

## Determinants and Effect of Quality of Life on the Disease Outcomes in Type 2 Diabetes Mellitus Patients

Mayyadah Adil Raheem Al- Janabi<sup>1</sup>, Raid Abd-Almuhssin Hamood Janabi<sup>2\*</sup>

### Author's Information

1.MBChB, FABHS-FM ( Arab Board ), Senior Specialist in Family Medicine, Imam Sadiq Hospital  
2.MBChB, FABHS-CM ( Arab Board), Senior Specialist in Community Medicine, AL- Hillh Teaching Hospital

### Corresponding author:

Dr. Raid Abd-Almuhssin Hamood Janabi  
[raaljanabi22@gmail.com](mailto:raaljanabi22@gmail.com)

### Funding information

Self-funded

### Conflict of interest

None declared by author

### ABSTRACT

Diabetes mellitus is a lifelong disease that required multidisciplinary approaches to control its adverse progression and prevent complications . Quality of life is very important in diabetic patients. Absence of self-care, poor control of blood sugar and diabetic complications lead to decrease of quality of life. Improving of diabetic patients quality of life decreases poor control of blood sugar, diabetic complications and burden of diabetes. Different factors determine the quality of life among these patients. We aimed to assess the quality of life and determine its main determinants among group of Iraqi patients with type 2 diabetes mellitus (DM). Hence, we conducted a cross-sectional study at Al-Hilla city during a period of 12 months including a total of 450 patients who met the selection criteria and agreed to participate in the study. Assessment of quality of life (QOL) was done using the Short Form (SF 36) questionnaire through direct interview with patients. All factors that possibly affect the QOL were taken into account. Findings of our study showed that the overall level of quality of life of patients was moderate. Poor quality of life was significantly associated with younger age, being unmarried, low level of education (less than secondary level), low and middle socioeconomic status, longer disease duration, using combined anti-diabetic medications, presence of comorbidities and level higher level of HbA1C

**Keywords:** Diabetes mellitus, Type 2, Quality of Life, Determinants, Disease Outcomes

This article is open access published under CC BY-NC Creative Commons Attribution Non-Commercial License: This License permits users to use, reproduce, disseminate or display the article provided that the author is attributed as the original creator and that the reuse is restricted to non-commercial purposes , ( research or educational use).



### 1. INTRODUCTION

Diabetes mellitus (DM) comprises a group of metabolic disorder that share the common phenotype of hyperglycemia. The prevalence of DM increases rapidly; type 2 DM frequency in

particular is rising in parallel with epidemic of obesity (1). Globally, by 2035 the estimated number of diabetic patients may rise to 592 million, also the number of people with type 2 diabetes is increasing in every country and account at least 90% of all cases of diabetes, however around 77% of peoples with diabetes live in low and middle income countries and diabetes caused at least 612 billion USA dollars in health expenditure (2). This global pandemic principally involves type 2 diabetes and it's associated with greater longevity, obesity, unsatisfactory diet, sedentary lifestyle and increasing urbanization, hence diabetes is a lifelong disease that required approach to prevent complications. This approach must include lifestyle change, self-management and negotiation of behavior goals, in addition to the treatment of hyperglycemia and addressing micro and macro vascular risk (3,4). According to the Iraqi Experts Consensus on the Management of Type 2 Diabetes/Prediabetes in Adults, round 1.4 million of Iraqis have diabetes and the reported T2DM prevalence in Iraq ranges from 8.5% to 19.7% (5). The World Health Organization (WHO) defines quality of life (QOL) as individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns, so the WHO has established one of the main objectives in caring for diabetic patients is maintaining the health and quality of life of individuals with diabetes through effective patient care and education, therefore QOL is an important goal health outcome in its own right, representing the ultimate goal of all health interventions (6–8). Quality of life issues are important, because they predict the individuals' capacity to manage his disease and maintain long term health and well-being, hence doctors and competent professionals may evaluate severity of the disease and the degree of deteriorations, their opinion of the patients' QOL may not match with view of the patients (9,10). Moreover, the QOL of patients who have diabetes is diminished as a result presence of complications, thus many factors showing that DM may have negative influences on general health and feeling of wellbeing, and on the other word QOL (11,12). Quality of life is very important in diabetic patients. Absence of self-care, poor control of blood sugar and diabetic complications lead to decrease of quality of life. Improving of diabetic patients quality of life decreases poor control of blood sugar, diabetic complications and burden of diabetes, this mean QOL is an intellectual concept consisting of positive and negative aspects of an individual's life and indeed it

demonstrates the method which a person perceives the health condition as well as the other aspects of his/her life and reacts to them (13).

