Evaluating Uric Acid Levels and Relationship to Diabetic and Gender Effect to Patient Attending the Diabetes and Endocrinology Center in Zliten.

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Abstract

This study was conducted during period from 10 of June to 20 of June 2026, aimed to evaluate the correlation and predictive relationship between fasting glucose (FBS) and uric acid (UA) levels in the blood, as well as to explore gender-based differences in diabetic patients. A cross sectional field study was conducted with a sample of 200 diabetic patients attending the Diabetes and Endocrinology Center in Zliten. Data were collected, descriptive indicators were extracted, and non-parametric tests such as the Mann Whitney U test and Spearman's rank correlation coefficient were used, in addition to multiple linear regression analysis using SPSS software. The descriptive results showed that females constituted the majority of the study sample (60.5%). Inferential analyses revealed no statistically significant correlation between fasting glucose and uric acid levels in the blood ($r=0.085$, $p=0.229$). Multiple linear regression analysis confirmed the lack of predictive power of the combined model (age, sex, fasting blood glucose) on uric acid levels ($p=0.720$). Furthermore, the Mann Whitney U test showed no statistically significant differences in uric acid levels

between males and females (p=0.734.(The study concludes that acute changes in fasting blood glucose are not directly associated with uric acid levels in the study population. The combined metabolic effects of diabetes also contributed to the diminishing of expected normal physiological differences between the sexes. The research recommends including long term metabolic indicators such as glycated hemoglobin (HbA1c) and renal function in future studies.

Keywords: Fasting blood glucose (FBS), uric acid (UA), Mann Whitney U test, Spearman's rank correlation coefficient, Zliten, diabetes mellitus.

تقييم مستويات حمض اليوريك وعلاقتها بمرض السكري وتأثير الجنس على المرضى المترددون الي مركز السكري والغدد الصماء في زليتن

المستخلص:

اجريت هذه الدراسة في الفترة من 10 الى 20 مايو 2026 هدفت هذه الدراسة إلى تقييم العلاقة الارتباطية والتنبئية بين مستوى سكر الدم الصائم ومستوى حمض اليوريك في الدم، بالإضافة إلى استكشاف الاختلافات بين الجنسين لدى مرضى السكري. أُجريت دراسة ميدانية مقطعية على عينة من 200 مريض سكري المترددين على مركز السكري والغدد الصماء في زليتن. جُمعت البيانات، واستُخرجت المؤشرات الوصفية، واستُخدمت اختبارات لا معلمية مثل اختبار مان ويتني يو ومعامل ارتباط رتبة سبيرمان، بالإضافة إلى تحليل الانحدار الخطي المتعدد باستخدام برنامج SPSS. أظهرت النتائج الوصفية أن الإناث شكلن غالبية عينة الدراسة (60.5%). وكشفت التحليلات الاستدلالية عدم وجود ارتباط ذي دلالة إحصائية بين مستوى سكر الدم الصائم ومستوى حمض اليوريك في الدم (r=0.085، p=0.229). أكد تحليل الانحدار الخطي المتعدد عدم قدرة النموذج المُدمج (العمر، الجنس، سكر الدم الصائم) على التنبؤ بمستويات حمض اليوريك (p=0.720). علاوة على ذلك، أظهر اختبار مان ويتني U عدم وجود فروق ذات دلالة إحصائية في مستويات حمض اليوريك بين الذكور والإناث (p=0.734). وتخلص الدراسة إلى أن التغيرات الحادة في سكر الدم الصائم لا ترتبط ارتباطًا مباشرًا بمستويات حمض اليوريك لدى عينة الدراسة. كما ساهمت التأثيرات الأيضية المُجتمعة لمرض السكري في تقليل الفروق الفسيولوجية الطبيعية المتوقعة بين الجنسين. وتوصي الدراسة بإدراج مؤشرات أيضية طويلة الأمد، مثل السكر التراكمي (HbA1c) ووظائف الكلى، في الدراسات المستقبلية.

