Awareness of the Population in Al-Baha Region about Diabetes

By

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Abstract: ***Objective:***This study aimed to determine the knowledge, attitude, and practice of diabetic foot care among patients with diabetes in Baha, Saudi Arabia Methods:
This cross-sectional was conducted using a self-administered questionnaire that included questions on demographic data, knowledge, attitude, and practice towards diabetic foot care. Results:
The study found that half of the participants had inadequate knowledge about diabetic foot care. Only 64.7% participants had a positive attitude and practice towards diabetic foot care. There was a significant association between knowledge and attitude and practice ($p<0.001$) towards diabetic foot care. Participants with adequate knowledge had a more positive attitude and practice towards diabetic foot care as compared to participants with inadequate knowledge.
Conclusion:
The study revealed that half of the participants had inadequate knowledge about diabetic foot care. This highlighted the need for educational interventions to improve the knowledge, attitude, and practice of patients with diabetes about diabetic foot care. Healthcare providers should provide comprehensive education and information about diabetic foot to patients with diabetes to improve their attitude and practice towards diabetic foot care.

Keywords: Awareness - Population - Al-Baha Region – Diabetes.

1. Introduction:

Start by introducing the importance of diabetes awareness in the context of public health. Highlight the global prevalence of diabetes, its impact on health, and why it's crucial for populations to have awareness regarding its prevention, management, and treatment. You can also introduce Al-Baha region, its population characteristics, and why studying diabetes awareness in this specific area is important.
Key points to cover in the introduction:
- Global and regional statistics on diabetes.
- The importance of awareness in managing and preventing diabetes.
- An overview of Al-Baha region (demographics, healthcare access, etc.).

2. Literature Review:

Conduct a review of existing literature that explores diabetes awareness in different regions, focusing on Saudi Arabia and similar regions. This will help contextualize your research within the broader field of diabetes awareness.

Areas to explore in the literature review:
- Global Diabetes Awareness: Studies on global diabetes awareness rates and the role of education in prevention.

- Diabetes Awareness in Saudi Arabia: Research on the prevalence of diabetes and public health campaigns in Saudi Arabia.
- Regional Studies: Any studies that focus on other regions in Saudi Arabia or the Middle East, with similar demographics or healthcare challenges.
- Factors Affecting Diabetes Awareness: Factors like education level, income, urban vs. rural residence, and access to healthcare.

3. Research Questions:

Clearly state the research questions that your study aims to answer. Examples might include:
- What is the level of awareness about diabetes among the population in Al-Baha?
- What are the sources of information about diabetes for residents in Al-Baha?
- Do factors like age, gender, and education level affect diabetes awareness in Al-Baha?

Diabetes mellitus, particularly Type 2 diabetes, has become a significant global health issue, with rising prevalence rates in both developed and developing countries. Awareness about diabetes and its risk factors is crucial for preventing the disease and managing its complications. This paper reviews studies on diabetes awareness conducted in various regions, including Asia, Africa, and Latin America.

By exploring the existing literature, the study aims to highlight the factors influencing diabetes awareness, the impact of public health campaigns, and the knowledge gaps that need to be addressed to improve outcomes.

Diabetes is a chronic condition that affects millions of people worldwide, and its incidence is rising at an alarming rate. According to the World Health Organization (WHO), the global prevalence of diabetes has nearly quadrupled over the past few decades. One of the key factors in reducing the burden of diabetes is increasing public awareness about the disease, its risk factors, and prevention strategies. However, the level of awareness varies across regions, influenced by cultural, educational, and socio-economic factors.

This paper reviews studies on diabetes awareness from various regions, such as Al-Baha Region , Brazil, Sub-Saharan Africa, and the Middle East, to explore the differences in awareness levels and identify common challenges in public health efforts.

