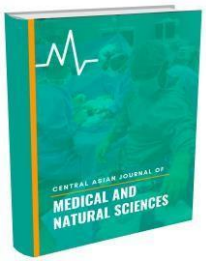

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Article

Assessment of Renal and Liver Function Tests and Correlations With Quality of Life in Patients With Type 2 Diabetes in Karbala City Iraq

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Abstract: The number of individuals afflicted with diabetes has increased dramatically this century. Quality of life in relation to health is subjective and varies from person to person based on their own history of experiences, perspectives, assumptions, and values. A person's emotional, psychological, and social health are all affected by these things. It is important for healthcare providers to understand the societal, psychological, and physiological impacts of long-term conditions like diabetes. More and more people are living with type 2 diabetes, a chronic metabolic disease that has a major influence on people's daily lives. Complications decrease patients' quality of life and raise the likelihood of negative outcomes such emergency department visits, hospitalizations, and death, which in turn effect healthcare spending and the sustainability of services. Objectives: This study aims to examine the correlation between quality of life and renal and liver function tests in individuals with type 2 diabetes. Methods: A cross-sectional study design was used to assess renal and liver function tests and correlation with quality of life in 200 people suffering from type 2 diabetes. The quality of life as it pertains to one's health was measured using the Arabic numeral 8. The assessment was conducted using a 5-point Likert scale, where responses could be given on a scale from 1 to 5. A lower score indicates good quality of life assessment because the scales are flipped for each part. Results: Overall, high creatinine significantly affected HRQoL in patients with diabetes, with patients' mean scores in all HRQoL domains being significantly higher ($P < 0.001$) than controls (P value $= 0.02 < 0.05$). We also found a highly significant correlation between alkaline phosphate and quality of life scores (p value $= 0.008 < 0.01$). Conclusions: there is a significant correlation between creatinine and quality of life ahigh concentration of creatinine lead to significantly lower health-related quality of life in various domains .in respect to liver function tests we obtained a highly significant correlation between alkaline phosphate and quality of life.

Keywords: Quality of life; Risk factors; Type 2 diabetics; Psychological

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1. Introduction

Metabolic disease is known as diabetes. High blood sugar levels caused by insulin resistance or insufficiency are diagnostic of type 1 diabetes [1]. It is a persistent metabolic condition resulting from a combination of environmental and genetic influences. At the present time, it is considered the third most harmful long-term health issue for humans [2]. International Reach As a result of rising standards of life, increased urbanization, industrialization, and an ageing population, this disease is on the rise around the world. As per the World Health Organization, there are around 422 million individuals with diabetes presently, and this figure is projected to rise to 600 million by 2040 [3].

Complications impact patients' quality of life and increase the likelihood of adverse outcomes such as emergency room visits, hospitalizations, and death, all of which impact health care spending and the sustainability of services [4]. According to IDF, the Kingdom of Saudi Arabia (KSA) has one of the five countries with the highest diabetes prevalence in the world, and five of the 10 countries most affected by diabetes mellitus (DM) are located in the Gulf region. The prevalence of diabetes in Saudi Arabia is estimated to be approximately 23% [5]. Due to urbanization, the lifestyle and eating habits of the Saudi people are changing. Chronic high-energy, high-fat meals with little physical activity can alter energy balance and lead to fat storage. The incidence of diabetes in Iraq increased from 5% in 1978 to 19.7% in 2012 [6]. In Basra, Iraq, one in five people has diabetes [7]. Emerging research indicates that diabetes mellitus (DM) remains a serious global health challenge and is expected to increase significantly in the coming decades, with a significant impact on health care costs, especially in developing countries [8]. Therefore, diabetes requires consistent treatment, including dietary and other lifestyle changes, as well as regular use of insulin and other blood sugar-lowering medications. Maintaining adequate quality of life (QoL) is one of the key patient-reported outcomes (PROs) of treatment for patients with diabetes. In addition to achieving adequate glycemic control and preventing chronic problems, patient-reported outcomes (PROs) are among the most important.) in the treatment of patients with diabetes [9]. The Objective is to investigate renal and liver function tests in T2DM patients, as well as the correlations with quality of life in patients with type 2 diabetes.