الكلمات المفتاحية: سكر الدم الصائم، حمض اليوريك، اختبار مان ويتني U، معامل ارتباط رتبة سبيرمان، زليتن، داء السكري.

1 Introduction

Gout is one of the oldest known medical diseases, historically known as the disease of kings due to its association with excessive consumption of red meat and luxurious beverages, which were once only available to the wealthy. (Pritzker and Pritzker 2022) In modern medicine, gout is a common and complex form of inflammatory arthritis, characterized by sudden and severe attacks of pain, swelling, redness, and heat in the affected joints.(Parisa et al. 2023) Gout arises as a result of a metabolic disorder that leads to a condition known as

hyperuricemia.(Du et al. 2024) It is a substance that is produced naturally in the body as a result of the breakdown of chemical compounds called purines found in some foods (such as red meat, seafood) and the body's own cells.(Zhang et al. 2022) Under normal circumstances, uric acid dissolves in the blood and passes through the kidneys to be excreted in the urine.(Ramos and Goldfarb 2022) When the body produces excess amounts of this acid, or when the kidneys are unable to eliminate it efficiently, the acid accumulates in the blood, over time, this excess crystallizes into sharp, needle like crystals (mono-sodiumurate crystals) within the joints or surrounding tissues, stimulating the immune system and triggering a severe inflammatory response that causes intense pain.(Yang et al. 2026) Most of cases, the Gout affects the metatarsophalangeal joint of the big toe, but it may affect other joints such as the ankles, knees, wrists, and elbows, the affected joint becomes swollen, hot, and dark red in color, and is so sensitive to touch that the patient may not bear the weight of a bed sheet.(AlJadir 2022) Diabetes mellitus is one of the most prevalent chronic diseases in Libya and worldwide, and is often accompanied by multiple metabolic disorders.(Jarallah and Algdar 2024) Gout is on the other hand, is the most common form of inflammatory arthritis.(VanItallie 2010) Recent studies indicate a close relationship and common mechanism between insulin resistance, metabolic syndrome, and high uric acid levels.(Copur, Demiray, and Kanbay 2022)

1.1 Problem of the study:

Determining the prevalence helps improve treatment and prevention strategies, and guides doctors at the center towards early detection of high uric acid and avoiding its complications (such as nephropathy or acute gout attacks) that exacerbate the suffering of diabetic patients.

1.2 Research Questions

Are there statistically significant differences in uric acid (UA) and fasting blood sugar (FBS) levels among diabetic patients attributable to the gender variable (males and females)?

Is there a statistically significant correlation between fasting blood glucose (FBS) levels and uric acid (UA) levels in the study sample?

1.3 Objectives of the study:

Determining the relationship between the prevalence of gout and diabetes.

A study of the relationship between gout and demographic factors (age, gender) with diabetes.

1.4 Significance of the study:

The importance of the study lies in providing up to date statistical and clinical data on the metabolic interaction between diabetes and uric acid (UA) levels in the Libyan environment, specifically within the city of Zliten, thus filling a gap in similar local studies.

The extent to which basic demographic factors as sex and biomarkers (such as fasting glucose FBS) influence the prediction of physiological changes in uric acid levels in diabetic patients.

2 Materials and Methodology

2.1 **Study Design:** Descriptive cross-sectional study depending on: Questionnaire: includes demographic data (age, gender,). Laboratory tests: Measurement of serum uric acid levels and fasting blood glucose.

2.2 **Study size :** A random sample of 200 patients who meet the inclusion criteria.

2.3 **Inclusion Criteria:** Patients who have been previously diagnosed with diabetes, who are over 18 years of age, and who agree to participate in the study.

2.4 **Exclusion Criteria**: Patients with acute or advanced kidney failure (because kidney failure raises uric acid independently), or pregnant women.

3 Results and data collection

Table (1): distribution of the diabetic patients in the study sample according to gender.