## **2. METHODOLOGY**

A cross sectional study conducted in a diabetes center in Al-Hilla City During the period from 1st of February to 30 of August, 2022).A total of 450 patients were included in the study

### **Inclusion criteria**

Adult Iraqi patients diagnosed as type 2 diabetes mellitus aged 30 years and older of both genders and had a disease duration of more than one year were included

### **Exclusion criteria**

1. Type 1 diabetes mellitus
2. Women with gestational diabetic patients
3. Patient with multiple comorbidities
4. Patients with malignant pathologies
5. Patients with diabetic foot or limb amputation
6. Refuse to participate
7. Did not complete the interview

### **Data collection**

Data were collected using a pre-constructed data collection questionnaire included two parts; the first for Socio-demographic characteristics and disease related Questions such as duration of disease, anti-diabetic medications, Comorbidity). The second part for the SF-36 which is made up of 36 questions in 8 domains (14).

1. Physical Functioning
2. Role Physical
3. Bodily Pain
4. General Health
5. Vitality
6. Social Functioning
7. Role Emotional
8. Mental Health

Glycosylated hemoglobin was measured as HbA1C%, the preferred standard for assessing glycemic control and the data were collected from patient records concerning their last HbA1C level, the level of control of diabetes were assessed according to the level of HbA1C. Those who have HbA1C < 7% were considered to have good control of DM, while those with HbA1C ≥ 7% were considered as poor control (15).

### **Statistical Analysis**

The data were analyzed using the Statistical Package for Social Sciences (SPSS) version 25. Appropriate statistical tests and procedures were applied according to the type of variables at a significance level of ≤ 0.05 to be significant difference or association

### **3. RESULTS**

The mean age of participants was  $52.8 \pm 7.3$  (range: 30 – 67) years, on the other hand, 70.9% of the patients aged ≥ 50 years. Females were relatively dominant and composed 53.8% of the studied group with a female to male ratio of 1.16 to one. Majority (82.4%) of the patients were married, 51.3% of urban residence, 49.8% had primary or less level of education and 28.7% of the studied group at low socio-economic class, (**Table 1**). The transformed scale scores for the SF-36 questionnaire and analysis revealed a mean overall total QOL score of  $97.6 \pm 11.6$  (range: 74-130) points out of 175. According to the total score, participant patients were categorized into three subgroups. Only 38 (8.4%) patients had good QOL (total QOL score >  $110 \pm 1$ ), 322 (71.6%) had moderate level of QOL (total QOL score :  $(87 - 110) \pm 1$ ) and 90 (20%) patients had poor QOL (Total QOL score of  $(< 87 \pm 1$  points), these findings displayed in (**Figure 1**). A significant associations between QOL and each of younger age , unmarried status, low level of (less than secondary) and lower and middle socioeconomic status, (P. value < 0.05). No significant association was found with each of gender (P. value=0.71) and residence (P. value= 0.38) (**Table 2**). It had been significantly found that patients on oral anti DM had better overall QOL scores; than those on insulin alone or combined; good overall QOL was found in 12.2% of those on oral Hypoglycemic Agent (OHA), compared to (4.9%) of those on insulin alone and (2.6%) of those on combined, (P=0.028) , (Table 3). There were significant associations between poor QOL and longer duration of disease (>10 years) and presence comorbidity, (P<0.05). It had been significantly found that patients with duration of diabetes less than 5 years had better overall QOL scores (21.3%);

