

# Knowledge About Diabetes and Its Effect on Quality of Life among Diabetic Patients in King Abdulaziz University Hospital, Jeddah

## Abstract:

### **Background**

Quality of life (QOL) is an essential part in Diabetic patients since low QOL can decrease self-care which can lead to increased mortality and complications. The purpose of this study is to determine the effects of diabetes on QOL in Saudi Arabia, and to assess the knowledge about diabetes among these patients in order to know if there is a relation between diabetes knowledge and patient's QOL.

### **Method**

Cross sectional study done in king Abdul-Aziz university hospital in Jeddah. The sample was on type 2 diabetic patients (N=300), they were recruited from hospital wards and outpatient clinics during 2016. The questionnaire consisted of 3 sections: demographic and medical characteristic, knowledge of diabetes and QOL by 4 dimensions.

### **Result**

The mean age of the study population was  $55.6 \pm 10.1$  years and 189 (63%) were female. The median duration of having diabetes was 10 years. The mean score of diabetes knowledge was  $8.57 \pm 1.8$  out of 12 indicating good level of knowledge. The worst score was for alcohol's effect on blood glucose, only 21.7% answered correctly. The mean score QOL was  $34.1 \pm 7.7$  out of 50 which indicates average level of lifestyle. **Regrading** effect of the knowledge on QOL, there was positive correlation with no significant association.

26 **Conclusion**

27 Diabetes impairs QOL of patients, and the knowledge about diabetes affects QOL. We  
28 recommend the engagement of health professionals in educational settings in order to  
29 enhance health-related knowledge. Seminars, counseling sessions and workshop should be  
30 arranged periodically for diabetic patients to increase their awareness.

31 **Key words:**

32 Knowledge, Quality of Life, Diabetic Patients.

33 **1.Introduction**

34 Diabetes is a common chronic illness that have been increasing throughout the years, million  
35 people have diabetes in the world and more than 35.4 million people in the MENA Region  
36 (middle east, north African region), by 2040 this will rise to 72.1 million. There were 3.4  
37 million cases of diabetes in Saudi Arabia in 2015(1).

38 Diabetic patients are usually older, overweight, less likely to exercise, and more likely to have  
39 comorbidities and complications. The increasing number of diabetes has harmful effects on quality of  
40 life outcomes. Quality-of-life issues are of absolute importance, because they may strongly predict an  
41 individual's capability to manage his disease and maintain long-term health and well-being (2).

42 Diabetes mellitus imposes a heavy burden on individuals and health care systems (3). Quality of life is  
43 an essential part in Diabetic patients since low quality of life can decrease self-care which can prompt  
44 to increase mortality and complications (e.g. chronic renal failure, blindness, and lower limb  
45 amputations) which influence wellbeing and productivity (4). Evidence shows that people affected  
46 by diabetes often have inadequate knowledge about the nature of the disease, its risk factors  
47 and the associated complications (5). Poor motivation from the patient's side to maintain  
48 optimum glycemic control, their negligent attitude toward infection, injury, and other  
49 symptoms related to the feet leads to a delay in timely consultation to their physician (6).

50 Knowledge about diabetes is fundamental for the management, since it requires day-to-day  
51 knowledge about nutrition, exercise, monitoring, and medications (7).

52 The purpose of this study is to assessing the knowledge about diabetes among diabetic  
53 patients in order to know if there is a relation between diabetes knowledge and patient's  
54 quality of life. Education about diabetes is important to change the behavior of the patients  
55 and encouraging the patients in active management of their condition.

56 We chose patients in King Abdul-Aziz University Hospital; assessing knowledge about DM\*  
57 and measuring different dimensions of quality of life, including (general health, physical  
58 health, psychological health, social relationships, environment).

59 A lot of other studies came to the importance of health education because it is the theoretical  
60 and methodological basis for health promotion actions, as it can support both diseases  
61 prevention and rehabilitation and promote citizenship, personal and social responsibility  
62 related to health and contribute in the training of multipliers and caregivers (8).

## 63 **2.Methods**

64 This is cross sectional, interview- based study design conducted at King Abdul-Aziz  
65 University Hospital in Jeddah, the target population was diabetic patients who were admitted  
66 in the hospital wards or attending outpatient clinics. The data was collected from April 2016  
67 to May 2016. Sample size was calculated using Raosoft site, it was 300 diabetic patients  
68 measured by adding 10%. (based on total DM patients number per month 1200 patients, an  
69 error of 5%, the confidence interval of 95% and a prevalence of 50%). Out of the 300 patients  
70 enrolled in the study, 200 were from outpatient clinic and 100 from hospital ward. Patients  
71 were chosen randomly, and they were included in the study if they had diagnosis of type 2  
72 DM, were at between 18-70 years old, Saudi or non-Saudi lived more than 3 years in Saudi  
73 Arabia, and excluded if they were currently pregnant and were non- Saudi living less than 3