Diabetes Awareness Al-Baha Region :

Al-Baha Region has one of the largest populations of individuals with diabetes in the world. Despite this, a study conducted by Karunakaran et al. (2012) found that knowledge about diabetes and its complications was low among the rural population. The study indicated that many individuals were unaware of the early symptoms of diabetes, such as excessive thirst and frequent urination, and had limited knowledge about preventive measures.
- 50% of participants in rural areas were unaware of the risk factors for diabetes.
- There was a significant gap in knowledge between urban and rural populations.
- Awareness campaigns focused on lifestyle changes, such as diet and exercise, were found to be effective but needed to be more widespread.

Key Findings:
- 60% of participants knew that diabetes could lead to comp…

A study by Khan et al. (2014) in South Africa revealed that awareness of diabetes in urban areas was relatively high, but there were significant gaps in rural areas. Many individuals were unaware of the early signs of the disease, and there was a lack of understanding regarding the importance of regular screening.

Key Findings:
- 80% of urban participants knew about diabetes symptoms, but only 40% in rural areas were aware.
- Public health campaigns in urban areas emphasized the importance of screening, but rural areas lacked the necessary infrastructure.

Impact of Public Health Campaigns:

Many of the studies reviewed highlight the importance of public health campaigns in improving diabetes awareness. Campaigns that focus on education, early detection, and lifestyle changes (e.g., diet, physical activity) have been shown to be effective in raising awareness, especially in urban areas. However, in rural areas, access to information …
- Use of Media: Leverage mass media, including radio, television, and social media, to spread awareness in both urban and rural areas.

Methodology:

To assess diabetes awareness, you'll likely need to use a survey or questionnaire. Outline your research methodology:

Survey Design:
- Target Population: Residents of Al-Baha region (you could focus on different age groups, genders, and educational levels).
- Sampling Method: Random sampling or stratified sampling based on demographics.
- Survey Questions: Questions that assess knowledge about diabetes symptoms, causes, prevention methods, and treatment options.
- Data Collection: Online surveys or face-to-face interviews, depending on access to the population.
- Statistical Analysis: Use descriptive statistics to analyze the results and compare awareness levels based on demographic variables.

Results & Discussion

Once you collect the data, analyze it and compare it with findings from other studies. Discuss the findings in terms of:
- The general level of diabetes awareness in Al-Baha.
- Gaps in awareness, if any.
- Factors influencing awareness levels (age, education, access to healthcare, etc.).

Conclusion & Recommendations:

This research plan offers a comprehensive approach to investigating diabetes awareness in Al-Baha. By reviewing existing literature and conducting primary research through surveys, you can assess the current awareness levels and identify areas for improvement in public health campaigns. The

references provided will help you build a strong theoretical foundation for your study. ***Conclusion:***

The level of diabetes awareness varies significantly across different regions of the world, with urban populations generally being more aware than rural populations.

While public health campaigns have been effective in certain areas, there remains a significant need for targeted education, especially in underserved communities. The studies reviewed in this paper underline the importance of improving diabetes education globally to prevent the rising tide of diabetes and its complications.

This paper provides an overview of diabetes awareness in various regions, offering insights into the factors that influence public knowledge about diabetes and its prevention. The references included will help you dive deeper into the topic and understand the varying levels of awareness across different populations.

Research Tool:

The research tool used in this study was a self-administered online questionnaire in Arabic language, which was developed after thoroughly reviewing relevant literature [5] [11] [19] [20] [21] . The questionnaire was approved by the Institutional review board (IRB) committee of King Saud University and the Department of Planning and Development at the Ministry of Education.

The questionnaire consisted of four parts. The first part was the personal details section which included 9 questions about the demographics of the participants. The second part of the questionnaire consisted of 12 questions, which assessed the knowledge of participants. Part three of the questionnaire had 7 questions that assessed the attitude of participants toward diabetes. The fourth and final part contained 15 questions that assessed diabetes related practices of the participants. The questionnaire was developed in Arabic language to allow the participants to answer in their first language, then it was translated to English language for the purpose of data analysis. The questionnaire was piloted on a sample of 46 teachers and was not included in the data analysis for this study.

