



ORIGINAL ARTICLE

Knowledge and Attitudes of Adult Diabetic Patients Attending Primary Health Care in Bahrain about Seasonal Influenza and Influenza Vaccination - A Cross-Sectional Study

Fatema Ali Mohamed Alekri*, Maryam Majeed Ahmed, Rehab Zuhair Ali Alsalman, Zainab Ali Abdulhusain Al-Aradi, Zainab Ali Hussain Ismaeel

Primary Health Care, Family Physician Residency Program, Ministry of Health, Kingdom of Bahrain

*Corresponding author:

Fatema Ali Mohamed Alekri, Primary Health care, Family Physician Residency Program, Ministry of Health, Kingdom of Bahrain, Bahrain. E-mail: dr.alekri@hotmail.com

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Abstract

Introduction: Influenza is a highly contagious respiratory viral illness that is vaccine-preventable and occurs seasonally. While most cases present with mild respiratory symptoms, influenza can lead to severe complications in vulnerable populations, such as diabetics. Despite the protective benefits of annual vaccination, its uptake remains inconsistent worldwide, including among diabetic patients. Various factors, including knowledge, attitudes, and practices toward vaccination, may contribute to this low adoption.

Aim: This study aimed to assess the knowledge and attitudes of diabetic patients attending primary health care in Bahrain about seasonal influenza and the determinants of vaccine uptake or refusal.

Methods: A cross-sectional study was conducted between 6th and 17th February 2022 in five health centers in Bahrain. Utilizing an online calculator, a sample size of 357 was determined. The study was conducted using a convenience sampling method, which may restrict its generalizability. A self-administered questionnaire was used to assess patients' knowledge and attitudes about seasonal influenza and influenza vaccination.

Results: A total number of 393 participants (208 males and 185 females) were enrolled in the study with a mean age 58.8 years (SD = 10.1). Most participants in the present study had poor levels of knowledge towards seasonal influenza and influenza vaccine (56.7% and 64.1%, respectively). Furthermore, advice from doctors about the importance of vaccination was the most decisive of vaccine uptake (72.9%), while patients' perception that the vaccine is unnecessary as flu is just a minor illness was the most determinant of vaccine refusal (40.2%). A significantly strong association was found between patients' knowledge and attitudes towards influenza vaccine uptake ($P < 0.001$).

Additionally, the results showed that around 49.4% of the patients did not get the vaccine. Uptake of influenza vaccine was significantly higher among female participants (Odds ratio; OR = 1.8), participants with diabetes duration above 6 years (OR = 2) and participants with good, combined knowledge of influenza and its vaccine (OR = 2.9).

Conclusion: In conclusion, this study found significant gaps in knowledge towards seasonal influenza

and influenza vaccine. Nonetheless, most patients showed significant positive attitudes in favor of the vaccine. Significant association was found between patients' knowledge and their attitudes toward influenza vaccine uptake. Urgent interventions to improve influenza vaccine uptake and knowledge are needed.

Keywords: Influenza, Influenza vaccine, Diabetes mellitus, Knowledge, Attitudes

Introduction

Influenza is a respiratory viral infection that is highly contagious and can be prevented by vaccination. Influenza A and influenza B are the main types of human influenza viruses, both of which are easily spread between people, and are responsible for the annual seasonal influenza epidemics.^{1,2}

According to World Health Organization, influenza attacks around 5-10% of adults and 20-30% of children annually. In addition, influenza infection results in about 3-5 million cases of severe illness and about 290,000-650,000 deaths per annum globally.³ Although most of the cases present with mild respiratory symptoms, influenza can result in severe complications among susceptible populations including patients aged 65 years, infants, during pregnancy and among patients with chronic medical diseases like diabetes mellitus.⁴

Globally, diabetes mellitus is one of the major public health problems and is associated with significant negative health and economic impacts.⁵ The kingdom of Bahrain is considered one of the countries most affected by diabetes mellitus with a prevalence of around 14.7% of the adult population.⁶