than those with duration of diabetes more than 10 years (2.6%) or patients with duration of diabetes 5 to 10 years (4.4%), ( $P = 0.001$ ). Additionally, those with comorbidities had lower proportion of good overall QOL than those with no comorbidities; 5.1% vs. 16.1%, respectively, ( $P=0.001$ ), (**Table 3**). Results of ANOVA test revealed that the mean HbA1C level of the 38 participants with good QOL was  $6.42 \pm 0.71$  % (Range 5.2 – 9.2%), and it was significantly lower than that of the 322 participants with moderate QOL scores and those with poor QOL scores, 7.85% and 9.17%, respectively, this indicated an inverse correlation between the QOL score and HbA1C, for more demonstration of this correlation, the curve estimation regression test was used to assess this correlation, this test revealed highly significant inverse correlation, ( $r = - 0.299$ ,  $P < 0.001$ ). Further analysis and assessment of this association between QOL score and HbA1C was performed by using Partial correlation test, controlling for all the other variables. The correlation between QOL and HbA1C level still highly significant after adjustment for other variables, (**Table 4 & 5 and Figure 2**).

Table 1. Socio-demographic and Socioeconomic characteristics of the studied group (N=450).

Variable	No.	%	
Age (year)	30 - 39	32	7.1
	40 - 49	99	22
	50 - 59	232	51.6
	$\geq 60$	87	19.3
Gender	Male	208	46.2
	Female	242	53.8
Marital status	Single	18	4
	Married	371	82.4
	Divorced	5	1.1
	Widow	56	12.4
Residence	Urban	231	51.3
	Rural	219	48.7
Education	Illiterate	77	17.1
	Read and write	68	15.1
	Primary	79	17.6
	Intermediate	59	13.1
	Secondary	67	14.9
	Higher education	100	22.2
Socio-economic status	High	58	12.9
	Middle	263	58.4
	Low	129	28.7

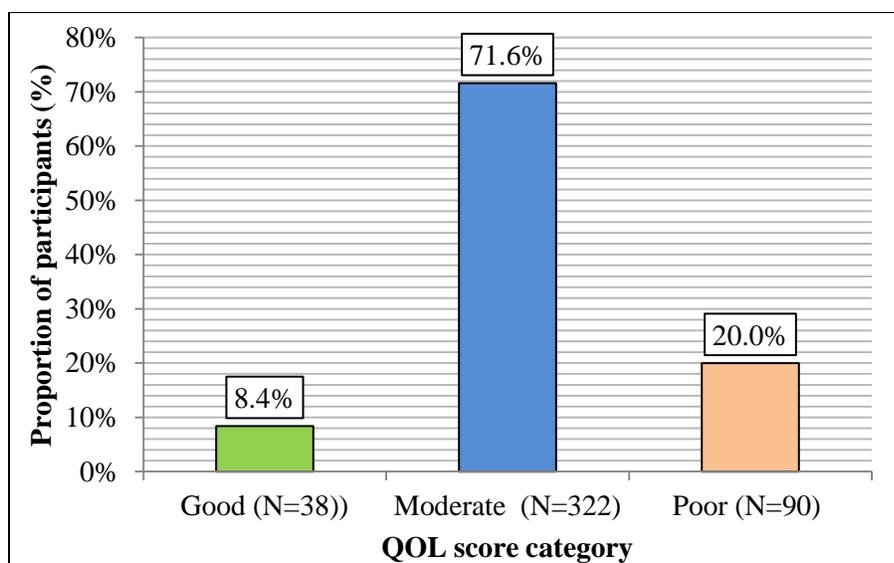


Figure 1. Distribution of participants according to the QOL total score

Table 2. Relationship between QOL score and sociodemographic and Socioeconomic variables

Variable	Overall QOL score categories						P. value	
	Good (N=38)		Moderate (N=322)		Poor (N=90)			
	No.	%	No.	%	No.	%		
Age (year)	30 - 39	2	6.3	18	56.3	12	37.5	0.001
	40 - 49	6	6.1	81	81.8	12	12.1	
	50 - 59	25	10.8	150	64.7	57	24.6	
	60 - 65	5	5.7	73	83.9	9	10.3	
Gender	Male	20	9.6	147	70.7	41	19.7	0.71
	Female	18	7.4	175	72.3	49	20.2	
Marital status	Married	27	7.3	277	74.7	67	18.1	0.006
	Unmarried	11	13.9	45	57.0	23	29.1	
Residence	Urban	16	6.9	165	71.4	50	21.6	0.38
	Rural	22	10.0	157	71.7	40	18.3	
Education	Illiterate	6	7.8	65	84.4	6	7.8	0.001
	Read and write	6	8.8	44	64.7	18	26.5	
	Primary	2	2.5	50	63.3	27	34.2	
	Intermediate	5	8.5	34	57.6	20	33.9	
	Secondary	5	7.5	52	77.6	10	14.9	
	Higher education	14	14.0	77	77.0	9	9.0	
Socio economic	High	13	16.7	59	75.6	6	7.7	0.002
	Middle	17	8.5	137	68.2	47	23.4	
	Low	8	4.7	126	73.7	37	21.6	

