

Journal of University Studies for inclusive Research

Vol.6, Issue 9 (2021), 1710–1735

USRIJ Pvt. Ltd.,

## **Saudi Arabia Medical Specialization Board of Family Medicine in Yanbu**

Knowledge and attitude of School Teachers toward diabetes mellitus Complications  
in Yanbu City

(January 2020 –January 2021)

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This research was submitted in Partial Fulfilment of the Saudi Board in FM, 2021

### Abstract

**Introduction:** Type 2 diabetes mellitus occurs when the pancreas (an organ in the abdomen) produces insufficient amounts of the hormone insulin and/or the body becomes resistant to normal or even high levels of insulin (1). Saudi Arabia is one of the 19 countries and territories of the IDF MENA region. There were 3.4 million cases of diabetes in Saudi Arabia in 2015 (2). Type 2 diabetes is thought to be caused by a combination of genetic and environmental factors Diabetes mellitus is a chronic condition that can lead to complications over time.

**Methods:** A random sample of 462 DM patients was selected from school teachers in Yanbu, and their knowledge attitude and practice assessed using a questionnaire. the data was collected by sheet was divided into two sections. The first section containing of personal information and the second section is containing a general information concerning the subject of research.

**Results:** This study shows that the levels of knowledge seemed particularly high in Yanbu. however, two thirds of our participants cited diabetes is a disease resulting from a relative or complete lack of insulin, while less than one third was consider smoking is factor that led to high blood sugar However, participants general awareness of diabetes symptoms and complications was relatively high, perhaps because they had experienced these symptoms themselves or observed them in fellow-patients. We observed several correlates of knowledge and attitudes. there was significant statistical distribution between knowledge and attitudes.

The majority of gender were females, for age group is (40 Less than 50) years old the most of the participants were university Educational level, most of the participants has no diabetes or other chronic diseases.

**Conclusions:** There was an increase in the level of knowledge with age, intervention programs should focus on younger aged populations to offer the most benefit to the community.

**Keywords:** diabetes, insulin, teachers, diseases.

## ملخص الأطروحة

**المقدمة:** يحدث داء السكري عندما ينتج البنكرياس (عضو في البطن) كميات غير كافية من هرمون الأنسولين أو يصبح الجسم مقاومًا لمستويات الأنسولين. المملكة العربية السعودية هي واحدة من 19 دولة ومنطقة في منطقة الشرق الأوسط وشمال إفريقيا. عدد سكان المملكة العربية السعودية بلغ 34,8 مليون شخص بلغ نسبة السكري 18,3% كان هناك 3.4 مليون حالة إصابة بالسكري في المملكة العربية السعودية في عام 2020, 68,2 % من سكان المملكة يعانون من زيادة الوزن و 33,7 % من السكان يعانون من السمنة. يُعتقد أن داء السكري من النوع 2 ناتج عن مجموعة من العوامل الجينية والبيئية مرض السكري هو حالة مزمنة يمكن أن تؤدي إلى مضاعفات بمرور الوقت.

**الأهداف:** التعرف على معرفة المعلمين بمرض السكري، للتعرف على معرفة المعلمين حول السن الأكثر شيوعًا لمرض السكري، للتعرف على معرفة المعلمين حول أكثر علامات وأعراض مرض السكري، للتعرف على معرفة المعلمين حول عوامل الخطر الأكثر شيوعًا التي تؤدي إلى الإصابة بمرض السكري ومضاعفات مرض السكري، وتقييم المواقف تجاه المعلمين حول مرض السكري

**الطرق:** تم اختيار عينة عشوائية من 462 مشاركًا من معلمي ومعلمات مدارس ينبع، وتم تقييم سلوكهم المعرفي وممارستهم باستخدام استبيان. تم جمع البيانات بواسطة نموذج Google وتم تقسيمها إلى قسمين. يحتوي القسم الأول على معلومات شخصية والقسم الثاني يحتوي على معلومات عامة تتعلق بموضوع البحث.

**النتائج:** أظهرت هذه الدراسة أن مستويات المعرفة بدت عالية بشكل خاص في ينبع. ومع ذلك، أشار 3/2 من المشاركين إلى أن مرض السكري هو مرض ناتج عن مقاومة الأنسولين أو نقص كامل في الأنسولين، بينما اعتبر >3/1 أن التدخين عامل يؤدي إلى ارتفاع نسبة السكر في الدم. ومع ذلك، فإن الوعي العام لدى المشاركين بأعراض مرض السكري ومضاعفاته كان مرتفع نسبيًا، ربما لأنهم عانوا من هذه الأعراض بأنفسهم أو لاحظوها في زملائهم المرضى. لاحظنا العديد من الارتباطات بالمعرفة والوعي بمضاعفات السكر. كان هناك توزيع إحصائي كبير بين المعرفة والوعي.