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74 years in Saudi Arabia. face to face structured interview questionnaire, was pre-tested on 10  
75 diabetic patients a likely similar population to the study participants. The questionnaire was  
76 based on three major dimension: demographic data (consisting of 18 items), knowledge  
77 (general knowledge consists of 2 items, monitoring blood glucose consist of 2 items, factors  
78 affecting on blood glucose level consist of 2 items, complication of DM consist of 3 items)  
79 and QOL (physical health consist of 4 items, psychological health consist of 3 items, social  
80 relationship consist of 2 items, environment consist of 1 item). The questionnaire was based  
81 on thorough search of relevant literature and discussion with experienced Faculty members.  
82 The

### 83 **Scoring of Participants' Responses**

84 Regarding knowledge questions (12), a score of (1) was given to the right answer.

85 Summation of scores computed and the total score was 12, and the range was (0 -12). Then  
86 the score was transformed to a percentage. Which was categorized into high, who will get  
87 >80, the moderate, who will get between 50 to 80, and poor, who will get <50. (100)

88 **Data Entry and Statistical Analysis**All collected data were coded and entered into a  
89 personal computer. Data entry and statistical analysis performed by using the Statistical  
90 Product and Service Solutions (SPSS, version 22.0) and appropriate statistical tests were  
91 applied.

92 Descriptive statistics (i.e., frequency, percentage, mean and standard deviation) calculated.  
93 Chi-square test, One way ANOVA, and independent t test were applied to compare  
94 participants' knowledge grades knowledge dimension & total score of lifestyle dimension  
95 and different demographic variables. Pearson test was used for the correlation between  
96 knowledge dimension & total score of lifestyle dimension P-value of <0.05 was considered as  
97 statistically significant.

98 **Ethical Considerations**

99 The protocol for the study was approved by the Ethics committee for Health at King Abdul-  
100 Aziz University Hospital

101 Moreover, before the interview, the researchers used to explain the purpose of the study to all  
102 participants briefly and deal with collected data confidentially and used only for the purpose  
103 of research. Participants were informed that their participation in the study was completely  
104 optional and they had the full right to refuse to participate. Their consent to participate was  
105 obtained and the ethical consideration was observed through all research steps.

106 **Pilot Study:**

107 Face to face structured interview questionnaire, was pre-tested on 10 diabetic patients a likely  
108 similar population to the study participants.

109 **Validity**

110 The questionnaire developed by the researchers after reviewing the relevant literature to  
111 collect the necessary data which has been revised and validated by three expert consultants  
112 from medicine department.

113 **Reliability**

114 The researchers evaluated the reliability of variables included in the study questionnaire. It  
115 was assessed using the Cronbach's alpha coefficient. The questionnaire proved an acceptable  
116 reliability which was equal 0.719.

117 **3.Results**

118 Three hundred diabetes patients who attend outpatient clinics in KAUH\*\*\* were involved in  
119 this study, of which 189 (63%) were female & 111 (37%)were male, with mean age score

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120 55.6±10.1, 144 (48%) were Saudi, and the majority (250-83.3%) were married. Only 56  
 121 (18.6%) had university degree & more than half (180- 60%) reported no job. three quarter  
 122 (265- 89%) reported no smoking. (Table 1)

123 **Table (1) Demographic data:**

Variables	N (300)	%
<b>Gender</b>		
Female	189	63.0
Male	111	37.0
<b>Nationality</b>		
Saudi	144	48.0
Non-Saudi	156	52.0
<b>Marital status</b>		
Single	16	5.3
Married	250	83.3
Divorced	11	3.7
Widow	23	7.7
<b>Employee</b>		
Employed	68	22.7
Not employed	180	60.0
Retired	52	17.3
<b>Education</b>		
University and above	56	18.6
High school	60	20.0
Intermediate school	41	13.8
elementary school	58	19.3
Illiterate	85	28.3
<b>Smoking</b>		
No	265	89.0
Yes	35	11.0
<b>Smoking type</b>		
Cigarettes	21	60%
Shisha	14	40%
<b>Variables</b>		
<b>Age</b>	<b>Mean± SD</b>	<b>Rang (min-max)</b>
	55.6±10.1	(27-70)

124 Table 2 showed the medical characteristic of the participants, the median score of duration of  
 125 being diabetes patients was 10 years, 255 (85%) reported taking medication on regular base ,  
 126 122 (40%) stated checking blood sugar 1-2 times per day ,the majority (249-83%) reported  
 127 hyperglycemia experience , where two third (200- 66.7% reported hypoglycemia experience  
 128 with main symptoms sweating (34.3%) followed by shacking (33.7%) then (32.7%)

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129 confusion. More than half (177-59%) stated seeing dietitian. The main source of knowledge  
 130 was doctors (64.7%). (Table 2)