**Table 3. Relationship between QOL score anti-diabetic , Duration of DM and Comorbidities**

		Overall QOL score						P. value
		Good (N=38)		Moderate (N=322)		Poor (N=90)		
		No.	%	No.	%	No.	%	
Anti-diabetic	Oral	28	12.2	152	66.4	49	21.4	0.028
	Insulin alone	9	4.9	141	77.5	32	17.6	
	Combined	1	2.6	29	74.3	9	23.1	
Duration of DM	< 5 years	16	21.3	43	57.3	16	21.4	0.001
	5 - 10	10	4.4	171	76	44	17.6	
	> 10 years	12	2.6	108	72	30	23.1	
Comorbidities	Yes	16	5.1	232	74.1	65	20.8	0.001
	No	22	16.1	90	65.7	25	18.2	

**Table 4. Results of ANOVA test for the mean HbA1C levels according to the QOL level**

		HbA1C (%)			
QOL level	N	Mean	SD	Minimum	Maximum
Good	38	6.42	0.71	5.2	9.2
Moderate	322	7.85	1.65	5.3	12
Poor	90	9.17	2.71	6.2	18
Total	450	7.99	1.99	5.2	18

ANOVA test, P. value < 0.001

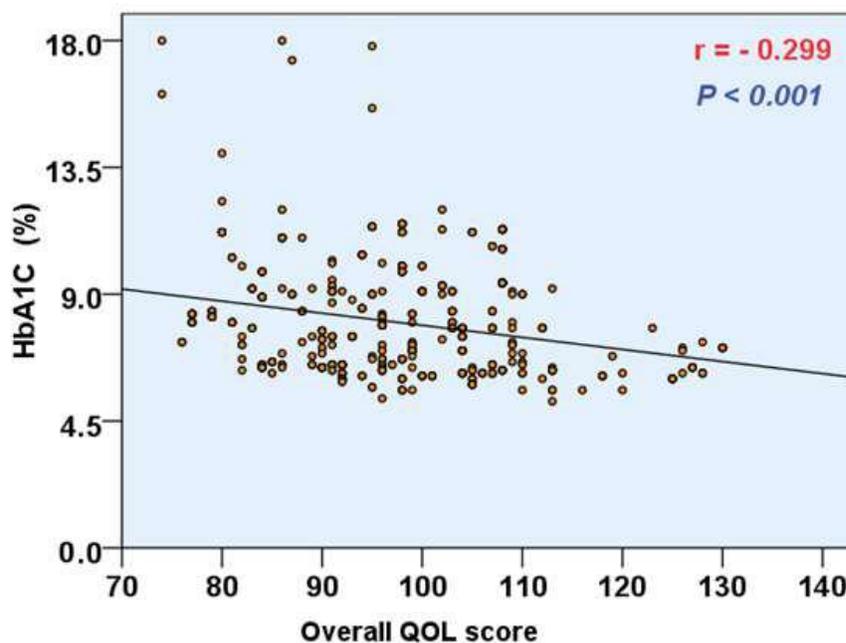


Table 5. Results of partial correlation analysis for the correlation between overall QOL score and HbA1c levels after adjustment for other variables

Correlation coefficient (r)	<b>-0.299 inverse correlation</b>
P. value (2-tailed)	<b>&lt;0.001</b>
Controlling for: age, gender marital status, residence, education, socio economic, disease related variables	