2. Materials and Methods

Study design & Participants

A cross-sectional study was conducted from November 2022 to December 2023 at the Diabetes Center/AL-Huja Hospital in Karbala, Iraq. Two hundred people with type 2 diabetes were included in the study; the control group consisted of 120 healthy individuals, with ages ranging from 51.04 to 10.17 years. The type 2 diabetes patients included 93 men and 107 women, with ages ranging from 51.46 to 9.05 years. All patients get routine check-ups at the clinic and are prescribed diabetes drugs under the guidance of an endocrinology specialist. The clinic has implemented all necessary measures to prevent the transmission of Covid-19.

Inclusion criteria: Patients aged 30-65 with type 2 diabetes were accepted and allowed to participate in the trial.

Exclusion criteria for this study were individuals with chronic illnesses, long-term mental issues that hindered their ability to participate in interviews, pregnant women, and individuals with mental illness.

Data collection

The researcher used a data collection form specifically created for the study to record detailed information about each participant. An individual's demographic characteristics including their age, gender, weight, height, socioeconomic status, degree of education, and monthly income.

Characteristics associated to type 2 diabetes include the length of time someone has had the condition and the quantity of diabetes drugs they are using. A family history of diabetes is expected if the patient has hypertension and dyslipidemia..

Blood sample collection and preparation

Patients' blood samples were collected while they were fasting for standard analysis at the center. Subsequently, the patient awaits the results prior to being seen by a physician. Participants were interviewed and each patient spent around 25 minutes filling out the study questionnaire during the waiting period. Collect 5ml of venous blood using a 23G

disposable plastic syringe. Divide the collected blood sample into three pieces, each containing 2ml of blood. Store one component in an EDTA tube for HbA1c calculation. Transfer the second portion into a basic disposable tube (gel), let it separate, and then use a centrifuge at 4000 rpm for 50 minutes to further separate it. Serum samples were maintained at -30 °C in test tubes until automated measurement of biochemical parameters, such as blood glucose, liver function tests, and renal function tests, using the Architect Clinical Chemistry Analyzer (c4000) from Abbott Diagnostics, under fasting conditions. Parker, Illinois, United States [10].

Diabetic Mellitus (DM) was defined as a combination of the following symptoms and signs in a patient: a fasting blood glucose level of 126 mg/dL or higher, a HbA1c level of 6.5% or higher, a self-reported diagnosis of diabetes by a physician, and the use of insulin or oral antidiabetic medications.

Ethical Approval

1. Al-Huja Hospital in Iraq received approval. Have reached Karbala.
2. Secure verbal agreement from participants before to engaging in the study.
3. Patient data will be handled privately and will not be shared with unauthorized individuals.

Statistical Analysis

The statistical programme for the social sciences, SPSS Inc.'s 26th Edition, was used to code the data. Frequencies and proportions are used to display categorical variables. Analyzing the quantitative variables of the Kolmogorov-Smirnov test for normal distribution is the first step. Common methods for describing quantitative variables include the median (interquartile range) or the mean ± standard deviation. A Mann-Whitney U test was employed in cases where the data did not conform to a normal distribution. In cases where the data did conform, an independent samples t-test was employed to compare the means of the two groups. The chi-square test was used to analyze the association between two category variables. If the P-value is less than or equal to 0.05, it is considered significant; if it is less than or equal to 0.001, it is really significant.

3. Results

Patients Demographics Characteristics

The study's participants, including both patients and healthy individuals, are listed in Table 1. There were no statistically significant differences between the healthy volunteers and patients with respect to age, gender, BMI, marital status, monthly income, or education level (p values > 0.05).

Table 1. Distribution of Demographic characteristics of studied sample.

Demographic Data		Freq.	%
Age (years)	<= 50	84	42.00
	> 50	116	58.00
	Mean ± SD	51.5 ± 9.04	
Gender	Females	107	53.5
	Males	93	46.5
Social Status	Un Married	20	10.0
	Married	100	
	Widows	80	
Education Level	Illiterate	40	20.0
	Primary	66	33.0
	Secondary	60	30.0
	College	34	17.0
Monthly Income	< 500	55	27.5
	500 - 1000	103	51.5
	> 1000	42	21.0
Total		200	100%

Table 2. Renal and liver activity assessments for 200 patients with type 2 diabetes mellitus

