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Short-Term Changes in Hematologic Inflammatory Indices During Exenatide Therapy in Patients with Type 2 Diabetes Mellitus

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ABSTRACT

Background: Inflammation plays an important role in the pathogenesis of type 2 diabetes mellitus (T2DM) and the development of complications. Glucagon-like peptide-1 receptor agonists (GLP-1RAs) are widely used to treat T2DM. Mean platelet volume (MPV), neutrophil-to-lymphocyte ratio (NLR), and platelet-to-lymphocyte ratio (PLR) are simple biomarkers of inflammation. This study evaluated the effects of six-month exenatide therapy on these parameters.
Methods: This single-center retrospective cohort study evaluated 100 adult patients with type 2 diabetes who initiated exenatide treatment and maintained a stable baseline treatment regimen for 6 months (no medication changes for at least 6 months). Clinical, biochemical, and blood count parameters were compared at the start of treatment (month 0) and at months 3 and 6.
Results: At the start of treatment, patients' weight decreased from 111.1±24.4 kg to 104.7±20.8 kg after 6 months ($p<0.001$). Initial HbA1c values decreased from 68.6±20.3 mmol/mol (8.43±1.86%) to 60.9±16.1 mmol/mol (7.72±1.47%) at 6 months ($p<0.001$). NLR remained unchanged throughout the study, while PLR showed a transient increase at 3 months ($p=0.03$) but returned to baseline at 6 months. Furthermore, ALT values were significantly lower at 6 months compared to baseline ($p=0.048$).
Conclusions: These findings suggest that exenatide therapy may be associated with improvements in metabolic parameters and a modest reduction in MPV. However, given the retrospective design and the lack of direct assessment of treatment adherence and persistence, these results should be interpreted with caution.

1. Introduction

Type 2 diabetes mellitus (T2DM) is increasingly recognized as a chronic metabolic disorder accompanied by a persistent, low-grade inflammatory state that contributes to insulin resistance and the development of diabetes-related complications [1]. Growing evidence highlights the close interplay between metabolic dysregulation and inflammation in T2DM, including in microvascular complications such as diabetic kidney disease [2]. In this context, inflammation-related laboratory markers have gained attention in the diabetic population. Glucagon-like peptide-1 receptor agonists (GLP-1RAs) are widely used in the management of T2DM and provide clinically meaningful benefits beyond glucose lowering, particularly in patients with cardiovascular comorbidities [3]. Experimental and clinical data suggest that GLP-1RAs may exert anti-inflammatory and vasculoprotective effects by modulating oxidative stress pathways, inflammatory cytokine signaling, and endothelial function [4]. These observations raise interest in whether GLP-1RAs therapy could influence systemic inflammation and related hematological indices in patients with T2DM. Among accessible inflammatory markers, indices derived from routine complete blood count parameters – such as mean platelet volume (MPV), neutrophil-to-lymphocyte ratio (NLR), and platelet-to-lymphocyte ratio (PLR) – have emerged as practical and cost-effective indicators of systemic inflammatory burden [1, 5]. Elevated MPV reflects platelet activation, whereas increased NLR and PLR are considered markers of immune-inflammatory imbalance [1, 6]. In T2DM, these indices have been associated with metabolic control, vascular complications, and diabetic nephropathy, supporting their potential clinical relevance [7]. Although the anti-inflammatory and cardiometabolic effects of GLP-1RAs have been increasingly reported, data specifically addressing the impact of exenatide on simple CBC-derived inflammatory indices such as MPV, NLR, and PLR remain limited. Moreover, real-world evidence evaluating short-term changes in these readily accessible hematologic markers is scarce. The primary aim of this study was to evaluate the change in MPV after 6 months of exenatide therapy in patients with T2DM. Secondary outcomes included changes in weight, glycaemic parameters, NLR, PLR, and selected biochemical markers.