131

132 **Table (2) Medical characteristic:**

<b>Variables</b>	<b>N (300)</b>	<b>%</b>
<b>Medications regularly</b>		
Yes	<b>255</b>	<b>85.0</b>
No	<b>45</b>	<b>15.0</b>
<b>Checking blood sugar</b>		
Never	<b>76</b>	<b>26.0</b>
1-2 times per day	<b>122</b>	<b>40.0</b>
3-5 times per day	<b>30</b>	<b>10.0</b>
3 times or less per week	<b>72</b>	<b>24.0</b>
<b>Experienced hypoglycemia</b>		
Yes	<b>200</b>	<b>66.7</b>
No	<b>100</b>	<b>33.3</b>
<b>If yes, list symptoms (Multiple symptoms)</b>		
Not applicable	<b>95</b>	<b>31.7</b>
Shaking	<b>101</b>	<b>33.7</b>
Rapid heart beat	<b>88</b>	<b>29.3</b>
Sweating	<b>103</b>	<b>34.3</b>
Blurred vision	<b>84</b>	<b>28.0</b>
Confusion	<b>98</b>	<b>32.7</b>
No symptoms, only low reading	<b>12</b>	<b>4.0</b>
<b>Experienced hyperglycemia</b>		
Yes	<b>249</b>	<b>83.0</b>
No	<b>51</b>	<b>17.0</b>
<b>Complain of other illness</b>		
Yes	<b>208</b>	<b>69.4</b>
No	<b>92</b>	<b>30.6</b>
<b>Saw dietitian</b>		
Yes	<b>177</b>	<b>59.0</b>
No	<b>123</b>	<b>41.0</b>
<b>Source of knowledge (Multiple sources)</b>		
Doctors	<b>194</b>	<b>64.7</b>
Social media	<b>62</b>	<b>20.7</b>
Friends	<b>30</b>	<b>10.0</b>
Other	<b>31</b>	<b>10.3</b>
Nothing	<b>34</b>	<b>11.3</b>
<b>Variables</b>		
<b>Duration of diabetes by years</b>	<b>Median</b>	<b>Quartile (25-75)</b>
	<b>10</b>	<b>(5-15)</b>

133

134 Table 3 showed the rate of choosing right information about DM, the higher rate was for  
 135 (Exercise: Decrease DM) 92%, followed by (Carbohydrates & stress : Increase DM) 91.3%  
 136 equally , (Home Monitoring: Blood testing) 89.3%, then (Hypoglycemia Correction: Drink  
 137 juice) 87.3% , then (Complication of diabetes: Eye diseases) 79.3% , (Diet: low fat, high  
 138 fiber, and low added sugar diet) 70.3% , (Infection : increase DM) 66.7% , then (Controlling  
 139 DM: Glycosylated HB (HbA1c) & Diabetic foot: Check the feet and wash ) 58.3%,  
 140 followed by (Hyperglycemia signs: Numbness) 53.3%, and lastly (Alcohol: Increase DM)  
 141 21.7%. (Table 3)

142

143 **Table (3) Participants' knowledge of DM:**

<b>Variables</b>	<b>N (300)</b>	<b>%</b>
<b>Exercise:</b> Decrease blood sugar	<b>276</b>	<b>92.0</b>
<b>Carbohydrates:</b> Increase blood sugar	<b>274</b>	<b>91.3</b>
<b>Stress:</b> Increase blood sugar	<b>274</b>	<b>91.3</b>
<b>Home Monitoring of Blood Sugar:</b> Blood testing	<b>268</b>	<b>89.3</b>
<b>Hypoglycemia Correction:</b> Drink juice	<b>262</b>	<b>87.3</b>
<b>Complication of Diabetes:</b> Eye diseases	<b>238</b>	<b>79.3</b>
<b>Healthy Diabetic Diet:</b> low fat, high fiber, and low added sugar diet	<b>211</b>	<b>70.3</b>
<b>Infection:</b> Increase blood sugar	<b>200</b>	<b>66.7</b>
<b>Assessing Control of Diabetes:</b> Glycosylated HB (HbA1c)	<b>175</b>	<b>58.3</b>
<b>Diabetic Foot Care:</b> Check the feet and wash	<b>175</b>	<b>58.3</b>
<b>Hyperglycemia signs:</b> Numbness	<b>160</b>	<b>53.3</b>
<b>Alcohol:</b> Increase blood sugar	<b>65</b>	<b>21.7</b>

144

145 Regarding participants' knowledge & relation with gender, martial statue & educational  
 146 level , there was significant association between gender & stress increasing DM item (94.2%  
 147 female vs 86.5%male, p=0.01),there was significant association between martial statue &



148 Controlling DM: Glycosylated HB (HbA1c) item ( $p=0.03$ ) , also there was significant  
 149 association between educational level and two items (Hypoglycemia Correction: Drink juice)  
 150 ( $p=0.03$ ) & (Alcohol: Increase DM) ( $p=0.004$ ), while all other items showed no significant  
 151 difference.