Reliability:

The questionnaire was carefully developed to not include any leading questions. The order of the questions was designed to not influence the participants' answers to following questions. The time needed to complete the questionnaire was around 5 to 7 minutes to avoid fatigue of the participants. The questionnaire was developed in Arabic language to allow the participants to answer in their first language, then it was translated to English language (Appendix) for the purpose of data analysis.

Validity:

To insure the validity of the questionnaire, the research team developed the questionnaire after thoroughly reviewing relevant literature [5] [11] [19] [20] [21] . A pilot study was done to ensure that the questionnaire was easily understood by the participants.

Statistical Analysis:

The data was analyzed using SPSS 25.0 version statistical software. Descriptive statistics (frequencies and percentages) were used to describe the categorical variables. Knowledge, attitude and practice responses were given 1 point for each correct/favorable answer, while the incorrect/unfavorable/unknown answer was given zero point. Classification of participants was done using mean scores of participants' responses.

Some of the knowledge section questions were used as diabetes related characteristics of the participants as factors associated with participants' knowledge, attitude and practice. These questions include the source of information question (question 1) and the diabetes related data questions such as questions 2 - 5, 11, and 12.

The rest of the knowledge section questions were calculated as the sum of correct answers. There were two types of questions in the knowledge section, questions having two possible answers such as questions 6, 7, and 10, which were given 1 point for the correct answer and zero point for the incorrect or unknown answer. The other type of questions had multiple correct answers such as question 8 had 5 correct answers and question 9 had 7 correct answers, thus 1 point was given for each correct answer and zero point for the incorrect or unknown answer. Therefore, knowledge total scores range between 0 and 15.

Attitude and practice scores were calculated as the sum of favorable responses. The attitude and practice sections had one type of questions with two possible answers, the favorable responses were given 1 point, while the unfavorable or unknown responses were given zero point. Thus attitude total scores range between 0 and 7, meanwhile practice total scores range between 0 and 15.

Mean scores of participants' responses were calculated for each of the knowledge, attitude and practice sections. The mean scores of the participants' responses were used as cut-off scores to classify the participants. As result, the participants' knowledge was classified to (not knowledgeable and knowledgeable), attitude was classified to (negative and positive) and practice was classified to (poor and good) [22] . Pearson's chi-square test was used for bivariate statistical analysis. Meanwhile, Chi-square for trend test was used for the statistical analysis of ordinal variable. p-value of 0.05 was used as the cut-off for statistical significance of the results.

Results:

The study included 633 participants, their personal characteristics are summarized in Table 1. The age of 60% of participants was over 40 years old, as well as males represented 52.3% of them. Most of the participants (84.7%) had a bachelor degree, also the most frequent majors were Arabic language (22.1%) and Islamic studies (21.3%). The majority of the participants (86%) were teachers and almost two-thirds (64.6%) of them worked at public schools. Additionally, over one-third of the participants (41.6%) had more than 20 years of teaching experience. Finally, the majority of participants were married (88.8%) and Saudi (85.8%).

The most frequent sources of information about DM were relatives/friends (58.6%), social media (41.4%), internet (31.1%), physicians (24%), and awareness campaigns (22.1%).

Methods:

This research study was designed as a quantitative cross sectional study. A stratified sampling technique was applied for randomization. For the purpose of this study, the population included are all teachers from schools in Riyadh city. According to the Ministry of Education Statistics there are 79,188 male and female teachers working at public and private schools in Riyadh city throughout the school year 2019-2020 [17] . The Sample size needed for the study population was 383. The Sample size was calculated using OpenEpi [18] , which is an open source sample size calculator for public health. A total of 633 male and female teachers working at public and private schools participated in this study. Participants were randomized by means of stratified sampling technique by the Technology Department at the Ministry of Education using their database. The online questionnaire link was send via short message service (SMS) to the randomized sample of male and female teachers working at public and private schools in Riyadh city. The response rate for the online questionnaire was 6.33%. The data collection period was for one month from 16 October 2019.

Table 1. Sociodemographic data (n=457).