Influenza infection imposes a significant disease burden and mortality in diabetic patients. Several studies found that diabetes mellitus increases the risk of influenza related complications by three to six times and risk of influenza-related mortality by 5-15% compared to non-diabetic patients.^{7,8} These complications could be minimized by enhancing the administration of influenza vaccine. Studies showed a reduction in hospital admissions by 79% during influenza epidemics amongst vaccinated diabetics.⁹ Thus, influenza vaccination is advised for all diabetic patients annually to reduce the disease morbidity and mortality.^{9,10}

Nonetheless, the uptake of influenza vaccine remains variably low worldwide, in general population and patients with diabetes mellitus. For instance, the European Union Council set a recommendation in 2009 advising vaccinating 75% of at-risk populations but no countries reached this target.¹¹ The highest vaccination coverage was reported in Netherlands (74.7% of diabetic patients) in 2013, while other countries such as France, the United Kingdom and Ireland reached between 60 and 70% of coverage of all diabetic patients. Similarly, the coverage rates in the United States of America and Canada were suboptimal and ranged between 60.2% and 63% in the period between 2011 and 2013, respectively.^{10,15}

Few, if any, studies have assessed the uptake of the influenza vaccine among diabetic patients in the Gulf Cooperation Council (GCC) countries. A study conducted in Southwestern Saudi Arabia among 353 diabetic patients showed that the coverage rate of seasonal influenza vaccination was 61%.¹⁶ In Bahrain, an audit conducted in 2017 in two health centers, found that influenza vaccine uptake rates were between 40% and 58%.¹⁷

Several factors contribute to this low uptake of influenza vaccine including patients' knowledge, attitudes and practices toward vaccination uptake. Some studies assessed this factor. For instance, a study conducted in Jordan to assess adults' and parents' knowledge, attitude and practice toward influenza and its vaccine showed that 47.3% only of the participants were considered knowledgeable.¹⁸ Another study conducted in Saudi Arabia found that 75.3% were unaware that the vaccine is suitable for all people, especially elderly and patients with chronic illnesses, and nearly half of the participants were unaware of the vaccine's recommended frequency or the route of delivery.¹⁹

To the best of our knowledge, no published study in the Kingdom of Bahrain evaluated the knowledge and attitudes of adult diabetic patients about seasonal influenza and vaccination. This study aimed to evaluate the knowledge and attitudes of diabetic patients visiting primary health care in Bahrain and the determinants of the vaccine uptake or refusal.

Materials and Methods

Study design, setting and subjects

A cross-sectional study was conducted in the period between 6th and 17th February 2022 in five health centers in Bahrain. The Kingdom of Bahrain provides its primary health services through 27 health centers that are distributed across five health governorates of the Kingdom. These health centers provide free curative, preventive and rehabilitative care through general and specialized clinics. Patients with diabetes are managed in general clinics, non-communicable diseases clinics and specialized diabetes clinics. Among all centers, five primary health care centers were conveniently selected, one center from each governorate. Hidd Health center from Muharraq governorate, Yousif Engineer Health center from Central governorate, Mohamed Jassim Kanoo Health center from Southern governorate, Sabah Al-Salem from Capital governorate and Jidhafs Health center from Northern Governorate.

Inclusion and exclusion criteria

The population of the study included all adult patients with type-I and II diabetes mellitus. Adult patients aged 18 years and above with type I or II diabetes mellitus for at least one year, who attended the selected health centers on the days of data collection were included. Patients with language barriers, pregnant patients and patients with intellectual impairment were excluded from the study.

Sample size

Since there were no published data about the prevalence of knowledge about influenza and its vaccine in Bahrain or GCC countries, the prevalence rates of good knowledge about influenza and its vaccine (11% and 37%, respectively) were extrapolated from a study conducted in Pretoria,

South Africa. Considering, prevalence of diabetes in Bahrain of 104637 patients (in December 2019), a margin of error 5% and confidence interval (CI) 95%, a sample of size of 357 patients targeted. This sample size was calculated using an online calculator (from select-statistics.co.uk website).

Sampling technique

This study followed a stratified proportional convenience sampling. The selection of the health centers was based on the catchment area where the health centers with the widest catchment area were chosen.