152 Table 4 showed the mean scores of individual domains for knowledge dimension & lifestyle  
 153 dimension and also the total score for each dimension, the mean score of total knowledge  
 154 dimension was  $8.57\pm 1.8$  which indicate good level of knowledge. While the mean score of  
 155 total lifestyle dimension was  $34.1\pm 7.7$  which indicate average level of lifestyle. (Table 4)

156 **Table (4) Participants' knowledge of DM and life style scores:**

<b>Variables</b>	<b>Mean <math>\pm</math> SD</b>	<b>RANG (Min-Max)</b>
<b>General knowledge</b>	<b><math>1.56\pm 0.6</math></b>	<b>(0-2)</b>
<b>Monitoring Blood glucose</b>	<b><math>1.47\pm 0.6</math></b>	<b>(0-2)</b>
<b>Factors affecting on blood glucose level</b>	<b><math>3.64\pm 0.9</math></b>	<b>(0-5)</b>
<b>Complication of DM</b>	<b><math>1.91\pm 0.9</math></b>	<b>(0-3)</b>
<b>Total score 1 (knowledge of DM)</b>	<b><math>8.57\pm 1.8</math></b>	<b>(0-12)</b>
<b>Physical health</b>	<b><math>12.8\pm 3.9</math></b>	<b>(4-20)</b>
<b>Psychological health</b>	<b><math>10.7\pm 3.1</math></b>	<b>(3-15)</b>
<b>Social relationship</b>	<b><math>8.02\pm 1.7</math></b>	<b>(2-10)</b>
<b>Environment</b>	<b><math>3.8 \pm 1.1</math></b>	<b>(1-5)</b>
<b>Total score 2 (quality of life)</b>	<b><math>34.1\pm 7.7</math></b>	<b>(10-50)</b>

157  
 158 Regarding Knowledge & lifestyle dimensions & relation with gender, marital status &  
 159 educational level , there was significant association between gender & physical activity  
 160 domain where male are more interesting in physical activity than female ( $12.33\pm 3.69$  for  
 161 female vs  $13.57\pm 4.14$  for male ,  $p=0.008$ ) , also there was significant association between  
 162 educational level & two domains Environment domain (  $p=0.001$ ) & Monitoring Blood  
 163 glucose domain ( $p=0.002$ ) & significant association between educational level & total mean  
 164 scores for Knowledge dimension was found (  $p=0.008$ ) in all the domain there is increasing in  
 165 lifestyle domains with high level of education, while all other domains showed no significant  
 166 difference .

168 Regarding the domain of quality of life. The mean scores of individual items are shown in  
 169 Table (5). One item (10.0%) (Item 4) its mean scores was (2.6) indicating poor quality of life,  
 170 scores on 3 out of 10 (30.0%) (Items 1,2 & 5) were between (3.0-3.5), and 5 items(50.0%)  
 171 (Items 3,6,7,9 &10 ) were between (3.6-4.0) which indicate average satisfaction, one item  
 172 (10.0%) (Item 8) was (4.2) indicating good quality of life with positive trend. On the other  
 173 each item of the domains was divided to three categories ( poor, moderate and good) and  
 174 percentage was calculate for each category, half of the participants reported poor level of  
 175 practicing exercises, more than third reported moderate impact on their sleep, emotions and  
 176 moderate level of physical pains, more than half stated moderate level of family supports and  
 177 safety environments, more than half reported that diabetes condition didn't affect their social  
 178 life , daily activities, working performance and that they don't have any worries about their  
 179 blood sugar changes. Regarding the association between level of knowledge and of quality of  
 180 life, the results showed significant association between good level of knowledge and all items  
 181 of good physical health, physiological conditions, social relationship, and environment.  
 182 (Table 5)

183 **Table (5) Dimensions of Quality of life:**

Variables	Poor	Moderate	Good	P value	Mean± SD	Range
<b>Physical Health</b>						
1-Physical pain	98 (32.6%)	126 (42.1%)	76 (25.3%)	<b>0.002*</b>	<b>3.3±1.2</b>	<b>(1-5)</b>
2-Sleep	100 (33.3%)	101 (33.6%)	99 (33.0%)	<b>0.0001**</b>	<b>3.3±1.5</b>	<b>(1-5)</b>
3-Performance at work	80 (26.6%)	92 (30.7%)	128 (42.7%)	<b>0.0001**</b>	<b>3.6±1.4</b>	<b>(1-5)</b>
4-Exercise	150 (50.0%)	112 (37.3%)	38 (12.7%)	<b>0.0001**</b>	<b>2.6±1.3</b>	<b>(1-5)</b>
<b>Psychological</b>						
5-Emotions	101 (33.7%)	130 (43.3%)	69 (23.0%)	<b>0.0001**</b>	<b>3.2±1.3</b>	<b>(1-5)</b>
6-Diabetes affect daily activities	74 (24.6%)	105 (35.1%)	121 (40.3%)	<b>0.0001**</b>	<b>3.7±1.3</b>	<b>(1-5)</b>
7-Blood sugar changes worries	65 (21.6%)	89 (29.6%)	146 (48.8%)	<b>0.0001**</b>	<b>3.8±1.4</b>	<b>(1-5)</b>
<b>Social relationships</b>						