#### 4. DISCUSSION

Quality Of Life (QOL) is a concept that covers a broad range of the human experience. It is one of the indices for determining the necessities and health problems for patients, so measuring QOL in chronically ill patients provide an important source of medical information in addition to laboratory or diagnostic test and is becoming increasingly relevant to controlled clinical trials (16)(17). The current study revealed that the overall perception of QOL of patients with diabetes mellitus and explored the sociodemographic and questions related to disease variables that significantly affected QOL of diabetes patients in Al- Hilla city, so the QOL of our results was illustrated by the mean of overall scores and standard deviation, then sub grouping to three groups, (8.4%) of patients had good QOL, (71.6%) of

patients had moderate and (20%) had poor QOL, this may be attributed to that majority of sample with high education and also majority of patients living in urban area. However, this finding of a moderate score of QOL in the present study was in agreement with studies conducted in Al-Hilla city 2014 by Al-Tukmagi et al (18) and Mostafa et al in Al-Mosul 2012 (19). Other studies showed the same result, that the majority of people with diabetes mellitus had a moderate score of QOL like a study done by Issa et al in the United Arab of Emirate 2011, a study done by Mathew et al in India 2014 and the study was conducted in Nigeria 2006 (12,20,21). The current study showed a statistically significant association between overall QOL and age group ( $P = 0.001$ ). The patients most likely had good QOL was an age group (50 – 59) and younger, this may be attributed to the fact that this age group most likely to use better medical facilities, likely to enjoy more family support, more carefree, optimistic and they have a positive outlook on life. This finding of the current study was in agreement with a study conducted by Somappa et al in India 2014, which showed that younger people report better QOL than older people (9). Similarly, Kalda et al in Estonia 2008 observed that older patients with type 2 diabetes assessed their QOL as being significantly lower than younger patients (22), also study was done by Nyanzi et al in Uganda 2014, which mention that better QOL in younger age patients (23), moreover, more clinical studies showed the same association (10,24). In contrast to the present study, the study was conducted in Iran in 2014 by Aghakoochak et al, mention that no significant association between QOL and age (13). The current study revealed that no significant association between overall QOL and gender ( $P = 0.71$ ), this consistency may be due to sampling variation, this finding of the present study was in accordance with studies done in Al-Hilla city of Al-Tukmagi et al on 2014 and Aghakoochak et al in Iran in 2014, were mention that there was no significant association between QOL and gender (13,18). While the study was conducted in Saudi Arabia in 2014 by Al-Hayek et al, showed that female with diabetic appear to have worse QOL than their counterpart, this could be partly explained by the worse situation of female patients in respect to the disease (25). The demonstrated study showed a significant association between overall QOL and marital status ( $P = 0.006$ ), the most likely to have good QOL was the unmarried patients; this may be attributed to the fact that both spouses are too preoccupied with daily life issues. Men, for instance, have to work

pretty long hours to provide their families with a decent life and women are extremely busy with caring and bearing and other home demands. Such type of life does not permit looking after to the disease, and then consequently it turns into worse QOL. Al-Shehri et al in Saudi Arabia on 2014 noted that married patients had significantly worse QOL compared with non married patients , this explained by the fact that married diabetic people have more responsibilities and more persons to look after in addition to their disease compare with those who are not married (26). Also study was conducted by Demirci et al in 2012 in Turkey mention that unmarried patients were better QOL than those who are married (24), while the study was conducted in Iran by Aghakoochak et al found no relationship between QOL and marital status (13). The present study revealed that significant association between overall QOL and level of education ( $P = 0.001$ ). The most likely to have good QOL was the higher educated patients, this may be related to fact that patients who are educated may be more able to obtain and understand the new information related to diabetes treatment compared with those who are less educated or illiterate, also there are evidences suggest that people who are more educated adopt medical technologies more rapidly than people are less educated and illiterate. This finding is similar to study was conducted by Issa et al on 2006 in Nigeria, the study mention that mean educated level of patients who scored poor was generally lower than that of patients who scored good (12), another study was conducted in Uganda showed that the better QOL appear among patients with higher education as the study said this may be attributed to the fact that they can easily read and understand the effect of diabetes on their life (23), while study was conducted in Saudi Arabia by Al-Shehri et al found no association between QOL and educated level (26). The demonstrated data revealed that there is no significant association between overall QOL and residence ( $P = 0.38$ ). This may be due to the role of mass media and internet which can reach both rural and urban areas. This finding is in agreement with the study done by Duaziska et al in Poland 2013 (27). The present data demonstrated that there is a statistically significant association between overall QOL and socioeconomic status ( $p=0.02$ ), this may be suggested that improvements in the social and economic situation consequently lead to improvement in well-being and access to the health services, so this lead to improve QOL for diabetic patients. The current study is supported by many studies, like study conducted by Eljedi et al