من بين 462 مشاركًا، كانت الغالبية العظمى من الإناث 265 معلمة (57.4%). أما الفئة العمرية من (40-50) سنة 198 معلمًا (42.9%). معظم المشاركين كانوا مستواهم التعليمي من الجامعيين وعددهم 375 معلمًا ومعلمه (81,2%). معظم المشاركين ليس لديهم مرض السكري أو أمراض مزمنة أخرى 397 معلمًا ومعلمه (85.9%). أشارت النتائج إلى أن معظم المشاركين 311 معلمًا (68.3%) لديهم مستوى منخفض من المعرفة حول مضاعفات مرض السكري. بينما 151 معلمًا (32.3%) لديهم مستوى عالٍ من المعرفة. بالنسبة للمضاعفات اعتبر 378 معلمًا (81.8%) من المشاركين أن مرض السكري يمكن أن يؤدي إلى مضاعفات عديدة ومتنوعة في جميع أجزاء الجسم.

33 (7.1%) يعتبرون أن السرطان هو أحد أهم مضاعفات مرض السكري .  
194 معلما (42%) اعتبروا أن مضاعفات مرض السكري تظهر بعد 10 - 15 سنة بعد اكتشافه .  
أفاد 250 معلما (54.1%) من المشاركين بوجود علاقة بين التدخين ومضاعفات مرض السكري .  
وأفاد 162 معلما (35.1%) من المشاركين إذا كان الشخص مصاباً بداء السكري ، فهناك احتمالية الإصابة بقرحة .  
أبلغ 54 معلما (11.7%) من المشاركين إذا كان الشخص مصاباً بمرض السكري يؤدي إلى فقر الدم .  
وأفاد 254 معلما (55%) من المشاركين أن هناك علاقة بين مرض السكري وارتفاع ضغط الدم .  
424 معلما (91.8%) من المشاركين أفادوا أنه يمكن تجنب مضاعفات مرض السكري .  
كانت الغالبية 391 معلما (84.6%) من المشاركين يعتبرون أن اعتلال الشبكية هو أحد أكثر مضاعفات مرض السكري .  
عندما سأل المشاركون عن العواقب السلبية لمرض السكري على الحمل، لاحظوا أن 318 معلما (68.8%) يعتقدون أنه يسبب تسمم الحمل، و61 معلما (13.2%) يعتقدون أنه يسبب وفاة الأم بعد الولادة، و197 معلما (42.6%) يعتقدون بمشاكل في الجهاز التنفسي عند الأطفال حديثي الولادة،  
وأخيراً 401 معلما (86.8%) أشاروا إلى أنه يجب على كل مريض سكري استشارة طبيبه قبل الصيام لأنه قد يسبب مضاعفات.

**الاستنتاجات:** كانت هناك زيادة في مستوى المعرفة مع تقدم العمر والمستوى التعليمي، يجب أن تركز برامج التدخل على الأشخاص الأصغر سناً لتقديم فائدة أكبر للمجتمع.

**الكلمات المفتاحية:** السكري ، الأنسولين ، المعلمين ، الأمراض.

## 1. INTRODUCTION

### 1.1 BACKGROUND

Type 2 diabetes mellitus occurs when the pancreas (an organ in the abdomen) produces insufficient amounts of the hormone insulin and/or the body becomes resistant to normal or even high levels of insulin (1). Saudi Arabia is one of the 19 countries and territories of the IDF MENA region. There were 3.4 million cases of diabetes in Saudi Arabia in 2015 (2). Diabetes mellitus is one of the most common diagnoses made by family physicians. Uncontrolled diabetes can lead to blindness, limb amputation, kidney failure and vascular and heart disease. Screening patients before signs and symptoms develop leads to earlier diagnosis and treatment, but may not reduce rates of end-organ damage. Randomized trials show that screening for type 2 diabetes does not reduce mortality after 10 years, although some data suggest mortality benefits after 23 to 30 years. Lifestyle and pharmacologic interventions decrease progression to diabetes in patients with impaired fasting glucose or impaired glucose tolerance. Screening for type 1 diabetes is not recommended. The U.S. Preventive Services Task Force recommends screening for abnormal blood glucose and type 2 diabetes in adults 40 to 70 years of age who are overweight or obese, and repeating testing every three years if results are normal. Individuals at higher risk should be considered for earlier and more frequent screening. The American Diabetes Association recommends screening for type 2 diabetes annually in patients 45 years and older, or in patients younger than 45 years with major risk factors. The diagnosis can be made with a fasting plasma glucose level of 126 mg per dL or greater; an A1C level of 6.5% or greater; a random plasma glucose level of 200 mg per dL or greater; or a 75-g two-hour oral glucose tolerance test with a plasma glucose level of 200 mg per dL or greater.

Results should be confirmed with repeat testing on a subsequent day; however, a single random plasma glucose level of 200 mg per dL or greater with typical signs and symptoms of hyperglycemia likely indicates diabetes. Additional testing to determine the etiology of diabetes is not routinely recommended. Type 2 diabetes is thought to be caused by a combination of genetic and environmental factors. Diabetes mellitus is a chronic condition that can lead to complications over time. These complications can include:

- ☐ Coronary heart disease, which can lead to a heart attack .
- ☐ Cerebrovascular disease, which can lead to stroke .
- ☐ Retinopathy (disease of the eye), which can lead to blindness .