Gender					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Male	79	39.5	39.5	39.5
	Female	121	60.5	60.5	100.0
	Total	200	100.0	100.0	

The demographic characteristics table shows the distribution of the diabetic patients in the study sample according to gender. The total sample size was 200 cases. Females constituted the majority of those visiting the Diabetes and Endocrinology Center in Zliten, with 121 cases (60.5%), while males numbered 79 cases (39.5%) of the total study population.

Table (2): the descriptive statistical for the main clinical and demographic variables.

Statistics				
		Age	**FBS**	**UA**
N	Valid	200	200	200
	Missing	0	0	0
Mean		43.15	197.58	6.19
Median		42.00	196.00	6.00
Minimum		26	130	4
Maximum		60	260	9

The table above presents the descriptive statistical indicators for the main clinical and demographic variables of the study. The mean age of

patients attending the center was 43.15 years, ranging from a minimum of 26 to a maximum of 60 years. Clinically, the results showed a significant increase in fasting blood glucose (FBS) levels among the study population, with a mean of 197.58 mg/dL and values ranging from 130 mg/dL to 260 mg/dL. Conversely, serum uric acid (UA) levels had a mean of 6.19 mg/dL, with a minimum of 4 mg/dL and a maximum of 9 mg/dL

Table (3): Results of the Mann-Whitney U test comparing fasting blood glucose and uric acid levels by gender .

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Age	.073	200	.011	.962	200	.000
FBS	.081	200	.003	.959	200	.000
UA	.151	200	.000	.910	200	.000

a. Lilliefors Significance Correction

Since the significance values ($p<0.05$) for all three variables are less than 0.05, the null hypothesis that the data are normally distributed is rejected. Therefore, the data for age, blood glucose, and uric acid do not follow a normal distribution.

Table (4): Results of the Mann-Whitney U test to compare FBS and UA levels by gender.

Study Variables	Gender	n	Mean Rank	Sum of Ranks	Mann-Whitney U	Z-value	p-value (.Sig)
FBS	Male	79	101.05	7983.00	4736.000	-0.109	.913
	Female	121	100.14	12117.00			
UA	Male	79	98.80				
	Female	121	101.61				

To determine whether there were statistically significant differences in fasting blood glucose (FBS) and uric acid (UA) levels attributable to the sex variable (male and female), and based on the results of normality tests which confirmed that the variables were not normally distributed, the Mann-Whitney U test for independent samples was used as a non-parametric alternative.

The results shown in the table above indicate no statistically significant differences between males and females in fasting blood glucose (FBS) levels. The test value (U=4736.00) had a statistical significance level (p=0.913),

which is greater than the p-value of 0.05. This is clearly demonstrated by the similarity in the mean ranks between men (101.05) and women (100.14) .

Similarly, the analysis showed no statistically significant differences between the sexes in blood uric acid (UA) levels. The test result was U=4645.50, with a significance level of p=0.734 (greater than 0.05), and a clear convergence in the mean ranks for men (98.80) and women (101.61) .

These indicators collectively reveal that the metabolic factors associated with diabetes in patients attending the Diabetes and Endocrinology Center in Zliten affect glucose and uric acid levels similarly and independently of the patient's sex, thus diminishing the usual physiological sex differences observed in typical study populations.

Table (5): significant correlation between the two variables FBS, UA

Correlations				
			FBS	**UA**
Spearman's rho	FBS	Correlation Coefficient	1.000	.085
		Sig. (2-tailed)	.	.229
		N	200	200
	UA	Correlation Coefficient	.085	1.000
		Sig. (2-tailed)	.229	.
		N	200	200

The results showed no statistically significant correlation between the two variables; the correlation coefficient (r = 0.085) at a significance level of (p = 0.229), which is greater than the p-value of 0.05. This result indicates, both physiologically and clinically, that fasting blood glucose levels in patients attending the diabetes center change independently and are not directly or inversely correlated with

Table (6): Multiple linear regression analysis for predicting uric acid (UA) levels