Laboratory Investigations	Min	Max	Mean	SD
Renal function tests				
B. urea (mg/dl)	10.0	45.0	28.7	7.1
S. Creatinine (mg/dl)	0.5	1.2	0.8	0.2
Live function tests				
S. SGOT (U/L)	2.5	39.0	21.7	7.9
S. SGPT (U/L)	8.0	49.0	25.7	9.5
S. Alkaline phosphatase (U/L)	31	137	84.8	26.2
Total serum bilirubin (mg/dl)	0.2	1.2	0.5	0.2

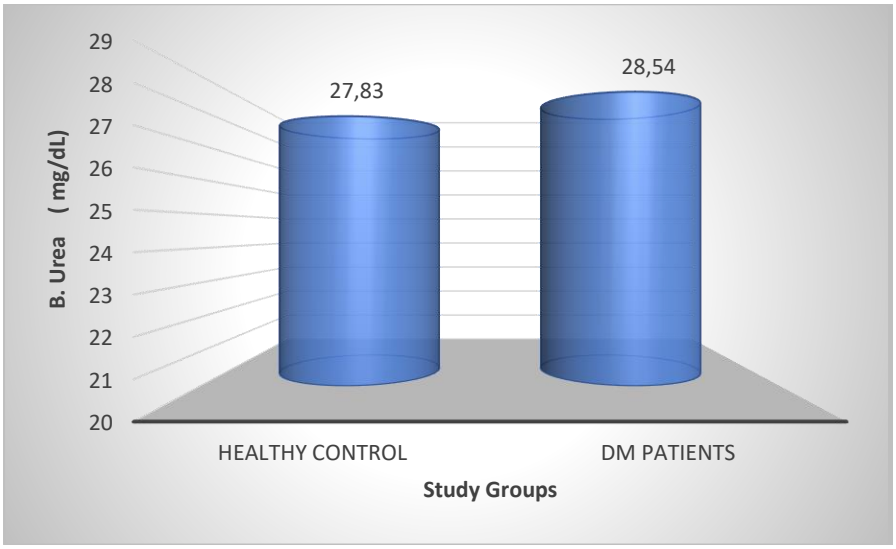

Fig. 1 Blood urea level for two groups

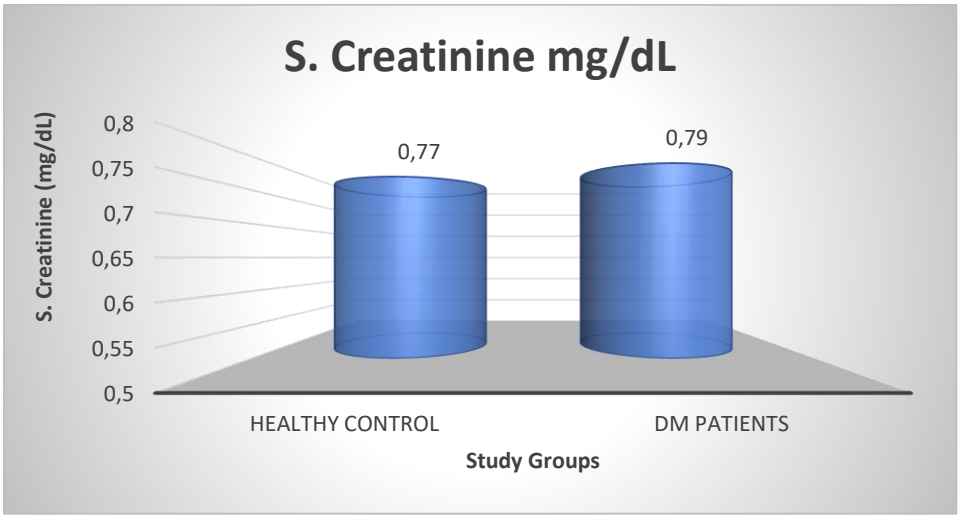

Fig. 2 Serum creatinine level for two groups.