- ☐ Nephropathy (disease of the kidney), which can lead to kidney failure and the need for dialysis .
- ☐ Neuropathy (disease of the nerves), which can lead to, among other things, ulceration of the foot requiring amputation.

Many of these complications produce no symptoms in the early stages, and most can be prevented or minimized with a combination of regular medical care and blood sugar monitoring.

### **1.2 EYE COMPLICATIONS (Retinopathy):**

People with type 2 diabetes should have an eye examination by an ophthalmologist or optometrist when they are first diagnosed with diabetes. The reason for this is that blood sugar levels often increase over a period of several years before the person is diagnosed. Eye complications can develop during this time and often have no symptoms. Having an eye examination soon after diagnosis can help to determine if there are eye complications, the extent or severity of the complications, and if treatment is needed.

### **1.3 KIDNEY COMPLICATIONS (Nephropathy):**

Diabetes can alter the normal function of the kidneys. A urine test that measures the amount of protein (albumin) in the urine can determine if diabetes is affecting the kidney's filtering action. Microscopic amounts of albumin in the urine (microalbuminuria) can be an early indicator of diabetes-related kidney complications (called nephropathy). The amount of albumin in the urine can also help the provider determine if nephropathy is worsening.

People with type 2 diabetes at the time of diagnosis. If the test shows that there is protein in the urine, tight blood sugar and lipid (cholesterol and triglyceride) control are recommended.

### **1.4 HYPERTENSION AND RELATED COMPLICATIONS:**

A blood pressure reading  $> 140/80$  mmHg is recommended for most people with diabetes who do not have kidney complications; a lower blood pressure goal ( $> 130/80$ ) is recommended for people with diabetes who have kidney disease.

### **1.5 DIABETIC FOOT:**

Diabetes can decrease the blood supply to the feet and damage the nerves that carry sensation. These changes put the feet at risk for developing potentially serious complications such as ulcers. Foot complications are very common among people with diabetes, and may go unnoticed until the condition is severe (3).

### **1.6 DIABETIC NEUROPATHY:**

Neuropathy is the medical term for nerve damage. Neuropathy is a common complication of type 1 and type 2 diabetes; up to 26 percent of people with type 2 diabetes have evidence of nerve damage at the time that diabetes is diagnosed. A generalized type of neuropathy, known as polyneuropathy, is the most common type of diabetic neuropathy. Other types of neuropathy can also affect people with diabetes.

Diabetic neuropathy is diagnosed based upon a medical history and physical examination of the feet. During an examination, there may be signs of nerve injury, including:

Loss of the ability to sense vibration and movement in the toes or feet (e.g., when the toe is moved up or down) Loss of the ability to sense pain, light touch and temperature in the toes or feet Loss or reduction of the Achilles tendon reflex (4).

## **2. RATIONALE**

Diabetes mellitus is systemic disease affected of many organs e.g., Heart, kidney, brain, eye, nervous system. It is affecting one quarter of the Saudi population, about (25%) of general population and another (10%) of the general population will be affected in 10 years. There is One third of Diabetes patients are affected by retinopathy, and (10%) are blind, one third of Diabetes patients are suffering from nephropathy, and (1%) are on dialysis.

One quarter of the diabetic population are suffering from ischemic heart disease, and (10%) of total number of diabetics in the Gulf stats are dying every year. There is about (40%) to (70%) of Amputated foot because uncontrolled diabetic ,6000 amputated foot yearly in KSA. High financial cost in the treatment of diabetes Disease and its complications, about 11 Billion riyals. Diabetes is the second leading cause of death in Saudi Arabia after car accidents, and the first cause of death for the elderly.

### **3. OBJECTIVES:**

### **3.1 GENERAL OBJECTIVE:**

The knowledge and attitude of School Teachers about diabetes mellitus Complications.

### **3.2 SPECIFIC OBJECTIVE**

- ❖ To identify the knowledge of teachers about Diabetes.
- ❖ To identify the knowledge of teachers about the most common age of patient with Diabetes.
- ❖ To identify the knowledge of teachers about the most sign and symptoms of patient with Diabetes.
- ❖ To identify the knowledge of teachers about the most common risk factors lead to Diabetes and complication of patient with Diabetes.
- ❖ To assess the attitudes toward of teachers about Diabetes

## **4. LITERATURE REVIEW**

Diabetes is a growing health problem globally and particularly in Saudi Arabia. Unfortunately, DM considered to be one of the most common cause for serious complications (either acute or chronic) that affecting a lot of organs all over the body. Public awareness and education about diabetes and its complications is the cornerstone in prevent progression of the disease and developing of complications. SO, considering this issue we conducted this study to assess school teacher's knowledge and their attitude toward DM complications in Yanbu city while no similar study had been done in our region.