The patients were approached in the waiting areas in the designated health centers and were asked about their diabetes status and the duration of diagnosis. Those eligible to participate were informed briefly about the study and informed consent was obtained. Consented participants were given the questionnaire to fill in. Patients who are illiterate or unable to read due to physical disability, the researcher assisted them without further elaboration.

Data collection tool

In this study, the questionnaire was adopted from a study done in Pretoria, South Africa without being validated.²⁸ The questionnaire is a self-administered questionnaire that addressed the same topic. Permission to use the original questionnaire was granted by the authors. The questionnaire was translated to Arabic then to English and back to Arabic to peruse and correct any linguistic mistakes. Then the questionnaire was tested via a pilot study on 10 people and modified with minor changes according to the participants response.

The questionnaire is composed of 3 sections. The first section assessed the socio-demographics of the patients, the second section assessed the knowledge of seasonal influenza (22 questions) and influenza vaccination (20 questions), and the third section assessed attitudes of diabetic patients regarding seasonal influenza and influenza vaccine (7 questions).

Scoring

The cutoff scores for knowledge and attitude questions were established based on the adopted study.²⁰

If the participants answered correctly to 65% or more of the questions related to seasonal influenza knowledge, influenza vaccine, or both combined, their responses were considered "good". Conversely, if they answered less than 65% of the questions correctly in the aforementioned sections, their responses were deemed "poor".

Attitude was determined based on the responses to seven attitude questions. If the participant chose more than four positive responses, their attitude was considered "positive". If they selected less than three negative responses, their attitude was categorized as "negative".

Data management and analysis plan

The study utilized SPSS 26 to enter and analyze data. Categorical variables were analyzed using frequencies and percentages, while quantitative variables were analyzed using mean and standard deviation. The Chi-Square test was used to determine any significant association between two categorical variables, while Spearman correlation was used to examine any significant correlation between two quantitative variables (Table 8). Regarding knowledge & attitude scoring we categorized them according to the cut of point recommended by the author into poor and good because they are originally quantitative variables computed according to the scoring method also recommended by the author. Furthermore, binary logistic regression was employed to explore the factors that influence the uptake of influenza vaccine (Table 7), the variables that were entered in logistic regression are the same variables used in logistic regression in the previous related research to enable us to compare our results to the other research results.²⁰ The statistical significance level was set at a *P*-value of 0.05.

Ethical considerations

Regarding ethical aspects, the questionnaire was obtained with the author's permission and was used accordingly. Informed consent was obtained from participants through verbal or written acknowledgment. Permission was sought from the Chief of Medical Services of Primary Health Care Centers to conduct the research and collect data from the designated health centers.

Results

A total of 393 diabetic participants were enrolled in the study with a mean age of 58.8 ± 10.1 (Mean \pm SD) years. In terms of sociodemographic profile: the mean age of participants was 58.8 years. Further, it was found that 52.9% were males (208/393) and 76.5% of participants were married (300/393).

Regarding employment, 20% were employed (76/393) while 43.7% were retired (166/393). A total of 67.2% had a secondary degree and above (262/390). Nearly half of the subjects had diabetes for fewer than 10 years (49.9%, 196/393) and 44% (173/393) were following in NCD (Non-Communicable Disease clinic). The baseline characteristics of the participants are presented in Table 1.

Table 1: Characteristics of study participants

Baseline characteristics of the participants		n (%)
Age, Mean \pm SD		58.8 \pm 10.1
Age	≤ 40	20 (5.1)
	41 – 50	53 (13.6)
	51 – 60	142 (36.5)
	61 – 70	132 (33.9)
	>70	42 (10.8)
Sex	Male	208 (52.9)
	Female	185 (47.1)
Marital status	Single	38 (9.7)
	Married	300 (76.5)
	Divorced	18 (4.6)
	Widow	36 (9.2)
Educational Status	Employed	76 (20)
	Unemployed	138 (36.3)
	Retired	166 (43.7)
Level of education	Illiterate	29 (7.4)
	Primary	49 (12.6)
	Intermediate	50 (12.8)
	Secondary	143 (36.7)
	University or above	119 (30.5)
Duration of diabetes	1-5 years	105 (26.7)
	6-10 years	91 (23.2)
	11-15 years	71 (18.1)
	>15 years	126 (32.1)
Clinic of follow up	General clinic	111 (28.2)
	NCD	173 (44)
	CDC	109 (27.7)