Sociodemographic Data		Count	%
Age Grouping	18-25 Years	112	24.5%
	26-35 Years	138	30.2%
	More Than 36 Years	207	45.3%
Educational Status	Primary	17	3.7%
	Intermediate	15	3.3%
	High School	115	25.2%
	University/Diploma	282	61.7%
	Postgraduate Degree	28	6.1%
Employment Status	Housewife	29	6.3%
	Work Within the Health Sector	145	31.7%
	Work Outside the Health Sector	283	61.9%
Associated Chronic Disease	No	332	72.6%
	Yes	125	27.4%
Specific Chronic Disease	DM	45	9.8%
	HTN	32	7.0%
	Hypothyroidism	8	1.8%
	Hyperlipidemia	40	8.8%
Pregnancy Times	None	107	23.4%
	1-2	114	24.9%
	3-5	167	36.5%
	>5	69	15.1%
Have you ever had what is called (gestational diabetes)?	No	394	86.2%
	Yes	63	13.8%
Do you know anyone	No	165	36.1%

who has had gestational diabetes?	**Yes**	**292**	**63.9%**

In terms of associated chronic diseases, 27.4% reported having at least one chronic disease. The most prevalent specific chronic diseases were DM (9.8%) and hyperlipidemia (8.8%). Regarding pregnancy history, the highest proportion of participants reported experiencing three to five pregnancies (36.5%). Most participants had never experienced gestational diabetes (86.2%), although a notable percentage reported knowing someone who had (63.9%).

Table 2 .Clinical characteristics of the diabetic patients (n = 348).

Variables	N (%)
Diagnosed with diabetes	
(i) Yes	266 (76.4%)
(ii) My son/daughter has diabetes	82 (23.6%)
Type of diabetes	
(i) Type 1	136 (39.1%)
(ii) Type 2	140 (40.2%)
(iii) I do not know	72 (20.7%)
Duration of diabetes	
(i) Between 1 and 5 years	166 (47.7%)
(ii) Between 6 and 10 years	94 (27.0%)
(iii) More than 10 years	88 (25.3%)
Diagnosed with DKA	
(i) Yes	104 (29.9%)
(ii) No	244 (70.1%)
Having good information about DKA	
(i) Yes	104 (29.9%)
(ii) No	244 (70.1%)
In your opinion, is there a lack of education for diabetic patients about diabetic ketoacidosis in Hail City?	
(i) Yes	324 (93.1%)
(ii) No	24 (06.9%)

Regarding Figure 1, the most commonly known source for DKA information was a doctor (27.6%), followed by the Internet (17.2%), and family and friends (14.9%).

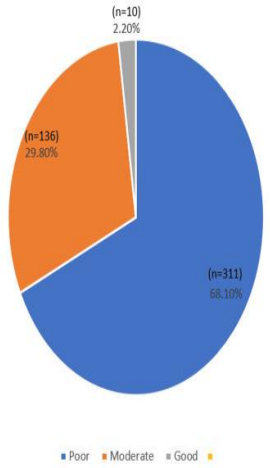
Assessment of awareness regarding GDM:

The results of the research reveal that a considerable number of participants demonstrated accurate knowledge regarding certain aspects related to GDM. For instance, 27.8% (127 participants) correctly identified that increasing the number of pregnancies does not increase the chance of developing GDM. Additionally, 61.1% (279 participants) recognized that women with a previous history of GDM have a higher chance of developing it again. Moreover, 49.9% (228 participants) correctly acknowledged that women with a family history of diabetes are at a higher risk of developing GDM. Furthermore, only 10.5% (48 participants) accurately identified the usual time to diagnose GDM in the absence of risk factors as weeks 24-28.

Among the participants, 40.9% (187 participants) correctly identified blood analysis after drinking a glucose solution as the appropriate analysis for diagnosing GDM. In terms of treatment for GDM, 61.3% (280 participants) correctly recognized the importance of organizing meals and exercise. Additionally, 33.7% (154 participants) correctly acknowledged the necessity of analyzing blood after drinking glucose 6-12 weeks after childbirth for those who developed GDM to ensure its removal. Lastly, 26.0% (119 participants) correctly identified a history of a previous pregnancy with a child weighing more than 4.5 kg as a factor that increases the suspicion of developing GDM in the future.