### **4.1 PREVIOUS STUDY:**



1- Faisal K. Alanazi in 2018, study about Knowledge and awareness of diabetes mellitus and its risk factors in Saudi Arabia, nineteen articles are included in our systematic review. These studies included the following populations: DM patients (n=13), healthcare workers (n=3), medical students (n=1), secondary school students (n=1), and general population (n=1). Most studies found a lack of public awareness of the risk factors and complications of DM. Among medical students and healthcare workers, knowledge about the epidemiology of the disease and angle of insulin injection was deficient. This review highlights the need for increased knowledge and awareness of DM among the Saudi population. The means of improving knowledge and awareness of DM needs to be integrated into existing healthcare systems and processes to better inform patients, families, and communities about this chronic disease (5).

2- another study done by Kh. Shafiur Rahaman in 2017 about Knowledge, Attitude and Practices (KAP) Regarding Chronic Complications of Diabetes among Patients with Type 2 Diabetes in Dhaka, practices were 9.2 (out of 14), 7.9 (out of 13), and 16.9 (out of 27), respectively. Age and gender were significant predictors of knowledge and attitude. Females had better level of knowledge and attitude compared to males ( $\beta$ s = 0.55 and 1.24, respectively). Patients with graduate degrees and above compared to illiterates reported significantly greater knowledge and practice ( $\beta$ s = 1.27 and 1.44, respectively), after adjustments for covariates. Educational program was the most important significant predictor of KAP. Higher duration of diabetes ( $\beta$  = 0.07) and positive marital status ( $\beta$  = 1.21) had influenced better practice (6).

3- study by H. M. M Herath in 2017 about Knowledge, attitude and practice related to diabetes mellitus among the general public in Galle district in Southern Sri Lanka: a pilot study, A total of 277 participants were included in the study. The majority (77%) had either moderate (39%) or above moderate knowledge (38%) on diabetes mellitus.

Even though, level of education was significantly and positively associated with knowledge ( $p = 0.001$ ), the association of gender and age with knowledge was not significant. Unlike knowledge, the attitude towards diabetes was poor in majority (90%) and level of education had no significant effect on attitude. With regards to practices, more than half of study subjects never had their blood sugar checked and, about 65% used to take refined sugar liberally and a large majority (80%) had no regular exercise activity (7).

4- Mohammed Abdullah A. Alzahrani studied the teachers' knowledge of Diabetes and Attitudes towards Diabetic Students in the Primary schools in Al Baha City in Saudi Arabia. The sample of the study consisted of 59 teachers in the governmental primary male schools with mixed background variables of, for example, majors, teaching experiences, and levels of education. The study used a questionnaire in order to achieve research questions. It included two scales: the teachers' knowledge of diabetes and an attitude scale towards diabetic students as well as the items of these two-scale knowledge tests and attitude scale developed by the researcher. The findings demonstrate that there was not a statistical difference between the teachers' knowledge test and their six different majors. On the other hand, the teaching experience had a positive impact on teachers' attitude towards diabetic students. Although the negative correlation between teachers' knowledge of diabetes and their attitude towards diabetic students was small, this value could still suggest a negative correlation. The current study can lead to increased awareness of teachers and educational policy-makers to take into consideration training teachers in some common chronic diseases such as diabetes in the Kingdom of Saudi Arabia. (19)

5- Hassan Ali Al Bahloul 2017, studied the school teachers' knowledge, attitude and management practices of the clinical presentation and consequences of type1 diabetes mellitus among children in the primary school. Out of 250 teachers invited to participate in the study, 221 returned completed questionnaire with a response rate of 88.4%. Their mean age was  $32.9 \pm 4.2$  years. Only nine teachers (4.1%) reported that they have attended courses or lectures regarding type 1 Diabetes mellitus. overall, the teachers' knowledge of type 1 DM was insufficient in more than half of them (59.3%) and good in 40.7%. Very good and excellent levels of knowledge were not reported in any teacher. Good level of knowledge was reported among 46% of male teachers compared to 35.2% of female teachers. Higher level of education, attending courses/lectures about type 1 DM, older age (26-35 years) and more experience were the main factors associated with better type 1 DM knowledge and practice of teachers. (20)

6- Abdulrahman F. Alluhaybi et al 2020, the study aimed was to assess the knowledge and attitude of schoolteachers about diabetes mellitus in the schools of Ha'il region, Saudi Arabia. Out of 433 participants, 277 (64%) were female and 156 (36%) males, and almost all (430, 99%) were Saudi resident. Almost half of the participants (198, 45.8%) were in the age group of 35- 44 years. The result suggested that most of the participants (247; 57%) have moderate level of knowledge about diabetes; while 31.4% (136) and 11.5% (50) have good and poor level of knowledge, respectively. (21)

## **5. METHODOLOGY**

### **5.1 STUDY DESIGN:**

The study was cross sectional community-based Description Design

### **5.2 STUDY AREA AND SETTING:**

Yanbu is a major Red Sea port in the Medina Province of western Saudi Arabia about 200 km west of Medina. It is approximately 300 kilometers northwest of Jeddah. The population is 222,360 (2020 census). There are 2 major hospitals in Yanbu city and 19 primary health care centers, and 61 male Schools and 78 Female schools.