in Gaza 2006 which revealed that lower socioeconomic status had a lower impact on QOL (28), also similar result was found by Kiadaliri et al in Iran 2013 and Al-Hayek et al in Saudi Arabia 2014, which they found that poor economic status was significantly associated with poor QOL (25,29). The data of current study showed a significant association between overall QOL and duration of disease ( $P = 0.001$ ). The study showed patients with duration of disease less than 5 years had a good QOL, This finding may be attributed that shorter duration of disease, means less complications, less side effect of treatment and less psychological impact due to short time of disease. However, this finding was in agreement with Al-Tukmagi et al in Al-Hilla city 2014 which revealed that good QOL is related to the duration of diabetes of less than 6 years due to short time for complications to appear (18), finding from another study done by Demirci et al in Turkey 2012 showed that diabetes patients with duration of disease exceeding 10 years reported lower average weight impact score than those shorter durations of time (24). While another study is disagreement with the current study like study done by Al-Shehri et al which showed that duration of illness had no significant effect on QOL (30). There was a highly statistically significant association between overall QOL and HbA1C ( $P = 0.000$ ), this significant was still high after adjustment for other variables by using the partial correlation test, this finding indicated that the poor QOL score associated with higher levels of HbA1C and poor control glycemic control among the study group. This may be related to the fact that good glycemic control in diabetic patients leads to less psychological impact and less complications, so this lead to better QOL, also patients who have better glycemic control tend to be more optimistic and thus, cope well with the disease resulting in better QOL. Khanna et al in United State of America (USA) 2012 showed improved HbA1C level among participant in diabetes self-management programs are associated with higher diabetic – specific QOL scores (31), also study conducted in Saudi Arabia 2012 found that the degree of glycemic control among diabetes was significantly and directly affect their QOL, the worst QOL was expressed among poorly control diabetes, while the best was among patients with excellent control (26). Similarly, study in Romania 2012 done by Porojan et al state that glycemic control becomes an important measurement for preventing long term complications and provide better QOL to diabetic patients(16) . While Wasem et al in Germany 2013 found no association between glycemic control and QOL (32).

The present data showed significant association between comorbidity and overall QOL ( $P = 0.001$ ), this finding showed that patients with co morbidities had a lower proportion of good QOL than with no co morbidities, This may be attributed that patient without co morbidities refer to less disease complications, more glyceimic control and hence leads positive impact on QOL. This is consistent with studies conducted by Spasic et al in Serbia 2014 has been stated that the present of Co morbidities has a major impact on the decrease QOL (10), Issa et al in Nigeria 2006 revealed that comorbidities like hypertension was statistically significant with overall QOL (12). Similarly study conducted in German 2013 by Wasem et al found that co morbidities reduced QOL (32), while Cheah et al in Malaysia 2012, which not found any significant difference between respondents with comorbidity conditions and those without comorbidity and its effect on general health component (33). The data of current study showed significant association between overall QOL and antidiabetic medications. The patients most likely had good QOL was patients with Oral Hypoglycemic Agent (OHA) than those on insulin and combined OHA and insulin, this result may be attributed to the fact that insulin injection lead to multiple complication in diabetic patients, in addition OHA more favorable with less psychological effect, less expensive and more easily to be taken than insulin, so this may lead to increase QOL in patient taken OHA. The current finding is similar to study conducted by Wexler et al in USA 2006 which state that insulin used associated with decrease QOL (34), Demirci et al in Turkey 2012 showed that patient on insulin treatment reduced QOL (24), the same finding which found in a study of Cheah et al in Malaysia (33), while Nyanzi et al in Uganda which state that there is no consensus regarding the influence of medication methods on QOL of diabetic patients (23).