8-Diabetes affect social life	35 (11.7%)	64 (21.3%)	201 (67.0%)	<b>0.0001**</b>	<b>4.2±1.2</b>	<b>(1-5)</b>
9-Family support	50 (16.7%)	163 (54.3%)	87 (29.0%)	<b>0.0001**</b>	<b>3.7±1.2</b>	<b>(1-5)</b>
<b>Environment</b>						
10-Home safety environment	32 (10.6%)	184 (61.4%)	84 (28.0%)	<b>0.0001**</b>	<b>3.8±1.1</b>	<b>(1-5)</b>

184 **Chi square test was used to detect the association** Regarding the relation between level of  
185 knowledge and of quality of life, the results showed significant association between good  
186 level of knowledge and safety environment (p=0.02), while in all other quality of life  
187 domains no significant difference was found. (Table 6)

188 **Table (6) Relation between level of knowledge and of quality of life:**

Variables	Level of knowledge			P value
	Poor N=5 (1.6%)	Moderate N=143 (47.7%)	Good N= 152 (50.7%)	
Physical health	12.4±3.6	12.9±3.8	12.4±4.0	0.9
Psychological health	12.4±3.4	10.8±2.9	10.7±3.3	0.4
Social relationship	7.0± 2.5	7.9±1.7	8.0±1.7	0.4
Environment	1.2±0.4	2.5±1.4	2.7±1.3	0.02*
Total score	33.2±6.1	34.2±7.1	34.2±8.3	0.9

189 **One way ANOVA test was used to detect the association**  
190 Concerning the correlation between total score of knowledge dimension & total score of  
191 lifestyle dimension there was a positive correlation but with no significant difference (r=  
192 0.014, p=0.82), while the correlation between total score of lifestyle dimension and age and  
193 duration of diabetes were negative correlation without significant difference (r= -0.103,  
194 p=0.07) and (r= -0.063, p=0.28) respectively.

#### 195 **4.Discussion**

196 The current study shows prevalence of T2DM in female (63%) is significantly higher than  
197 men (37%).similar result found in studies made in brazil and Saudi Arabia (8,11). On the

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198 contrary, studies show the opposite result with minimal differences (9,10,12). It is maybe due  
199 to larger number of females involve in the study compared to men.

200 Our result show significant increases of DM in married people compare to other patient with  
201 different marital status and maybe due to higher number of married patient (N= 250- 83.3%)  
202 compare to single patients (N=16 -5.3%), divorced (N=11- 3.7%), and widow (N=23 -7.7%).

203 Studies from Brazil and Poland show the same result. (8,14)

204 Also, the study found increase prevalence of DM2\*\* in not employed patients (60%). The  
205 same result in study made in Saudi Arabia (11).

206 The current study found illiterate diabetic patient have higher prevalence of diabetes than  
207 educated patients with minimal differences (28.3 %)This result agrees with other studies from  
208 Saudi Arabia (11) and Canada (13).

209 Study also show increase prevalence of DM 2 in non-smoker patients (89%). It may be due to  
210 a higher number of females compared to men in the study and smoking is less common in  
211 female in Saudi culture. The same result from study from Canada (13).

#### 212 **Medical characteristic:**

213 Although the most of diabetic patients are taking their medication regularly (85%) and more  
214 than the half had saw dietitian (59%), it shows increase prevalence of experienced  
215 hypoglycemia (66.7%) and (83%) experienced hypoglycemia. May be due to poor sources of  
216 knowledge about this chronic disease as current study shows most of them have information  
217 from their doctors (64.7%),followed by Social media (20.7%), then (11.3%) had No source  
218 of knowledge (18) .As study from USA(15) and Thailand (16) found strong opposite  
219 relationship between patient education and glyceimic control .The other reason that may  
220 contribute to having poor glyceimic control is having other illness as the current study show  
221 highly prevalence (69.4%) of diabetic patient with other diseases .

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222 The results of the current study found (40%) of DM2 patient are checking blood sugar at  
223 home and (26%) are never which may increase risk of diabetes complication (17).

#### 224 **Knowledge of DM:**

225 The mean score of total knowledge dimension was  $8.57 \pm 1.8$  which indicate good level of  
226 knowledge, similar to other researches done in Saudi Arabia Riyadh in 2016 (22). Unlike 2  
227 studies done in Vietnam with different regions (23,24) show insufficient knowledge of T2D  
228 in different geographical regions indicate the importance of education especially in rural  
229 areas.

230 Our study shows No differences in knowledge were observed between men and women, and  
231 between different martial statues (single, married, divorced and widow). The same result  
232 regarding relation between sex and knowledge found in study conducted in Greece (19).

233 Patients with higher education demonstrated greater diabetes knowledge comparing to  
234 Illiterate people as better education attainment is indicative of better understanding of the  
235 disease. The same result in studies conducted in Greece (19) and Ohio (20), and Pakistan  
236 (21).