Table. 3 Distribution of enrolled patients according to responses to Health-related quality of life questions

Question	Response	Freq.	%	Mean of score	SD	Assess
1: Overall, how would you rate your health during the past 4 weeks?	Excellent	**10**	**5.0**	**3.8**	**1.13**	Poor
	Very Good	**13**	**6.5**			
	Good	**47**	**23.5**			
	Fair	**73**	**36.5**			
	Poor	**51**	**25.5**			
	Very Poor	**6**	**3.0**			
2: During the past 4 weeks, how much did physical health problems limit your usual physical activities (such as walking or stairs)?	Not at All	**22**	**11.0**	**3.2**	**1.30**	Poor
	Very Little	**49**	**24.5**			
	Could not do Physical Activities	**35**	**17.5**			
	Somewhat	**56**	**28.0**			
	Quite a Lot	**38**	**19.0**			
3: During the past 4 weeks, how much difficulty did you have doing your daily work, both at home and away from home, because of your physical health?	Not at All	**23**	**11.5**	**3.03**	**1.18**	Poor
	A Little Bit	**43**	**21.5**			
	Could not do Daily work	**63**	**31.5**			
	Some	**47**	**23.5**			
	Quite a Lot	**24**	**12.0**			
4: How much bodily pain have you had during the past 4 weeks?	None	**19**	**9.5**	**3.86**	**1.41**	Poor
	Very Mild	**23**	**11.5**			
	Mild	**16**	**8.0**			
	Moderate	**68**	**34.0**			
	Severe	**58**	**29.0**			
	Very Severe	**16**	**8.0**			
5: During the past 4 weeks, how much energy did you have?	Very Much	**9**	**4.5**	**3.23**	**0.81**	Poor
	Quite a Lot	**16**	**8.0**			
	Some	**100**	**50.0**			
	A Little	**70**	**35.0**			
	None	**5**	**2.50**			
	Not at All	**35**	**17.5**	**2.95**	**1.31**	Poor
	Very Little	**47**	**23.5**			

6: During the past 4 weeks, how much did your physical health or emotional problems limit your usual social activities with family or friends?	Could Not Do Social Activities	**34**	**17.0**			
	Somewhat	**60**	**30.0**			
	Quite a Lot	**24**	**12.0**			
	Not at All	**35**	**17.5**	**3.06**	**1.23**	Poor
7: During the past 4 weeks, how much have you been bothered by emotional problems (such as feeling anxious, depressed or irritable)?	Slightly	**26**	**13.0**			
	Moderately	**47**	**23.5**			
	Quite a Lot	**77**	**38.5**			
	Extremely	**15**	**7.5**			
	Not at All	**39**	**19.5**	**2.91**	**1.26**	Poor
8: During the past 4 weeks, how much did personal or emotional problems keep you from doing your usual work, school or other daily activities?	Very Little	**38**	**19.0**			
	Could Not Do Daily Activities	**38**	**19.0**			
	Somewhat	**72**	**36.0**			
	Quite a Lot	**13**	**6.5**			

Abbreviations: a) mean of score (<= 2.5) = Good, mean of score (> 2.5) = Poor,
b) mean of score (<= 2) = Good, mean of score (> 2) = Poor.

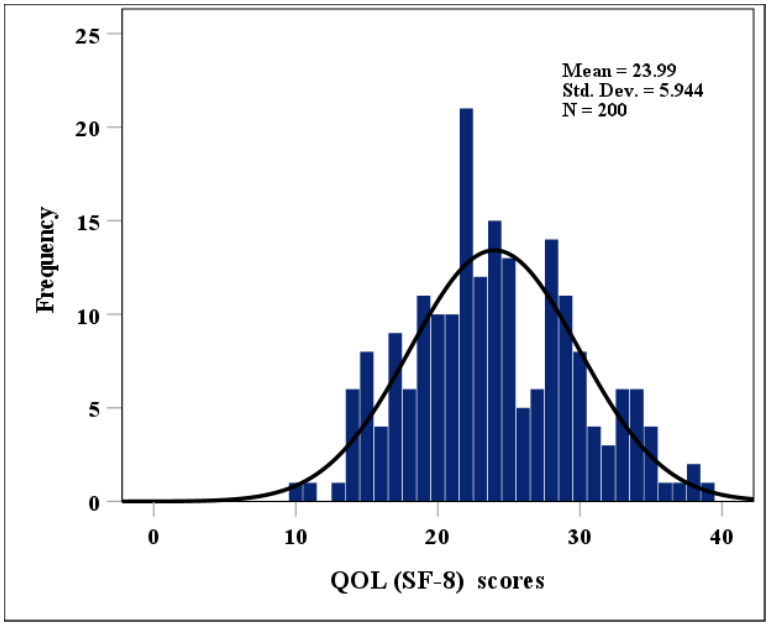

Fig. 3 Distribution of DM patients according to quality-of-life score.