### **5.3 STUDY POPULATION AND TARGET GROUP:**

Schoolteachers in Yanbu from all level's groups (Male and Female)

### **5.4 INCLUSION CRITERIA:**

Yanbu Teachers from all level of education.

### **5.5 EXCLUSION CRITERIA:**

People from other jobs

### **5.6 SAMPLE SIZE**

Represented sample size was calculated using Raosoft sample size calculator

Yanbu teachers = 3652

Margin error = 5

Confidence interval = 95

Recommended sample size = 378

The response was 462 participants were included in this study.

### **5.7 SAMPLE TECHNIQUE**

The study was random, total number of samples were 462 teachers, from both genders.

The questionnaire was published in Google form and sent to teachers (what's aap) groups in different school levels in Royal commission and general Yanbu Schools .

## **STUDY VARIABLE:**

- ☐ Gender
- ☐ Age
- ☐ Educational level
- ☐ Diabetes or not
- ☐ other chronic diseases
- ☐ Knowledge of the causes Diabetes
- ☐ Knowledge of complications of diabetes
- ☐ Prevention of diabetes complications
- ☐ Sources to get the right medical information

### **5.8 DATA COLLECTION:**

The data was collected by sheet was divided into two sections. The first section containing of personal information and the second section is containing a general information concerning the subject of research.

#### **SECTION I: PERSONAL INFORMATION:**

the general questions about gender of the participant in the research, age, marital status and educational level.

#### **▪ SECTION II: RESEARCH'S SUBJECT:**

Which were Other chronic diseases, knowledge of the causes Diabetes, knowledge of complications of diabetes, Prevention of diabetes complications and sources to get the right medical information.

### **5.9 DATA ANALYSIS**

The data was analyzed using IBM SPSS statistics program, chi square test was used for testing the significance P value of  $\leq 0.05$  will be considered statistically significant.

## **6. RESULTS:**

462 of the participants completed the questionnaire.

**TABLE 1: SOCIODEMOGRAPHIC PROFILE OF THE PARTICIPANTS.**

The study participants' characteristics are summarized in Table 1. The majority were females (57.4%), the majority of age group is (40 Less than 50) years old (42.9%), (82.2%) most of the participants are University Educational level, (85.9%) of the participants has no diabetes and (82%) of the participant had no other chronic diseases.

<u>Categories</u>	<u>Groups</u>	<u>Frequency</u>	<u>Percentage</u>
<b>Gender</b>			
	Male	197	42.6
	Female	265	57.4
<b>Age</b>			
	20 Lees than 30	40	8.7
	30 Lees than 40	165	35.7
	40 Lees than 50	198	42.9
	More than 50	59	12.8
<b>Educational level</b>			
	Elementary	7	1.5
	Secondary	43	9.3
	University	375	81.2
	High university	37	8.0
<b>Diabetes or not</b>			
	Yes	65	14.1
	No	397	85.9
<b>Other chronic diseases</b>			
	Yes	83	18.0
	No	379	82.0

**Assessment of KA responses:**

The participants' frequency distribution on the KA questions demonstrated in (Tables 2– 4).

### 1. Knowledge:

**Table 2: Frequency distribution of the responses to knowledge questions:**

<u>Questions</u>	<u>Responses</u>	<u>Frequency</u>	<u>Percentage</u>
1. Diabetes is a disease resulting from a relative or complete lack of insulin	Yes	388	84.0
	No	9	1.9
	Don't know	65	14.1
2. What is the age group at risk of developing diabetes?	Children	3	.6
	Young people	6	1.3
	Old people	52	11.3
	The disease not limited to certain age	401	86.8
Does the accumulation of fat around the abdomen increase the incidence of diabetes?	Yes	321	69.5
	No	32	6.9
	Don't know	109	23.6
If a person is thin, can they develop diabetes?	Yes	402	87.0
	No	17	3.7
	Don't know	43	9.3
What are the factors that lead to high blood sugar?	Smoking	53	11.5
	psychological state	329	71.2
	Do not know	80	17.3
Is diabetes a genetic disease?	Yes	374	81.0
	No	68	14.7
	Don't know	20	4.3

The majority were 388 (84.0%) of the study participants knew that the Diabetes is a disease resulting from a relative or complete lack of insulin, 401 (86.8%) of the participants reported that the risk of developing diabetes is not limited to certain age, 321 (69.5%) of the participants reported that the accumulation of fat around the abdomen increase the incidence of diabetes, 402 (87%) of the participants reported that if a person is thin, they can develop diabetes, 329 (71.2%) of the participants reported that psychological state is the most factors that lead to high blood sugar and finally, 374 (81%) of the participants reported that diabetes is a genetic disease.

