diabetic foot disorder (DFD), either alone or in combination with other topical treatments which is nearly similar to the figures of this study. It was also discovered that nearly a third of them (37.4%) utilized Commiphora molmol (Myrrh), 35.1% used Nigellia sativa (Black seed). Fenugreek (Helba) and Lawsonia inermis (Henna), which were the least often utilized CAM treatments for diabetic foot, were found in 12.5% and 12.1%, respectively. The top 10 CAM product combinations that have been utilized topically to treat diabetic foot disorder (DFD) was honey and black seeds (19.1%), which headed the list, followed by honey and myrrh (12.1%). In terms of percentage, Black seeds and Sabr (a member of the cactaceae) came in the least at 2.3%. All of these natural or CAM products are available in the local market with no restrictions [17]. In a study conducted on diabetic patients attending the outpatient clinics in four major hospitals in Riyadh, Kingdom of Saudi Arabia, patients with diabetes frequently utilize herbs, (17.4%), the most popular ones were myrrh, black seed, helteet, fenugreek, and aloes [29]. In Jeddah study, it has been shown that friends and relatives, especially diabetics,

were the most frequent sources of knowledge about natural remedies (70.8%), followed by traditional healers (38.4%) [17], which are similar to the results of the study.

Numerous studies advocate the consumption of honey, particularly those on Manuka honey conducted by Peter Molan *et al.* of New Zealand [30]. A Malaysian study compared the effectiveness of honey and povidone iodine as dressing solutions treating Wagner type II diabetic foot ulcers and found no discernible difference between the study groups' ulcer healing rates [31]. However, they confirmed in their conclusion that honey dressing is a secure substitute dressing for diabetic foot ulcers since it promotes wound healing, inhibits superadded infection, and is easily accessible at a cheap price in most developing countries [18] [31] [32] [33].

Some international studies investigated the clinical effects of the CAM and their antibacterial activities [34] [35] [36].

In Asia, Middle East, and African continent, Nigella sativa (Black seed) has been utilized for therapeutic purposes for thousands of years. It has been traditionally used as an analgesic, anti-inflammatory, anti-allergic, and for many other conditions [37]. The seeds have an extremely low level of toxicity; with only two instances of contact dermatitis in two people have been documented after topical usage [38]. Morsi of Cairo tested the antibacterial potency of several crude extracts of Nigella sativa against various bacterial isolates that shown multiple antibiotic resistances, more gram-negative isolates than gram-positive ones were affected [39].

Most of the local studies have shown similar figures regarding the commonly used types of CAM, their therapeutic effects and the drive to use them. Although it is a local study with limited respondents, nevertheless it highlighted the wide use of CAM in diabetic foot infections in the local area. The results reflect the belief and use of CAM in diabetic foot infections in a local area in the western part of Saudi Arabia. Future national studies are needed to generalize the outcomes.

5. Conclusion

The study has shown a wide use of CAM in diabetic foot infections in the local area researched. The results are near to some of the local previous studies in Saudi Arabia. A national study including laboratory analysis to isolate the active ingredients to adjust the safe limits and to avoid complications is necessary in order to generalize the outcomes.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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