Table. 4 Assessment of SF-8, its domains and total score.

Question	N	Min	Max	Mean	SD	Median	IQR
Physical Functioning	200	1	6	3.8	1.1	4.0	3.0-5.0
Role Physical *	200	1	6	3.2	1.3	3.0	2.0-4.0
Pain	200	1	5	3.0	1.2	3.0	2.0-4.0
General Health	200	1	6	3.9	1.4	4.0	3.0-5.0
Vitality*	200	1	5	3.2	0.8	3.0	3.0-4.0
Social functioning	200	0	5	3.0	1.3	3.0	2.0-4.0
Role Emotional	200	0	5	3.0	1.3	3.0	2.0-4.0
Mental Health	200	1	5	2.9	1.3	3.0	2.0-4.0
Physical Domain Summary	200	13	41	26.0	7.2	27.0	20.0-32.0

Table. 5 Regression analysis for identified SF-8 scores that associated with DM patients and control.

Step 1[a]		B	p-value	OR	95% C.I. for OR	
					Lower	Upper
DM patients/ Healthy controls	Physical Functioning	0.748**	0.0001	2.113*	1.573	2.838
	Role Physical *	-0.208	0.148	0.813	0.613	1.077
	Pain	0.487**	0.004	1.627*	1.173	2.257
	General Health	-0.417**	0.003	0.659*	0.501	0.867
	Vitality*	0.209	0.224	1.232	0.880	1.724
	Social functioning	-0.065	0.631	0.937	0.721	1.220
	Role Emotional	-0.274*	0.047	0.760*	0.580	0.997
	Mental Health	-0.163	0.245	0.850	0.645	1.118

Binary logistic Regression test.

Table. 6 Univariate analysis between Renal and liver function tests and quality of life

Renal and liver function tests	SF-8 domains	
	Correlation coefficient, r	p-value
Urea	-0.014	0.843
Creatinine	-0.164	0.020 [S*]
ALP	0.186	0.008 [S**]
TB	0.045	0.528
GOT	0.046	0.519
GPT	-0.001	0.988

S*: Correlation is-significant at the p-value ≤0.05 level.

S**: Correlation is-highly significant at the p-value ≤0.01 level.

4. Discussion

Diabetes is rapidly increasing worldwide and presents a significant risk to global health. The prevalence of diabetes is growing swiftly and frighteningly. The disease of the 21st century, impacting millions globally, has been identified [11]. There are monetary and health-related costs associated with diabetes, a metabolic condition. The Arab world is expected to have the second-highest diabetes prevalence by 2030. HRQoL is a reflection of how well a person feels about their health and general wellness [12] . For individuals with diabetes, intricate treatment plans and strict management of blood sugar levels, together with reduced physical and social activities due to problems, greatly affect Health-Related Quality of Life (HRQoL) [13].

For more than 20 years, studies in Western nations have shown abnormalities in liver enzyme levels in Type 2 Diabetes Mellitus (T2-DM), while data from Middle Eastern countries like Iraq is rare or nonexistent. Several prospective studies have found a dose-response association between high serum GGT levels (even when within the normal range) and the development of type 2 diabetes. This association was unaffected by recognized risk factors for diabetes, such as age, body mass index, and alcohol use or liver impairment. To confirm and use our results as diabetes mellitus benchmark data, we need to undertake more in-depth studies on people with type 1 and type 2 diabetes from various parts of Iraq [14].

5. Conclusion

The article discusses a study conducted in Karbala, Iraq, that assessed renal and liver function and their correlations with quality of life (QoL) in patients with type 2 diabetes. The study involved 200 patients with type 2 diabetes and 120 healthy individuals as a control group. The results showed a significant correlation between high creatinine levels and a decline in health-related quality of life (HRQoL). Additionally, there was a highly significant correlation between alkaline phosphatase levels and QoL. The study underscores the importance of monitoring renal and liver function in type 2 diabetes patients to manage the disease's impact on their quality of life. These findings can aid healthcare providers in developing more effective treatment strategies to improve the QoL for diabetes patients.

6. Credit Author Statement

Sammar Jassim: Data curation, Writing–review and editing, Conceptualization, Investigation, Methodology, Visualization, Writing – original draft, Writing–review & editing. Data curation, Formal analysis, Investigation.

7. Conflict of Interests

The authors declare that no competing interest exists

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