Predictor Variables	**Unstandardized Coefficients (B)**	**Standard Error (SE)**	**Standardized Coefficients (β)**	**t-value**	**p-value (.Sig)**
(Constant)	5.426	0.891	--	6.091	.000
Age	-0.001	0.012	-0.007	-0.102	.919
FBS	0.003	0.003	0.079	1.104	.271
Gender	0.080	0.238	0.024	0.335	.738

The analysis revealed that the overall statistical model was not statistically significant, with a p-value of 0.447 at a significance level of 0.720, which is greater than the p-value of 0.05. Furthermore, the coefficient of determination ($R^2 = 0.007$) indicated that the independent variables collectively explained only 0.7% of the variance in uric acid levels. When examining the individual effects of variables within the model (the coefficient table), no statistically significant effect was found for any of them. The significance values for age were 0.919, for fasting blood glucose 0.271, and for sex 0.738. Taken together, these results confirm that uric acid levels in the study population are not linearly affected by these direct demographic and clinical factors, thus opening the door to a more in-depth discussion of the role of other metabolic and clinical factors.

4 Discussion

The current study aimed to evaluate the correlation and predictive relationship between fasting blood glucose (FBS) and uric acid (UA) levels, as well as to explore gender differences in a sample of 200 diabetic patients attending the Diabetes and Endocrinology Center in Zliten. Statistical analysis revealed no statistically significant correlation between fasting blood glucose and uric acid levels ($r=0.085$, $p=0.229$). Multiple linear regression analysis confirmed that fasting blood glucose, age, and gender combined could not predict uric acid levels, explaining only 0.7% of the variance ($R^2=0.007$, $p=0.720$). This finding contradicts some literature suggesting a strong positive correlation between hyperglycemia and the prevention or increase of uric acid excretion.(Ma et al. 2025) The lack of clinical correlation in the current study population can be explained by the complex metabolic nature of diabetes.(Guan et al. 2024) Since rapid, daily fluctuations in fasting blood glucose levels do not necessarily translate into immediate and cumulative effects on kidney function in filtering and excreting uric acid, which may be more significantly influenced by other long-term indicators such as HbA1c or the presence of early-onset nephropathy not included in the model variables.(Suijk et al. 2022) Furthermore, the results showed no statistically significant differences in uric acid levels between males and females ($p=0.734$). This finding is physiologically noteworthy, as it is medically

established that men have higher uric acid levels than women before menopause due to the urinary exocrine effect of estrogen in women.(Asadi 2025) The disappearance of these normal sex differences in the study sample can be explained by the fact that a significant proportion of the female participants may be in an older age group (near or after menopause), where declining estrogen levels lead to uric acid levels comparable to those of men.(Paat, Windewani, and Pitoy 2026) In addition, the metabolic dysfunction associated with diabetes and insulin resistance affects the efficiency of the renal tubules in excreting salts symmetrically in both sexes, leading to homogeneity in uric acid levels and the disappearance of the expected normal differences between men and women within this clinical sample.(Alamilla-Sanchez et al. 2025)

5 Conclusion:

Demographic and clinical indicators showed that females constituted the majority of the study population, with a significant and uncontrolled increase in the overall average fasting blood glucose (FBS) levels among the sample. Statistically and inferentially, the study revealed no correlation or true linear predictive power between fasting blood glucose (FBS) and uric acid (UA) levels, indicating that acute changes in blood glucose do not directly reflect uric acid levels. The results also confirmed the disappearance of the usual physiological sex differences in uric acid levels between males and females within this clinical sample. This is attributed to the combined metabolic effects of diabetes and insulin resistance, along with age-related hormonal changes in females. Based on these findings, the research recommends the inclusion of more in depth and long term clinical and metabolic indicators in future studies, such as glycated hemoglobin (HbA1c), kidney function indicators, and insulin resistance, to gain a more accurate and deeper understanding of the metabolic disorders associated with diabetes in the local community.

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