Moreover, 27.1% (124 participants) correctly recognized that weight gain before pregnancy or its rapid increase during the first months of pregnancy may contribute to the development of GDM. Furthermore, 19.3% (88 participants) correctly identified that polycystic ovary syndrome (PCOS) increases the risk of GDM. Additionally, 26.9% (123 participants) correctly acknowledged that a mother's age over 35 years old may contribute to GDM. It is important to note that the majority of participants had a poor awareness level, with 68.1% (311 participants) falling into this category. Table 2 and Figure 1 present the overall awareness level among the study participants.

Figure 1. Overall Awareness level among the study participants



Discussion:

GDM is a pregnancy illness that harms the health of many millions of women globally [13]. It is a common metabolic illness that can affect approximately 25% of pregnant women, and the global prevalence ranges between 5% and 25.5% [14]. GDM refers to any level of glucose intolerance that occurs during pregnancy due to insulin resistance and pancreatic cell malfunction [15]. It is an illness that occurs during the second and third trimesters of pregnancy and features marked insulin

resistance secondary to placental hormonal release. GDM also features urgent pregnancy problems such as extra fetal growth and adiposity, with the consequent threat of delivery strain and hypertensive ailments in pregnancy [16]. While the cause of GDM is not generally unknown, some theories consider obesity, late parental age, and women from specific races as high risks [17]. Knowing the public's knowledge and perception of GDM is vital in designing and implementing proper preventative and management strategies. This discussion examines the knowledge and views about GDM held by participants in research performed in the Al-Baha region of Saudi Arabia.

Generally, the study outcomes indicate that the participants had a poor understanding of GDM. A large percentage of respondents (68.1%) had a poor level of awareness, 29.8% had reasonable awareness levels, and only 2.2% had a good level of awareness of the disease. These outcomes resemble recent research performed in Saudi Arabia, where 60.3% of participants had poor awareness levels, 33% reported moderate awareness, and only 6.6% reported a good level of awareness [8]. Another study surpassed the current findings. Based on the study outcomes, 77.8% of women in Jeddah reported poor knowledge, and only 6.1% understood GDM properly [18]. Additionally, 93.69% of participants reported poor awareness of GDM [19]. This study represents extreme levels of poor awareness compared to other studies in Saudi Arabia that reported fair awareness. Awareness of GDM was poor among respondents (53.45%), with only a marginal percentage of 7.80% knowing GDM [20].

Diabetes is one of the most common non-communicable diseases worldwide. There are three main types of diabetes type 1, type 2, and gestational diabetes. Type 1 diabetes accounts for 5% - 10% of diabetes and mostly affects children and adolescents. Meanwhile, type 2 diabetes accounts for 90% - 95% of all diabetes. Most patients with type 2 diabetes are overweight or obese, because of their sedentary lifestyle, high calorie intake, also body fat itself causes insulin resistance. In both types of diabetes type 1 and type 2, genetic and environmental factors cause the loss of beta cells in the pancreas resulting in hyperglycemia [1] .

Over the past 30 years the incidence rate of type 1 diabetes has increased in the Kingdom of Saudi Arabia (KSA) [2] . According to the most recent International Diabetes Federation (IDF) report in 2019, KSA is one of the top ten countries worldwide for the number of incidence per year of type 1 diabetes in children and adolescents aged 0 - 14 years. According to the IDF report KSA is the fifth country worldwide (after Finland, Sweden, Kuwait, and Norway) in the incidence rates per 100,000 population per year of type 1 diabetic children and adolescents aged 0 - 14 years with an incidence rate of 31.4 per 100,000 population per year.

The IDF also reported that in the Middle East and North Africa (MENA) Region KSA is the third country (after Algeria and Morocco) for the number of children and adolescents aged 0 - 19 years with type 1 diabetes with an estimated number of 27,800 diabetic children and adolescent [3] .