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2. Methods

2.1. Study Design and Population

This retrospective single-arm cohort study evaluated changes in patients with T2DM before and after initiation of exenatide. The study was conducted at the endocrinology outpatient clinic of a tertiary care center. Patients who initiated exenatide therapy between January 2018 and December 2020 and had available follow-up data for at least 6 months were eligible for inclusion. A 6-month follow-up period was selected as it reflects routine clinical practice for evaluating treatment response to GLP-1RAs and allows sufficient time to observe stable changes in glycaemic control and body weight. After applying exclusion criteria and excluding patients with incomplete follow-up or medication changes, 100 patients were included in the final analysis. Patients were required to have stable background antidiabetic therapy for at least 6 months without dose modification. This inclusion criterion may have preferentially selected clinically stable and treatment-adherent individuals. Due to the retrospective design and limitations of the electronic medical record system, comprehensive baseline characterization (including detailed comorbidities, smoking status, full medication profiles, and duration of diabetes) was not consistently available for all patients, and no formal a priori sample size calculation was performed. The sample size was determined by the number of eligible patients who met the inclusion criteria during the study period. Therefore, analyses were limited to variables reliably documented across the cohort. Exenatide was administered subcutaneously as a once-weekly 2 mg formulation. The starting dose was 2 mg, with no titration, per standard clinical practice at our center. Dosing was consistent across all patients. Background therapies included metformin, sulfonylureas, DPP-4 inhibitors, SGLT2 inhibitors, thiazolidinediones, and/or insulin, and these regimens remained unchanged throughout the 6-month follow-up period. Data on concomitant medications and comorbidities that could directly influence MPV (such as statins, antiplatelets, ACE inhibitors/ARBs, and cardiovascular conditions) were not consistently or reliably available in electronic medical records due to the retrospective design. Therefore, these variables could not be systematically analyzed or adjusted for in the present study. Patients with known malignancy, acute infection, pregnancy, active inflammatory or rheumatologic disease, or advanced hepatic, renal, or cardiac failure were excluded.

Laboratory parameters were recorded at baseline (month 0), month 3, and month 6 after exenatide initiation. The primary endpoint of the study was the change in MPV at 6 months. Secondary endpoints included changes in body weight, glycated hemoglobin (HbA1c), NLR, PLR, and selected biochemical parameters. Complete blood count analyses were performed using EDTA-anticoagulated blood samples and using the same automated hematology analyzer throughout the study period. Only patients with available laboratory data at each respective time point were included in the analyses (complete-case analysis). No imputation method was applied for missing data. Given the absence of a control group and the retrospective design, causal inferences cannot be established. Additionally, because multiple laboratory parameters were evaluated at three time points, the analyses should be considered exploratory. No formal adjustment for multiple comparisons was applied, and p-values should therefore be interpreted cautiously. Due to the retrospective design, the Ethics Committee waived the requirement for individual informed consent, and the exact number of patients initially screened and excluded at each stage could not be fully reconstructed. Therefore, a detailed participant flow diagram could not be generated. Only patients with complete laboratory data at baseline, 3 months, and 6 months, and without any changes in background antidiabetic therapy during follow-up, were included in the final analysis (n=100). Adherence and treatment persistence were not directly measured in this study. Due to the retrospective design and limitations of the electronic medical record system, the exact number of patients initially screened, excluded, and included at each study stage could not be reliably reconstructed. Therefore, a detailed participant flow diagram with precise counts at each step could not be provided. Only patients with complete laboratory data at baseline, 3 months, and 6 months, and without any changes in background antidiabetic therapy during follow-up, were included in the final analysis (n=100). The main reasons for exclusion were incomplete follow-up data, treatment discontinuation, and changes in concomitant medications; however, their exact frequencies could not be quantified.

2.2. Statistical Analysis

The Kolmogorov-Smirnov test was used to assess whether the data obtained in the study were normally distributed. Data that followed a normal distribution were expressed as mean ± standard deviation (SD). Appropriate parametric tests (e.g., paired t-test or ANOVA) were used to compare parameters measured over time (baseline, 3 months, 6 months) for repeated measurements. Data that did not show a normal distribution were analyzed using non-parametric tests and presented as median and quartile values. The paired t-test or Wilcoxon signed-rank test was used to compare two time points. A p-value <0.05 was considered statistically significant. We acknowledge that regression to the mean may partially explain the observed improvements, given the enrollment criteria. Data analysis was performed using SPSS v26 (IBM Inc., Chicago, IL, USA). Ethical approval for the study was obtained from the Harran University Faculty of Medicine Ethics Committee (date: 21/12/2020, number: 22). Institutional permission was obtained from the hospital where the study was conducted to access the patient records used in the study.