## **5. CONCLUSIONS**

The overall level of quality of life of patients with type 2 diabetes mellitus in the present study was a moderate . Poor quality of life was significantly associated with younger age, being unmarried, low level of education (less than secondary level), low and middle socioeconomic status, longer disease duration, using combined anti-diabetic medications, presence of comorbidities and level higher level of HbA1C. Our findings and conclusion addressed the needs for supportive and motivational programs for indigents and low socioeconomic status diabetic patients to promote QOL and we recommend to encourage

the patients for regular monitoring and follow up to reach good glycemic control to enhance good QOL. We also highly suggest conducted further studies in a national level for further assessment and improvement of QOL of diabetic patients

### **Ethical Approval:**

All ethical issues were approved by the author. Data collection and patients enrollment were in accordance with Declaration of Helsinki of World Medical Association , 2013 for the ethical principles of researches involving human. Signed informed consent was obtained from each participant and data were kept confidentially.

### **6. BIBLIOGRAPHY**

1. Longo D L, Anthony S F, Dennis L K , Stephen L H, J Larry J, Joseph L. Diabetes Mellitus (etiology and prevalence). HARRISONS Manual of Medicine. 18th McGraw-Hill Companies 2013: 1137 – 1138.
2. International Diabetes Federation. ABOUT DIABETES, DIABETES ATLAS (six edition) 2015. Available at <http://www.idf.org>. Accessed on 23 March 2015.
3. Frier B. M., M. Fisher. Diabetes mellitus (Davidson’s Principles and Practice of Medicine) 21st Edition. Colledge N R, Brian R. W, Stuart H. R . CHURCHILL LIVINGSTONE/ ELSEVIER 2010: 798.
4. Donahue K, Sam W, Mary R, Evie S. Diabetes. Essentials of Family Medicine (Sixth Edition). Sloane P D, Lisa M S, Mark H E, Mindy A S, David P, Anthony J V. Wolters Kluwer Health 2012: 149.
5. Abusaib M, Ahmed M, Nwayyir HA, Alidrisi HA, Al-Abbood M, Al-Bayati A, et al. Iraqi Experts Consensus on the Management of Type 2 Diabetes/Prediabetes in Adults. Clin Med Insights Endocrinol Diabetes. 2020;13(7):1–11
6. World Health Organization. Programme on Mental Health. Measuring Quality of Life 1997.
7. Chaveepojnkamjorn W, Natchaporn P, Frank-Peter S and Udomsak M. Quality of Life and Compliance Among Type 2 Diabetic Patients. Southeast Asian J Trop Med Public Health 2008; 39(2): 328-334.
8. Stanetic K, Suzana S, Maja R. The quality of life of patients with type 2 diabetes mellitus. Omuta me 2012; 18(3-4): 70-77.
9. Somappa H K, Mahesh V, Raghavendra P. Quality of Life Assessment Among Type 2 Diabetic Patients in Rural Tertiary Centre. International Journal of Medical Science and Public Health 2014; 3(4): 415-417.
10. Spasic A, Radmila V R, Aleksandra C D, Nikola S, Tatjana C. Quality of Life in Type 2 Diabetes Patients. Scientific Journal of the Faculty of Medicine in Nis 2014; 31(3): 193-200.
11. WANDELL P E. Quality of life of patients with diabetes mellitus. Scandinavian Journal of Primary Health Care 2005; 23: 68-74.
12. Issa BA, O Baiyewu. Quality of Life of Patients with Diabetes Mellitus in a Nigerian Teaching Hospital. Hong Kong J Psychiatry 2006; 16: 27-33.
13. Aghakoochak A, Ahmad S A, Mahmood V, Nasim N. Quality of life in Diabetic Patients: A Case – Control Study. Iranian Journal of Diabetes and Obesity 2014; 6(1): 28 – 33.