SD:standard deviation, n:number

Around three-quarters of participants believed that flu is a viral infection (74.8%), 86.5% believed that it spreads from one person to another (340/393) and 85.8% believed that it is a preventable disease (337/393). In addition, 58.3% of participants (299/393) believed that influenza symptoms are worse among diabetic patients, while only 44.8% (176/393) believed that flu results in serious complications like poor diabetes control, hospitalization and pneumonia (Table 2).

Table 2: Participants knowledge about seasonal influenza

Knowledge about seasonal influenza		Correct n (%)
Seasonal influenza	Caused by a virus	294 (74.8)
	Spread from one person to the other	340 (86.5)
	Can be prevented	337 (85.8)
	Same as common cold	59 (15)
	Occurs at certain period of the year	318 (80.9)
	Flu symptoms are worse among diabetics	164 (41.7)
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Symptoms	Headache	319 (81.2)
	Vomiting	111 (28.2)
	Sore throat	328 (83.5)
	Muscle ache	313 (79.6)
	Fever	335 (85.2)
	Fatigue	321 (81.7)
	Running nose	355 (90.3)
	Sneezing	335 (85.2)
	Cough	333 (84.7)
	Abdominal pain	97 (24.7)
Diarrhea	118 (30)	
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Complications	Flu can cause serious complications among diabetics	176 (44.8)
	Poor blood sugar control	141 (80.1)
	High risk of hospitalization	118 (67)
	Pneumonia	123 (69.9)

About two-thirds of participants (271/393) heard about influenza vaccine; 92.6% believed it is safe (251/271), 75.3% believed it prevents flu (204/271) while 80.8% believed that flu can be caught regardless of the vaccination status (219/271).

In the context of knowledge about influenza vaccine, 37.6% (102/271) of patients stated that

flu vaccine has side effects. According to 82.4% of respondents, it causes injection site reactions and 70.6% believed it causes fever. Also, 72.7% (197/271) believed that flu vaccine can prevent serious complications among diabetics. (Table 3)

Table 3: Participants knowledge about influenza vaccine

Knowledge about influenza vaccine		Correct n (%)
Heard of vaccine to prevent flu		271 (69)
The flu vaccine is safe		251 (92.6)
The vaccine works to prevent flu		204 (75.3)
Vaccine Route	Injection	265 (97.8)
	Nose Spray	15 (5.5)
	Mouth drop	255 (94.1)
The vaccine has side effect(s)		102 (37.6)
Vaccine side effect(s)	Headache	49 (48)
	Soreness/swelling at injection site	84 (82.4)
	Fever	72 (70.6)
	Nausea	26 (25.5)
Duration of vaccine efficacy	Muscle ache	59 (57.8)
	One flu season	237 (87.5)
	Two flu seasons	248 (91.5)
3 or more flu seasons		250 (92.3)
Influenza vaccine can prevent serious complication among diabetics		197 (72.7)
Before flu season starts		215 (79.3)
Vaccination time	During the flu season	213 (78.6)
	Immediately after flu season	265 (97.8)
You can never have flu if you are vaccinated during the seasonal flu		219 (80.8)

More than half of participants (60.6%, 238/393) believed that influenza vaccination is important among diabetics and should be taken yearly and 53.7% (211/393) believed that all diabetics should receive influenza vaccine. Among the participants, 61.8% (243/393) thought that influenza vaccine prevents serious complications among diabetics while 82.2% of them (323/393) indicated that if there is an effective vaccine to prevent flu, they will take it. On the other hand, 6.1% of participants admitted that influenza vaccine has serious side effects and therefore should not be taken (24/393) and that flu is a mild illness, therefore vaccination is not necessary as believed by 32.6% of participants

(128/393). It was eventually found that 50.6% (199/393) of the patients had received the vaccine previously (Table 4).