237 The knowledge percentage of questions about treat hypoglycemia by different (drink juice)  
238 was 87.3% which is a good percentage comparing to incorrect answering in the studies  
239 (22,26,27).

240 Knowledge scores were high regarding questions about factors affecting the glucose level in  
241 blood which are (Exercise: Decrease DM), as study done at 2016(22) and (Carbohydrates:  
242 Increase DM). This finding disagrees with those of other studies (25,26,27.). Also, high  
243 scores in answering the question (Home Monitoring: Blood testing) 89.3% with relatively  
244 same result in study done in Emirate (28).

245 Patients' awareness about complications was relatively average; 79.3% with same finding in  
246 a study (22). Other study shows satisfaction result (28).

247 Knowledge scores were low regarding the both questions (Controlling DM: by (HbA1c) and  
248 diabetic foot: check the feet and wash) 58.3% as in the in Riyadh (25) show poor knowledge  
249 about Hba1c test but good knowledge about foot caring.

250 lastly, knowledge about (Alcohol: Increase DM) was significant low 21.7% maybe as  
251 Alcohol drinking is not allowed in Islam and is not socially accepted.

## 252 **Quality of Life:**

253 Diabetes affects negatively all quality dimensions, the quality of life score  $34.1 \pm 7.7$  out of 50.

254 Many studies found similar results (4,29). In Saudi Arabia, the quality of life of diabetic  
255 patients was studied by multiple researchers using deferent questioners such as SF36 and  
256 EQ5d, they also reached the same result (11,22).

257 The main age of the sample was 55 years and most of the sample had diabetes for 10 years.

258 The effect of age on quality of life showed negative correlation without significant difference  
259 ( $r = -0.103$ ,  $p = 0.07$ ), while the correlation between duration of diabetes and quality of life also  
260 showed negative correlation without significant difference ( $r = -0.063$ ,  $p = 0.28$ ). These results  
261 were similar a research done in Portuguese (12).

262

263 Women had worse quality of life than men regarding physical health dimension only and  
264 similar results as men in other dimensions. The physical health score for female  $12.33 \pm 3.69$   
265 out of 20, and as for male  $13.57 \pm 4.14$  and the P-Value is 0.008. This is similar to a research  
266 done India and Saudi Arabia in 2014 (4,11) This might be due to higher HbA1c and anxiety  
267 level and increased cardiovascular risk in female (12).

268 The safety of home and neighborhood conditions such as availability of stairs at home and  
269 places for exercise affects quality of life, the score for environment is  $3.8 \pm 1.1$  out of 5. In  
270 Saudi Arabia, a research was done to assess environment effect in lifestyle of diabetic

271 patients and it shows a close relation between the environment setting, life style and health  
272 statutes (30).

273 The association between quality of life and level of knowledge about diabetes was studied.

274 There was significant association between good level of knowledge about diabetes and a safe  
275 environment, P-Value is 0.02. Regarding effect of the knowledge on other dimensions of  
276 quality of life, there was positive correlation with no significant association. In contrast to a  
277 pilot study done in Saudi by Hana R. Al-Ban nay, et al (31), which showed education  
278 program has increased all dimension of the quality of life not only environment dimension,  
279 this result is similar to another research done in Thai (16).

## 280 **5.Conclusion**

281 The knowledge of diabetic patient in KAUH is average, which indicate patient need for more  
282 education during their hospital stay or while following up diabetes especially about factors  
283 affecting blood glucose level. The quality of life for the sample was also average, which  
284 require further assessment of the patients' conditions to know the risk factors affecting their  
285 quality of life and how to improve it. Similar to other researches, the knowledge of diabetes  
286 didn't significantly increase quality of life which might be due attitude and practice issues of  
287 already established knowledge. We recommend the engagement of health professionals in  
288 educational settings in order to enhance health-related knowledge. Seminars, counseling  
289 sessions and workshop should be arranged periodically for diabetic patients to increase their  
290 awareness.

## 291 **6.Limitation of the study**

292 The study was done in one center only in Jeddah and the result can't be generalized to  
293 Kingdom of Saudi Arabia. The research consisted of two parts, knowledge about diabetes and  
294 quality of life, which compromised the number of questions that can be asked to patients. In

295 kingdom of Saudi Arabia, the assessment of quality of life was done by different methods  
296 which made the comparison of the results between researches not accurate.