14. Short Form (SF 36). Health Survey comes from Medical Outcome Study (MOS). RAND Corporation. Available at <http://www.rand.org>. Accessed on 1 July 2014.
15. Bin Rakhis SAS, AlDuwayhis NM, Aleid N, AlBarrak AN, Aloraini AA. Glycemic Control for Type 2 Diabetes Mellitus Patients: A Systematic Review. *Cureus*. 2022 Jun;14(6):e26180.
16. Porojan M, Laura P, D. L. Dumitrascu. Assessing Health Related Quality of Life in Diabetic Patients. *ROM. J. INTERN. MED* 2012; 50(1); 27 – 31.
17. Ghassemzadeh R, Homa N, Ali A A, Mohammed K, Abbas R F, Masoud A. Quality of Life in Elderly Diabetic: Comparison between Home and Nursing Home. *Acta Media Iranica* 2013; 51(4): 254 – 259.
18. Al-Tukmagi H F, Miamin A M. Quality of life of patients with type 2 diabetes mellitus in AL-Hilla City- Iraq. *Iraqi J Pharm Sci* 2014; 23(2): 99 -103.
19. Mostafa W A A, Mohammad Y A. Quality of life of Patients with type 2 diabetes mellitus in Mosul. *Annals of College of Medicine* 2012; 38(1): 20 – 24
20. Issa W B. Evaluation of the health-related quality of life of Emirati people with diabetes: integration of sociodemographic and disease-related variables. *Eastern Mediterranean Health Journal* 2011; 17(11): 825 – 830.
21. Mathew A, Anusree T K, Aparna M A, Archana S, Athira M, Sachina B T et al. Quality of Life Among Type 2 Diabetes Mellitus Patients in South India: A Descriptive Study. *American International Journal of Research in Humanities, Arts and Social Sciences* 2014; 7(2): 197 – 200.
22. Kalda R, Anneli R, Margus L. Predictors of quality of life of patients with type 2 diabetes. *Patient preferences and Adherence* 2008; 2: 21 – 26.
23. Nyanzi R, Robert W, Leonard K A. Diabetes and Quality of Life: A Uganda Perspective. *Journal of Diabetes Research* 2014:1-9.
24. Demirci H, Yildirim C, Nuran B, Nazan B. Quality of life in type2 diabetic patients in primary health care. *Dan Med J* 2012; 59 (10): A4468.
25. Al-Hayek A A, Asirvatham A R, Abdulghani A, Aus A A, Fahad S A. Factors Associated with Health-related Quality of Life among Saudi patients with Type 2 Diabetes Mellitus: A cross-sectional survey. *Diabetes and Metabolism Journal* 2014; 38: 220 – 229.
26. Al-shehri F S. Quality of life among Saudi Diabetics. *Journal of Diabetes Mellitus* 2014; 4: 225 – 231.
27. Dudzinska M, Jerzy S T, Agnieszka Z, Maria K, Joanna M, Agata S et al. Type 2 diabetes mellitus in relation to place of residence: evaluation of selected aspects of socio-demographic status, course of diabetes and quality of life – a cross-sectional study. *Annals of Agricultural and Environmental Medicine* 2013; 20(4): 869 – 874.
28. Eljedi A, Rafael T M, Alexander K, Ulrich L. Health-related quality of life in diabetic patients and controls without diabetes in refugee camps in the Gaza strip: a cross-sectional study. *BMC Public Health* 2006; 6: 268.
29. Kiadaliri A A., Baharak N, Maryam M S. Quality of life in people with diabetes: a systemic review of studies in Iran. *Journal of Diabetes and Metabolic Disorders* 2013; 12: 54.
30. Al-Shehri A H, Attia Z T, Ahmed A B, Mohammad S . Health-related quality of life in type 2 diabetic patients. *Ann Saudi Med* 2008; 28(5): 352 – 360.

31. Khanna A, Amber L B, J Michael S, Melissa F P, Richard L S, Aanand D N. Hemoglobin A1C improvements and better diabetes-specific quality of life among participants completing diabetes self-management programs: A nested cohort study. *Health and Quality of Life outcomes* 2012; 10: 48.
32. Wesam J, Peter B, Anselm K G, Christiane B, Michael K, Evelin D et al. Co-morbidity but not dysglycaemia reduces quality of life in patients with type 2 diabetes treated with oral mono or dual combination therapy - an analysis of the DiaRegis registry. *Cardiovascular Diabetology* 2013; 12: 47.
33. WL Cheah, Lee PY, Lim PY, Fatin N A, Luk Kj, Nur I. Perception of Quality of Life among People with Diabetes. *Malaysia Family Physician* 2012; 7(2&3): 21 – 30.
34. Wexler D J, R W Grant, E Wittenberg, J L Bosch, E Cagliero, L Delahanty et al. Correlate of health-related quality of life in type 2 diabetes. *Diabetologia* 2006;49: 1489 – 1497.

**Citation:**

*Al-Janabi M.A.R, Janabi R.A.H Determinants and Effect of Quality of Life on the Disease Outcomes in Type 2 Diabetes Mellitus Patients. AJMS 2024; 10 (2): 171-185*