Table 4: Participants attitude towards seasonal influenza vaccination

Attitudes of participants regarding seasonal influenza vaccination	Negative n (%)	Positive n (%)
Influenza vaccination is important among diabetics and should be taken yearly	155 (39.4)	238 (60.6)
Influenza vaccine prevent serious complication among diabetics	150 (38.2)	243 (61.8)
Influenza vaccine has serious side effect and therefore should not be taken	151 (38.4)	242 (61.6)
All diabetics should receive influenza vaccine	182 (46.3)	211 (53.7)
Flu is a mild illness and therefore vaccination is not necessary	200 (50.9)	193 (49.1)
If there is an effective vaccine to prevent flu, I will take it	70 (17.8)	323 (82.2)
Received influenza vaccine	194 (49.4)	199 (50.6)

Multiple factors influenced the uptake of influenza vaccine; doctor’s recommendation accounted for 72.9% of these factors (145/199) while patient’s

Table 5: Factors influencing the uptake of influenza vaccine among participants

Factors influencing the uptake of influenza vaccine among participants	Yes n (%)	No n (%)	
My doctor told me it's important	145 (72.9)	54 (27.1)	
Factors influencing receiving the influenza vaccine	Because it was free of charge	44 (22.1)	155 (77.9)
	A fellow patient told me it is effective	50 (25.1)	149 (74.9)
	Others	45 (22.6)	154 (77.4)
Factors influencing not receiving the influenza vaccine	It is not necessary because flu is just a minor illness	78 (40.2)	116 (59.8)
	It has serious side effect	24 (12.4)	170 (87.6)
	The vaccine is not effective	24 (12.4)	170 (87.6)
	Fear of needles and injection	14 (7.2)	180 (92.8)
	People who had the vaccine still eventually had the flu	23 (11.9)	171 (88.1)
	I reacted to it the first time I attempted it	3 (1.5)	191 (98.5)
	Other causes	115 (59.3)	79 (40.7)

belief that flu is a minor illness accounted for 40.2% out of the factors influencing the negative uptake of the vaccine (78/194) (Table 5).

Less than third of participants (31%) had good, combined knowledge levels about influenza and its vaccine, 43.3% (170/393) had a good knowledge about seasonal influenza infection and 35.9% (141/393) had good knowledge about influenza vaccine. However, 65.1% (256/393) had positive attitude towards the influenza vaccine (Figure 1).

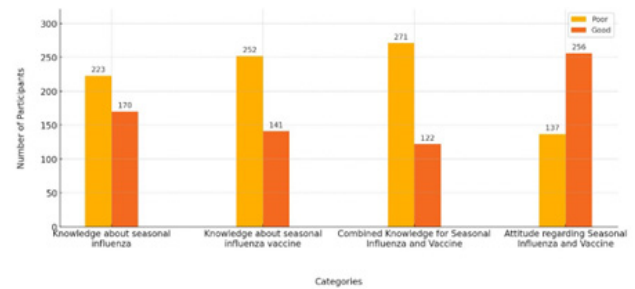


Figure 1: Knowledge and attitude about seasonal influenza and its vaccine

As shown in Table 6, 37.3% of diabetic female patients had good, combined knowledge about influenza (P = 0.011). Additionally, 46.2% of university-educated patients had good, combined knowledge, while 73.9% of those with same level of education had positive attitudes towards influenza vaccine (P < 0.001 and P = 0.017, respectively).

Table 6: Association between socio-demographic characteristics, knowledge and attitudes about seasonal influenza and its vaccine