## 297 **7.References**

- 298 1. Anonymous. Saudi Arabia diabetes journal list. 2015. Accessed 14 December 2017.  
299 Available: <https://www.omicsonline.org/diabetes-journals-saudi-arabia/>
- 300 2. Richard R. Rubin, PhD, CDE. Diabetes and Quality of Life. Diabetes Spectrum. 2000.  
301 Accessed 14 December 2017. Available:  
302 <http://journal.diabetes.org/diabetesspectrum/00v13n1/pg21.htm>
- 303 3. Yang, Chi-Hsuan Asphodel; Ting, Hung-Wen. Health-Related Quality of Life and Its  
304 Related Factors in Patients with Diabetes. 2016;17:3 Accessed 1 December 2017  
305 .Available:<http://www.nursinglibrary.org/vhl/bitstream/10755/601677/1/Chi>  
306 Hsuan\_Yang\_2015.pdf
- 307 4. Jain V, Shivkumar S, Gupta O.. Health-Related Quality of Life (Hr-Qol) in Patients with  
308 Type 2 Diabetes Mellitus. N Am J Med Sci. 2014 Feb;6(2):96-101. doi: 10.4103/1947-  
309 2714.127752.
- 310 5. Alanazi AM, Abo El-Fetoh NM, Alotaibi HK, Alanazi KA, Alotaibi BK, Alshammari  
311 SM, et all. Survey of awareness of diabetes mellitus among the Arar population, Northern  
312 Border Region of Saudi Arabia. Electron Physician. 2017 Sep 25;9(9):5369-5374. doi:  
313 10.19082/5369. eCollection 2017 Sep.
- 314 6. Taksande BA, Thote M, Jajoo UN. Knowledge, attitude, and practice of foot care in  
315 patients with diabetes at central rural India. J Family Med Prim Care. 2017 Apr-  
316 Jun;6(2):284-287. doi: 10.4103/2249-4863.219994.
- 317 7. Anonymous. Diabetes Education: Why It Is so Crucial to Care. Accessed 19 march 2018.  
318 Available:  
319 [http://www.joslin.org/info/diabetes\\_education\\_why\\_its\\_so\\_crucial\\_to\\_care.html](http://www.joslin.org/info/diabetes_education_why_its_so_crucial_to_care.html)



- 320 8. Imazu MF, Faria BN, de Arruda GO, Sales CA, Marcon SS. Effectiveness of individual  
321 and group interventions for people with type 2 diabetes. *Rev Lat Am Enfermagem*. 2015  
322 Feb-Apr;23(2):200-7. doi: 10.1590/0104-1169.0247.2543.
- 323 9. Singh A, Shenoy S, Sandhu JS. Prevalence of Type 2 Diabetes Mellitus among Urban  
324 Sikh Population of Amritsar. *Indian J Community Med*. 2016 Oct-Dec;41(4):263-267.
- 325 10. Meo SA, Zia I, Bukhari IA, Arain SA. Type 2 diabetes mellitus in Pakistan:  
326 Current prevalence and future forecast. *J Pak Med Assoc*. 2016 Dec;66(12):1637-1642.
- 327 11. Al Hayek AA, Robert AA, Al Saeed A, Alzaid AA, Al Sabaan FS. Factors Associated  
328 with Health-Related Quality of Life among Saudi Patients with Type 2 Diabetes  
329 Mellitus:A Cross-Sectional Survey. *Diabetes Metab J*. 2014 Jun;38(3):220-9. doi:  
330 10.4093/dmj.2014.38.3.220. Epub 2014 Jun 17.
- 331 12. Sepúlveda E, Poínhos R, Constante M, Pais-Ribeiro J, Freitas P, Carvalho D. health-  
332 related quality of life in type 1 and type 2 diabetic patients in a Portuguese central public  
333 hospital. *Diabetes Metab Syndr Obes*. 2015 Apr 29;8:219-26. doi:  
334 10.2147/DMSO.S80472. eCollection 2015.
- 335 13. Imayama I, Plotnikoff RC, Courneya KS, Johnson JA. Determinants of quality of life in  
336 adults with type1 and type 2 diabetes. *Health Qual Life Outcomes*. 2011 Dec 19;9:115.  
337 doi: 10.1186/1477-7525-9-115.
- 338 14. Golicki D, Dudzińska M, Zwolak A, Tarach JS. Quality of Life in Patients with Type  
339 2 Diabetes in Poland – Comparison with the General Population Using the EQ-5D  
340 Questionnaire. *Adv Clin Exp Med*. 2015 Jan-Feb;24(1):139-46. doi:  
341 10.17219/acem/38137.
- 342 15. Chrvala CA, Sherr D, Lipman RD. Diabetes self-management education for adults with  
343 type 2 diabetes mellitus: A systematic review of the effect on glycemic control. *Patient  
344 Educ Couns*. 2016 Jun;99(6):926-43. doi: 10.1016/j.pec.2015.11.003. Epub 2015 Nov 22.