**Table 3: Frequency distribution of the responses to knowledge questions (Symptoms):**

Table 3 demonstrate that about 422 (91.3%) of the participants consider the main symptoms of diabetes is frequent urination during day and night, 296 (64.1%) consider the symptoms of diabetes is extreme thirst, 288 (62.3%) consider the symptoms of diabetes is feeling tired and exhausted, 246 (53.2%) consider the symptoms of diabetes is slow healing of bruises and wounds, 254 (55%) consider the symptoms of diabetes is blurred vision, 106 (22.9%) consider the symptoms of diabetes is headache, 22 (4.8%) consider the symptoms of diabetes is fever, 321 (69.5%) of the participants reported that the people can have diabetes symptoms but does not have diabetes and 219 (47.4%) consider that there were no direct relationship between the pain in the knees and legs with diabetes symptoms.

<u>Symptoms</u>	<u>Responses</u>	<u>Frequency</u>	<u>Percentage</u>
<b><u>The main symptoms of diabetes</u></b>			
Frequent urination, day and night	Yes	422	91.3
	No	40	8.7
Extreme thirst	Yes	296	64.1
	No	166	35.9
Feeling tired and exhausted	Yes	288	62.3
	No	174	37.7
Slow healing of bruises and wounds	Yes	246	53.2
	No	216	46.8
Blurred vision	Yes	254	55.0
	No	208	45.0
Headache	Yes	106	22.9
	No	356	77.1
fever	Yes	22	4.8
	No	440	95.2
Someone may have diabetes symptoms and he does not have diabetes. Is this true?	Yes	321	69.5
	No	32	6.9
	Don't know	109	23.6
pain in the knees and legs a symptom of diabetes?	Yes	56	12.1
	No	31	6.7
	Don't know	156	33.8
	There is no direct relationship	219	47.4

**Table 4: Frequency distribution of the responses to knowledge questions (Complication):**

Table 4 demonstrate that about 378 (81.8%) of the participants consider that diabetes can lead to many and varied complications in all parts of the body, 33 (7.1%) consider that cancer is one of the most important complications of diabetes, 194 (42%) consider that the complications for diabetic appear after 10 – 15 years after discovering, 250(54.1%) of the participant reported there a relationship between smoking and diabetes complications, 162(35.1%) of the participant reported if a person has diabetes, there is a possibility of developing an ulcer, 54(11.7%) of the participant reported if a person has diabetes that lead to anemia, 254 (55%) of the participant reported, there is a relationship between diabetes and high blood pressure, , 424 (91.8%) of the participant reported that the complication of the diabetes can be avoided.

The majority was 391 (84.6%) of the participant consider the retinopathy is one of the most complication of the diabetes.

When the participants asked about the negative consequences of diabetes for pregnancy they noted, 318 (68.8%) consider pregnancy poisoning, 61 (13.2%) consider mother's death after childbirth, 197 (42.6%) consider respiratory problems in new-borns and finally 401 (86.8%) noted that every diabetic should consult with his doctor before fasting, because it may cause complications.

<b><u>Complications</u></b>	<b><u>Responses</u></b>	<b><u>Frequency</u></b>	<b><u>Percentage</u></b>
Diabetes leads to many and varied complications in all parts of the body	Yes	378	81.8
	No	33	7.1
	Don't know	51	11.0
One of the most important complications of diabetes is cancer?	Yes	33	7.1
	No	260	56.3
	Don't know	169	36.6
When do complications begin to appear for a diabetic if he is under control, and the duration of the disease is known?	About 10-15 years	194	42.0
	From the first months of discovering the disease	151	32.7
	About two years	117	25.3
Is there a relationship between smoking and diabetes complications	Yes	250	54.1
	No	63	13.6
	Don't know	149	32.3
If a person has diabetes, is there a	Yes	162	35.1



possibility of developing an ulcer	No	157	34.0
	Don't know	143	31.0
If a person has diabetes, does that lead to anemia	Yes	54	11.7
	No	48	10.4
	Don't know	142	30.7
	There is no direct relationship	218	47.2
Is there a relationship between diabetes and high blood pressure	Yes	254	55.0
	No	81	17.5
	Don't know	127	27.5
Can complications of diabetes be avoided	Yes	424	91.8
	No	6	1.3
	Don't know	32	6.9
<b><u>What are the complications of diabetes for the patient?</u></b>			
Narrowing of all arteries in the body	Yes	202	43.7
	No	260	56.3
Retinopathy	Yes	391	84.6
	No	71	15.4
Nephropathy	Yes	256	55.4
	No	206	44.6
Osteopathy	Yes	222	48.1
	No	240	51.9
<b><u>What are the negative consequences of diabetes for pregnancy?</u></b>			
Pregnancy poisoning	Yes	318	68.8
	No	144	31.2
Mother's death after childbirth	Yes	61	13.2
	No	401	86.8
Respiratory problems in new-borns	Yes	197	42.6
	No	265	57.4
Every diabetic should consult with his doctor before fasting, because it may cause complications	Yes	401	86.8
	No	33	7.1
	Don't know	28	6.1