P value	Knowledge about influenza		Knowledge about vaccine		Combined Knowledge		Attitude regarding influenza vaccine		
	Poor	Good	Poor	Good	Poor	Good	Negative	Positive	
	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)			
Age in years	≤40	12 (60)	8 (40)	11 (55)	9 (45)	13 (65)	7 (35)	4 (20)	16 (80)
	41-50	27 (50.9)	26 (49.1)	36 (67.9)	17 (32.1)	37 (69.8)	16 (30.2)	21 (39.6)	32 (60.4)
	51-60	85 (59.9)	57 (40.1)	92 (64.8)	50 (35.2)	101 (71.1)	41 (28.9)	49 (34.5)	93 (65.5)
	61-70	72 (54.5)	60 (45.5)	83 (62.9)	49 (37.1)	88 (66.7)	44 (33.3)	43 (32.6)	89 (67.4)
	>70	23 (54.8)	19 (45.2)	26 (61.9)	16 (38.1)	28 (66.7)	14 (33.3)	19 (45.2)	23 (54.8)
	P-value	0.797		0.872		0.927		0.312	
Gender	Male	124 (59.6)	84 (40.4)	142 (68.3)	66 (31.7)	155 (74.5)	53 (25.5)	77 (37)	131 (63)
	Female	99 (53.5)	86 (46.5)	110 (59.5)	75 (40.5)	116 (62.7)	69 (37.3)	60 (32.4)	125 (67.6)
	P-value	0.223		0.069		0.011		0.341	
Marital Status	Single	16 (42.1)	22 (57.9)	25 (65.8)	13 (34.2)	25 (65.8)	13 (34.2)	16 (42.1)	22 (57.9)
	Married	175 (58.3)	125 (41.7)	199 (66.3)	101 (33.7)	206 (68.7)	94 (31.3)	100 (33.3)	200 (66.7)
	Divorced	9 (50)	9 (50)	9 (50)	9 (50)	12 (66.7)	6 (33.3)	5 (27.8)	13 (72.2)
	Widow	23 (63.9)	13 (36.1)	19 (52.8)	17 (47.2)	28 (77.8)	8 (22.2)	15 (41.7)	21 (58.3)
	P-value	0.194		0.235		0.673		0.509	
Occupation	Employed	47 (61.8)	29 (38.2)	54 (71.1)	22 (28.9)	60 (78.9)	16 (21.1)	20 (26.3)	56 (73.7)
	Unemployed	77 (55.8)	61 (44.2)	83 (60.1)	55 (39.9)	94 (68.1)	44 (31.9)	50 (36.2)	88 (63.8)
	Retired	90 (54.2)	76 (45.8)	107 (64.5)	59 (35.5)	108 (65.1)	58 (34.9)	64 (38.6)	102 (61.4)
	P-value	0.534		0.280		0.092		0.173	
Level of education	Illiterate	21 (72.4)	8 (27.6)	18 (62.1)	11 (37.9)	23 (79.3)	6 (20.7)	13 (44.8)	16 (55.2)
	Primary	28 (57.1)	21 (42.9)	39 (79.6)	10 (20.4)	38 (77.6)	11 (22.4)	25 (51)	24 (49)
	Intermediate	21 (42)	29 (58)	39 (78)	11 (22)	37 (74)	13 (26)	20 (40)	30 (60)
	Secondary	89 (62.2)	54 (37.8)	91 (63.6)	52 (36.4)	107 (74.8)	36 (25.2)	46 (32.2)	97 (67.8)
	University or above	61 (51.3)	58 (48.7)	63 (52.9)	56 (47.1)	64 (53.8)	55 (46.2)	31 (26.1)	88 (73.9)
	P-value	0.033		0.003		0.001		0.017	
Duration of diabetes	1-5 years	61 (58.1)	44 (41.9)	70 (66.7)	35 (33.3)	74 (70.5)	31 (29.5)	40 (38.1)	65 (61.9)
	6-10 years	57 (62.6)	34 (37.4)	54 (59.3)	37 (40.7)	62 (68.1)	29 (31.9)	29 (31.9)	62 (68.1)
	11-15 years	41 (57.7)	30 (42.3)	46 (64.8)	25 (35.2)	50 (70.4)	21 (29.6)	23 (32.4)	48 (67.6)
	>15 years	64 (50.8)	62 (49.2)	82 (65.1)	44 (34.9)	85 (67.5)	41 (32.5)	45 (35.7)	81 (64.3)
	P-value	0.360		0.738		0.951		0.784	
Clinic of follow up	General clinic	71 (64)	40 (36)	75 (67.6)	36 (32.4)	82 (73.9)	29 (26.1)	44 (39.6)	67 (60.4)
	NCD	101 (58.4)	72 (41.6)	100 (57.8)	73 (42.2)	109 (63)	64 (37)	56 (32.4)	117 (67.6)
	CDC	51 (46.8)	58 (53.2)	77 (70.6)	32 (29.4)	80 (73.4)	29 (26.6)	37 (33.9)	72 (66.1)
	P-value	0.031		0.061		0.077		0.443	

NCD: Non-Communicable Disease clinic, CDC: Central Diabetic Clinic, n: number.