- 345 16. Wichit N, Mnatzaganian G, Courtney M, Schulz P, Johnson M. Randomized controlled  
346 trial of a family-oriented self-management program to improve self-efficacy, glycemic  
347 control and quality of life among Thai individuals with Type 2 diabetes. *Diabetes Res*  
348 *Clin Pract.* 2017 Jan;123:37-48. doi: 10.1016/j.diabres.2016.11.013. Epub 2016 Nov 19.
- 349 17. Younis BB, Shahid A, Arshad R, Khurshid S, Masood J. Charcot osteoarthropathy in type  
350 2 diabetes persons presenting to specialist diabetes clinic at a tertiary care hospital. *BMC*  
351 *Endocr Disord.* 2015 Jun 12;15:28. doi: 10.1186/s12902-015-0023-4.
- 352 18. Jamal A, Khan SA, AlHumud A, Al-Duhyim A, Alrashed M, Bin Shabr F, et al.  
353 Association of Online Health Information–Seeking Behavior and Self-Care Activities  
354 Among Type 2 Diabetic Patients in Saudi Arabia. *J Med Internet Res.* 2015 Aug  
355 12;17(8):e196. doi: 10.2196/jmir.4312.
- 356 19. Poulimeneas D, Grammatikopoulou MG, Bougioukli V, Iosifidou P, Vasiloglou  
357 MF, Gerama MA, et al. Diabetes knowledge among Greek Type 2 Diabetes Mellitus  
358 patients. *Endocrinol Nutr.* 2016 Aug-Sep;63(7):320-6. doi:  
359 10.1016/j.endonu.2016.04.008. Epub 2016 Jun 3.
- 360 20. Jeppesen KM, Hull BP, Raines M and Miser WF. A Validation Study of the Spoken  
361 Knowledge in Low Literacy in Diabetes Scale (SKILLD). *J Gen Intern Med.* 2012  
362 Feb;27(2):207-12. doi: 10.1007/s11606-011-1900-9. Epub 2011 Oct 18.
- 363 21. Masood I, Saleem A, Hassan A, Umm-E-Kalsoom, Zia A, Khan AT. Evaluation of  
364 diabetes awareness among general population of Bahawalpur, Pakistan. *Prim*  
365 *Care Diabetes.* 2016 Feb;10(1):3-9. doi: 10.1016/j.pcd.2015.06.004. Epub 2015 Jun 29.
- 366 22. Al-Aboudi IS, Hassali MA, Shafie AA. Knowledge, attitudes, and quality of life of type 2  
367 diabetes patients in Riyadh, Saudi Arabia. *J Pharm Bioallied Sci.* 2016 Jul-Sep;8(3):195-  
368 202. doi: 10.4103/0975-7406.171683.

- 369 23. Binh T, Phuong P, Nhung. Knowledge and associated factors towards type 2 diabetes  
370 among a rural population in the Red River Delta region, Vietnam. Rural Remote  
371 Health. 2015 Jul-Sep;15(3):3275. Epub 2015 Sep 26.
- 372 24. Quang LN, Ha NT, Viet NQ. Study on knowledge, attitude and practices about control of  
373 diabetes in ThaiBinh population, 2011. Vietnam Journal of Practical  
374 Medicine2012; 7(834): 127-132.
- 375 25. Murata GH, Shah JH, Adam KD, Wendel CS, Bokhari SU, Solvas PA, et L. Factors  
376 affecting diabetes knowledge in Type 2 diabetic veterans. Diabetologia. 2003  
377 Aug;46(8):1170-8. Epub 2003 Jul 11.
- 378 26. Al-Maskari F, El-Sadig M, Al-Kaabi JM, Afandi B, Nagelkerke N, Yeatts KB.  
379 Knowledge, attitude and practices of diabetic patients in the United Arab Emirates. PLoS  
380 One. 2013;8(1):e52857. doi: 10.1371/journal.pone.0052857. Epub 2013 Jan 14.
- 381 27. Al-Adsani AM, Moussa MA, Al-Jasem LI, Abdella NA, Al-Hamad NM. The level and  
382 determinants of diabetes knowledge in Kuwaiti adults with type 2  
383 diabetes. Diabetes Metab. 2009 Apr;35(2):121-8. doi: 10.1016/j.diabet.2008.09.005. Epub  
384 2009 Feb 27.
- 385 28. Hashim MJ, Mustafa H, Ali H . Knowledge of diabetes among patients in the United  
386 Arab Emirates and trends since 2001: a study using the Michigan Diabetes Knowledge  
387 Test. East Mediterr Health J. 2017 Jan 23;22(10):742-748.
- 388 29. Manjunath K, Christopher P, Gopichandran V, Rakesh PS, George K, Prasad JH. Quality  
389 of Life of a Patient with Type 2 Diabetes: A Cross-Sectional Study in Rural South India. J  
390 Family Med Prim Care. 2014 Oct-Dec;3(4):396-9. doi: 10.4103/2249-4863.148124.
- 391 30. Sidawi B, Al-Hariri MT. The Impact of Built Environment on Diabetic Patients: The  
392 Case of Eastern Province, Kingdom of Saudi Arabia. Glob J Health Sci. 2012 Jun  
393 13;4(4):126-38. doi: 10.5539/gjhs.v4n4p126.

394 31. Al-Bannay HR, Jongbloed LE, Jarus T, Alabdulwahab SS, Khoja TA, Dean E. Outcomes  
395 of a type 2 diabetes education program adapted to the cultural contexts of Saudi women.  
396 A Pilot Study. Saudi Medical Journal. 2015 Jul;36(7):869-73. doi:  
397 10.15537/smj.2015.7.11681.

398