**Table 5: The level of knowledge of teachers about Diabetes.**

	Frequency	Percent	Mean	Std. Deviation
High	151	32.7	1.67	.470
Low	311	67.3		

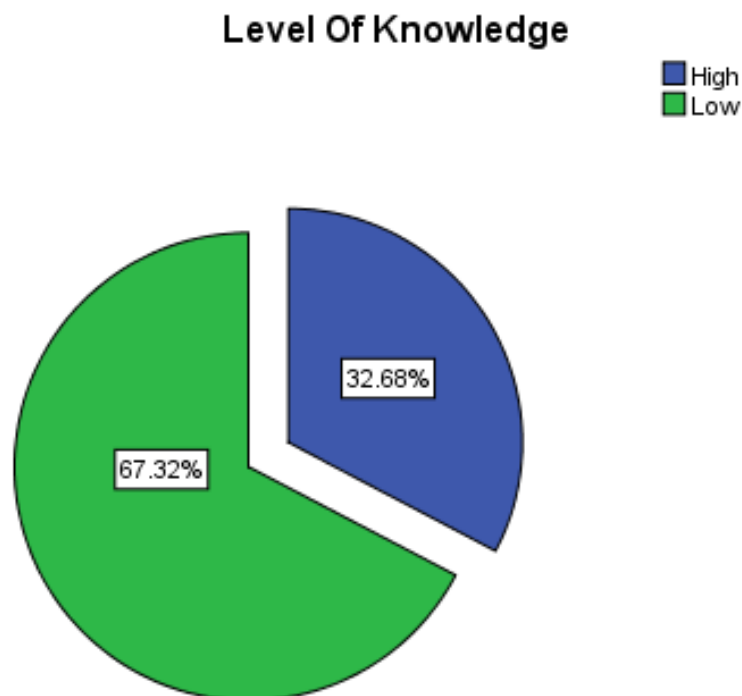


Figure 1: level of knowledge

Table (5) and figure (1) presents the level of knowledge of teachers about Diabetes., it was detected that the majority of teachers were low level of knowledge 311 (67.3%), with overall knowledge mean and St. Deviation (1.67) and (0.470) respectively.

**Table 6: Frequency distribution of the responses to attitudes (Treatment):**

Table 6 demonstrated the assessment of attitudes among the participant, 422 (91.3%) of them noted that the reasons of treating diabetes are: to keep blood sugar as much as possible at its normal level, reduce the possibility of diabetes complications, or at least delay them as much as possible, and reduce their severity, 358 (77.5%) of the participant noted the insulin injection treatment of diabetes, 260 (56.3%) consider the tablets, 376 (81.4%) consider following necessary diet, 342 (74%) noted doing adequate and regular physical exercise and 241 (52.2%) noted keep the body at a normal weight. when the participant asked about if the diabetes can be cure, 334 (72.3%) of them think the treatment is depend on the type of the diabetes.

<b><u>Treatment</u></b>	<b><u>Responses</u></b>	<b><u>Frequency</u></b>	<b><u>Percentage</u></b>
The reasons of treating diabetes are: to keep blood sugar as much as possible at its normal level, reduce the possibility of diabetes complications, or at least delay them as much as possible, and reduce their severity	Yes	422	91.3
	No	4	.9
	Don't know	36	7.8
insulin injection	Yes	358	77.5
	No	104	22.5
Tablets	Yes	260	56.3
	No	202	43.7
Follow the necessary diet	Yes	376	81.4
	No	86	18.6
Doing adequate and regular physical exercise	Yes	342	74.0
	No	120	26.0
Keep the body at a normal weight	Yes	241	52.2
	No	221	47.8
Can diabetes be cured?	Yes	59	12.8
	No	36	7.8
	Don't know	33	7.1
	Depending on the type you have	334	72.3

**Table 7: The level of attitudes of teachers about Diabetes**

	Frequency	Percent	Mean	Std. Deviation
High	292	63.2	1.37	.483
Moderate	170	36.8		

**Table 8: Correlation Between Knowledge, attitudes and practice (KAP):**

Table 8 demonstrated that there was significant statistical distribution between knowledge and attitudes (p value <0.001\*, ratio 0.321).

<u>Variable</u>	<u>Ratio</u>	<u>P-value</u>
Knowledge	0.321	<0.001*
Attitudes		

**Table 9: Sociodemographic distribution of the participants and their KA scores;**

<b>Variable value</b>	<b>K. Score</b>	<b><u>P-value</u></b>	<b>A. Score</b>	<b><u>P-</u></b>
	1.67+.470 <b>Mean rank</b>		1.37+.483 <b>Mean rank</b>	
<b>Gender</b>				
Male	229.61		219.20	
Female	232.91	0.747	240.64	.041
<b>Age</b>				
20 Lees than 30	278.13	.033	267.78	.013
30 Lees than 40	227.20		213.70	
40 Lees than 50	230.00		242.17	
More than 50	216.95		220.89	
<b>Educational level</b>				
Elementary	208.00		245.50	
Secondary	253.28	.169	296.92	.001
University	232.46		224.12	
High university	200.86		227.66	

Table 9 demonstrate that There was statistically significant difference in attitudes scores between females (p value 0.747). there was statistically significant difference in knowledge scores between the age group 20 Lees than 30 (p value 0.033\*), there was no statistically significant difference in knowledge scores between secondary education level (p value 0.169). For attitude scores there was no statistically significant difference in knowledge scores between females (p value 0.041\*). there was statistically significant difference in attitudes scores between the age group 20 Lees than 30 (p value 0.013\*), there was statistically significant difference in attitudes scores between secondary education level (p value 0.169\*).