As presented in Table 7, the uptake of influenza vaccine was significantly higher amongst female participants (OR=1.8, P = 0.002), intermediate degree holders (OR=3.3, P = 0.018), patients with longer diabetes duration (OR = 2, P = 0,018) and patients with good, combined knowledge of influenza and its vaccine (OR = 2.9, P < 0.001). Moreover, patients with good knowledge had significantly higher positive attitudes toward influenza vaccine uptake (P < 0.001) (Figure 2, Table 8).

Table 7: Participants Characteristics Potentially Influencing previous uptake of influenza vaccine

Baseline characteristics of the participants		P value	OR	95% CI for OR
Sex	Female	0.002	1.876	1.250 – 2.815
(Reference, Male)				
	Primary	0.109	0.458	0.176 – 1.191
Education	Intermediate	0.018	0.299	0.110 – 0.813
(Reference, Illiterate)				
	Secondary	0.471	0.731	0.312 – 1.712
	University or above	0.496	0.736	0.304 – 1.779
Duration of diabetes	6-10 years	0.015	2.047	1.148 – 3.649
(Reference < 6 years)				
	11-15 years	0.018	2.112	1.136 – 3.925
	>15 years	0.018	1.900	1.115 – 3.240
Clinic of follow up	NCD	0.721	1.098	(0.659 - 1.830)
	CDC	0.577	1.176	(0.666 - 2.075)
Combined influenza and vaccine knowledge (good versus poor)		<0.001	2.915	(1.813 - 4.689)

-NCD: Non-Communicable Disease clinic, CDC: Central Diabetic Clinic, OR: Odds Ratio, CI: Confidence Interval

-Relevant independent variables included in the binary logistic regression includes sex, level of education, duration of diabetes, clinic of follow up and combined influenza and vaccine knowledge.

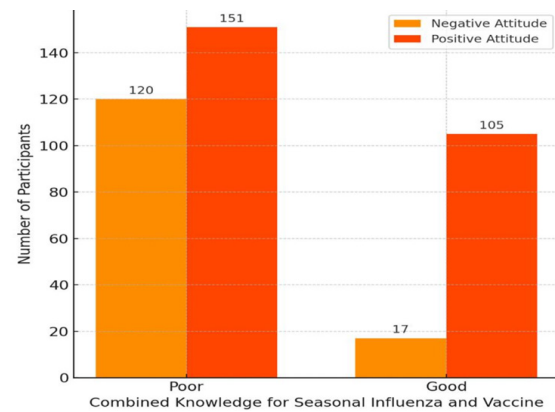


Figure 2: Association between combined knowledge and attitude regarding influence vaccine

Table 8: Correlations between knowledge about influenza and its vaccine and attitude

Attitude regarding seasonal influenza and influenza vaccine	
Combined Knowledge for Seasonal Influenza and Influenza Vaccine	Correlation Coefficient: 0.518
	P value: <0.001

Discussion

This study aimed to determine knowledge and attitudes of adult diabetic patients about seasonal Influenza and its vaccination. Poor levels of knowledge towards seasonal influenza and its vaccine as well as a low influenza vaccine uptake were noticed among diabetic patients.

Most of the participants were older than 40 years of age, married, retired or not employed. Further, most of them were holding secondary school or above, while almost half of the cohort had diabetes for less than 10 years, which is around the screening age for diabetes type two in the Kingdom of Bahrain.