DKA at diagnosis of diabetes:

Diabetic ketoacidosis is the leading cause of acute morbidity and mortality in children with T1D. It is a metabolic imbalance which is caused by a low level of insulin in the presence of increased counterregulatory hormones and characterized by hyperglycemia, metabolic acidosis, and ketosis. In new onset T1D, DKA is caused by underlying progressive beta cell failure while in established patients, DKA occurs due to insulin omission, infection, gastrointestinal illness, stress, or pump failure. In T2D patients, DKA may occur during concomitant acute illness or the transition to insulin dependency [5].
In one study, Saudi Arabia had one of the highest rates of DKA at diagnosis of T1D (59%) beside other countries such as United Arab Emirates (80%), Romania (67%), and Taiwan (65%). In contrast, the lowest rates were in Sweden (14%), Canada (18.6%), Finland (22%) and Hungary (23%) [6]. In a study of American youth with T1D, 29–31% of patients <20 years of age presented in DKA at diagnosis [7]. An extensive review of national studies indicates that the DKA rate at diagnosis has decreased over the past 30 years in Saudi Arabia (Table 1).

Table 3. Epidemiology of DKA among patients with newly diagnosed T1D in Saudi Arabia.

Study	Region	Study time	T1D No.	M: F	Mean age (Y)	DKA %	Study type
Salman H et al [9]	Riyadh	1985–1989	110	0.8:1.2	5.9	67%	Follow-up
Kulaylat et al [10]	Eastern	1986–1997	46	0.6:1.4	9	77%	Retrospective
Al-Magamsi et al [11]	Al-Madina	1992–2001	230	0.9:1.1	6.9	55.2%	Clinical
Habib [12]	Al-Madina	1992–2004	311	0.95:1.05	6.7	55.3%	Retrospective
Abduljabbar et al [13]	Eastern	1990–2007	438	0.8:1.2	6.7	40%	Observational
Abdulaziz M Al Rashed [14]	Jeddah	1993–2005	369	0.9:1.1	12.3	49.9%	Retrospective
Cherian et al [15]	Eastern	1980–2009	119	1.05:0.95	4.7	74%	Retrospective
Mohammad A. Al Qahtani [16]	Aseer	2006–2013	508		8.5	48%	Retrospective
A.M. Ahmed et al [17]	Northwest	2005–2014	541	0.93:1.06	5.5	44.9%	Retrospective
Ahmed H. Alghamdi [18]	Al-Baha	2007–2014	372	0.91:1.09	8.3	44.2%	Prospective
Al-Ghamdi [19]	Al-Baha	2006–2016	471	0.64:1.36	8.2	40.8%	Retrospective

T1D, Type 3 diabetes mellitus; M: F, male/Female; DKA%, Diabetes Ketoacidosis percent.

Since Finland has ranked as the country with the highest prevalence of T1D with 54 cases per 100,000, the Type 1 Diabetes Prediction and Prevention Project (DIPP) was implemented. Thereafter, the prevalence of DKA at diagnosis decreased from 30% in 1982–1991 to 19% in 1992–2002. However, DKA at diagnosis remained high in children aged two

years (39.1%–47.8%) [8]. According to the Diabetes Atlas (8th edition), Saudi Arabia ranked the 8th highest country for type 1 diabetes in those < 20 years of age, with an estimated 35,000 affected children and adolescents. Thus, in light of the significantly high incidence and prevalence of T1D, a structured program is required to decrease DKA at new-onset DM. This program should focus on increasing awareness of T1D signs and symptoms among both the public and health care providers, as patients with severe DKA are often seen earlier by healthcare providers who missed the diagnosis, particularly in the youngest children [7]. Moreover, the program should also include diabetes screening for family members of children with T1D.

The prevalence of DM among participants was 17.7%. In 42.8% of diabetic teachers the duration of DM ranged between 1 to 5 years. Most teachers (74.7%) had a family history of DM, mostly among parents (72.6%). Less than one-third of teachers (30%) reported the presence of glucometer at school, meanwhile 59.1% had a diabetic student .

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- Urban residents had a 60% higher awareness rate compared to rural residents.

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