**Table 10: The distribution of the KA according to the score**

Variable		Knowledge		P-value	Attitude		P-value	
	Good	Fair	Poor		Good	Fair	Poor	
Gender								
Male	(66) (14.3%)	0	(131) (28.4%)		(135) (29.2%)	(62) (13.4%)	0	
Female	(85) (18.4%)	0	(180) (39%)	.746	(157) (34%)	(108) (23.4%)	0	.041
Age								
20 Lees than 30	(5) (1.1%)	0	(35) (7.6%)		(19) (4.1%)	(21) (4.5%)	0	
30 Lees than 40	(57) (12.3%)	0	(108) (23.4%)		(117) (25.3%)	(48) (10.4%)	0	
40 Lees than 50	(66) (14.3%)	0	(132) (28.6%)	.033	(116) (25.1%)	(82) (17.7%)	0	.013
More than 50	(23) (5%)	0	(36) (7.8%)		(40) (8.7%)	(19) (4.1%)	0	
Educational level								
Elementary	(3) (0.6%)	0	(4) (0.9%)		(4) (0.9%)	(3) (0.6%)	0	
Secondary	(10) (2.2%)	0	(33) (7.1%)		(15) (3.2%)	(28) (6.1%)	0	
University	(121) (26.2%)	0	(254) (55.0%)	.168	(249) (53.9%)	(126) (27.3%)	0	.001
High university	(17) (3.7%)	0	(20) (4.3%)		(24) (5.2%)	(13) (2.8%)	0	

## **7. DISCUSSION**

Diabetes is a chronic disease that can be seen in any age group. it is difficult to compare our results with others, as most of the studies used different instruments and/or are carried out among different ethnic or age groups. This study shows that the levels of knowledge seemed particularly high in Yanbu. For example, two thirds of our participants cited diabetes is a disease resulting from a relative or complete lack of insulin, while less than one third was consider smoking is factor that lead to high blood sugar However, participants general awareness of diabetes symptoms and complications was relatively high, perhaps because they had experienced these symptoms themselves or observed them in fellow-patients. We observed several correlates of knowledge and attitudes. there was significant statistical distribution between knowledge and attitudes.

The majority of gender were females, for age group is (40 Less than 50) years old the most of the participants were university Educational level, most of the participants has no diabetes or other chronic diseases.

Diabetes is a life-long disease, and education should be considered an integral part of prevention, treatment, care and follow-up. In no other disease does the education of the individual play as important a role as it does in diabetes. More than 90% of diabetes care is carried out by the diabetic patients themselves. In this respect, the patient needs to learn self-care and how to conduct monitoring and evaluation, that is, take on the management of his/her own disease by gaining more awareness and acquiring the necessary skills.

In previous study were in Jeddah 2017 about school teachers' knowledge, attitude and management practices of the clinical presentation and consequences of type1 diabetes mellitus among children in the primary school. Out of 250 teachers invited to participate in the study, overall, the teachers` knowledge of type 1 DM was insufficient in more than half of them (59.3%) and good in 40.7%. Good level of knowledge was reported among 46% of male teachers compared to 35.2% of female teachers.

Higher level of education, attending courses/lectures about type 1 DM, older age (26-35 years) and more experience were the main factors associated with better type 1 DM knowledge and practice of teachers.

Also in another study Hail 2020 about assess the knowledge and attitude of schoolteachers about diabetes mellitus in the schools of Ha'il region. Out of 433 participants, 277 (64%) were female and 156 (36%) males, and almost all (430, 99%) were Saudi resident. Almost half of the participants (198, 45.8%) were in the age group of 35- 44 years. The result suggested that most of the participants (247; 57%) have moderate level of knowledge about diabetes; while 31.4% (136) and 11.5% (50) have good and poor level of knowledge, respectively.

In our study about Knowledge and attitude of School Teachers toward diabetes mellitus Complications in Yanbu City 2020. Out of 462 participants, 265 (57.4%) were female and 197 (42.6%) males. Almost half of the participants (198 teachers, 42.9%) were in the age group of 40- 50 years. The result suggested that most of the participants 311 teachers 68.3%) have low level of knowledge about complications of diabetes; while 151teachers (32.3%) have high level of knowledge.

## **8. CONCLUSION**

There is an increase in the level of knowledge with age, education level, intervention programs should focus on younger aged populations to offer the most benefit to the community. In light of these results, it can be recommended to identify missing information and negative attitudes towards diabetes, to organize training programs to improve knowledge and attitudes, and to increase patient awareness of attitudes, considering the individual characteristics of the patients.



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