Consistent with the findings of the present study, several studies found critical gaps in knowledge about influenza and influenza vaccination.^{18,19} Most patients did not recognize the distinguishing symptoms between common cold and influenza, specifically the intestinal symptoms (vomiting, abdominal pain and diarrhea) which affected the influenza knowledge score.

Although the patients in this study showed suboptimal levels of knowledge towards influenza and vaccine, most of them reported positive

attitudes towards the vaccine. This positive attitude towards vaccination was consistently reported in the literature. The negative attitudes toward the influenza vaccination were mainly due to underestimation of the seriousness of the infection which can be improved by counseling and education. The latter association was further supported by analyzing the determinants of influenza vaccine uptake. Advice from doctors about the importance of vaccination was the most determinant of vaccine uptake. On the other hand, however, the largest contributor to vaccine refusal was that patients had a perception that the vaccine is not necessary as the flu is just a minor illness. In congruent with these findings, several other studies reported similar determinants and barriers to influenza vaccine uptake.^{13,14,21,22}

The uptake of influenza vaccine was significantly higher amongst female participants. A result that is replicated by a similar Saudi study indicating that females are more likely to respond to a healthcare provider's advice and take the vaccine.²¹

Also, the uptake of influenza vaccine was significantly higher among participants with prolonged diabetes duration and participants with good, combined knowledge of influenza and its vaccine.

The impact of patients' educational level on their knowledge and attitudes towards influenza and influenza vaccine was assessed in multiple studies. In general, a positive relationship between knowledge about influenza and its vaccine was seen among patients with higher educational achievements. Similarly, this study found that university-graduated patients had significantly higher knowledge and positive attitudes towards influenza vaccine. This could be because they are more likely to comprehend and accept information about the flu and the vaccine. Additionally, A high level of social integration can increase their chances of discussing issues with knowledgeable individuals, thus tend to have broader information.

Interestingly, the association between attitudes towards influenza vaccination and educational level was inconsistent among the studies. In line with our findings, some studies found that higher levels of education were associated with a higher uptake of

the influenza vaccine, whereas some studies showed the opposite.^{25,26}

The present study also found, in concordance with some studies, that there was a higher uptake of the vaccine among patients with a prolonged duration of diabetes.²⁶ This could be attributed to the higher exposure to medical professionals which provides an opportunity to recommend immunization. In contrast, several studies reported that duration of diabetes does not influence the uptake of influenza vaccination rates.²⁷

Strengths and limitations

This study has several strengths. It is the first study to assess the knowledge, attitudes and practices about influenza vaccine among patients with diabetes in Bahrain. In addition, the study assessed different aspects including knowledge, attitudes, barriers and facilitators of the influenza vaccine uptake. However, the study has some limitations as well. Firstly, a convenience sampling technique was adopted, although we selected health centers with the largest catchment areas, this cannot exclude the possibility of selection bias. Secondly, since it was self-administered, response bias was inevitable. Furthermore, only diabetic patients who attended the health center were included and diabetic patients following up in other governmental or private hospitals were not involved. All of which might have affected the results of the study. Moreover, we had limited duration of time for data collection.

Recommendations

This research found that half of the patients did not obtain the influenza vaccination, hence urgent measures are required to increase uptake. Educational programs targeting both patient and health care providers should be established to improve knowledge of influenza and influenza vaccines to improve the uptake of the vaccine, with tailored content for each group. Medical professionals should be strongly encouraged to bring up the topic of vaccination with their high-risk patients and those patients should be given accurate, unbiased information including details about the disease, possible complications, preventive measures, vaccine effectiveness, vaccine safety and highlight common misconceptions.^{20,30,31}

Other suggested interventions might include sending written vaccination correspondence to members of the community.³⁴ Multiple studies showed that the strategies boosted influenza vaccination uptake.^{32,33}

Conclusion

This study identified substantial deficiencies in knowledge regarding seasonal influenza and influenza vaccine. Nevertheless, most patients exhibited markedly positive sentiments. A notable correlation was identified between patients' knowledge and their attitudes on influenza vaccine acceptance. Focused education and healthcare provider involvement are crucial to enhance vaccine acceptance among diabetic individuals.

Conflicts of Interest

None

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