3. Results

The analysis included 100 patients with complete laboratory data at baseline, 3 months, and 6 months. Sixty-six of the patients included in the study were female, and 34 were male. The measurements taken at the start of treatment and at 3 and 6 months were evaluated. The average weight of the patients was 111.1 ± 24.4 kg at the start, decreasing to 104.76 ± 20.81 kg at 6 months. Glucose levels were 184.2 ± 81.9 mg/dL at baseline, with a slight increase (189.3 ± 76.74 mg/dL) observed at the 3rd month and a decrease to 170.78 ± 66.72 mg/dL at the 6th month. White blood cell (WBC), hemoglobin (Hgb), hematocrit (Hct), neutrophil, and lymphocyte values remained stable from baseline through month 6. A slight increase in platelet count (from 306.8 ± 93.4 to 314.47 ± 102.24) was observed. MPV was 8.08 ± 1.1 fl at baseline and gradually decreased during treatment, measuring 7.60 ± 1.05 fl at 6 months. HbA1c values decreased from 68.6 ± 20.3 mmol/mol (8.43 ± 1.86%) to 60.9 ± 16.1 mmol/mol (7.72 ± 1.47%) at month 6, indicating improved glycaemic control. NLR was 2.04 ± 1.02 at baseline, increased to 2.17 ± 1.02 at month 3, and decreased to 2.07 ± 0.97 at month 6. Similarly, PLR was 116.4 ± 46.4 at baseline, increased to 129.73 ± 73.06 at month 3, and decreased to 120.67 ± 44.03 at month 6.

When comparing the baseline and 3-month **(Table 1)** laboratory parameters of the patients included in the study, statistically significant changes were observed in creatinine ($p=0.02$), MPV ($p<0.001$), HbA1c ($p<0.001$), and PLR ($p=0.03$) values. A significant decrease was observed in HbA1c ($p<0.001$) and MPV ($p<0.001$) values, while a significant increase was observed in PLR ($p=0.03$) and creatinine ($p=0.02$) values. **(Tables 2 and 3)** shows a significant decrease

Table 1: Clinical and Laboratory Findings of Patients

Parameter	Baseline	Month 3	Month 6
Age (years)	53.2 ± 9.3	–	–
Glucose (mg/dL)	184.2 ± 81.9	189.3 ± 76.74	170.78 ± 66.72
Creatinine (mg/dL)	0.76 ± 0.10	0.78 ± 0.16	0.78 ± 0.17
ALT (U/L)	25.7 ± 12.9	26.08 ± 15.71	23.55 ± 11.75
Total bilirubin (mg/dL)	0.44 ± 0.30	0.45 ± 0.29	0.46 ± 0.29
Amylase (U/L)	49.3 ± 21.30	52.7 ± 21.46	55.18 ± 20.12
White blood cell count (×10³/μL)	9.01 ± 2.44	9.3 ± 4.56	9.42 ± 5.07
Haemoglobin (g/dL)	13.4 ± 1.95	13.41 ± 1.80	13.41 ± 2.08
Haematocrit (%)	42.72 ± 4.89	42.86 ± 4.72	42.66 ± 4.66
Neutrophil count (×10³/μL)	5.28 ± 1.88	5.27 ± 1.80	5.31 ± 2.04
Lymphocyte count (×10³/μL)	2.80 ± 0.80	2.67 ± 0.88	2.76 ± 0.87
Platelet count (×10³/μL)	306.8 ± 93.4	310.42 ± 93.16	314.47 ± 102.24
MPV (fL)	8.08 ± 1.10	7.80 ± 1.07	7.60 ± 1.05
HbA1c (mmol/mol)	68.6 ± 20.3 (8.43 ± 1.86%)	64.6 ± 17.1 (8.06 ± 1.56%)	60.9 ± 16.1 (7.72 ± 1.4%)
NLR	2.04 ± 1.02	2.17 ± 1.02	2.07 ± 0.97
PLR	116.4 ± 46.4	129.73 ± 73.06	120.67 ± 44.03

ALT, alanine aminotransferase; HbA1c, haemoglobin A1c; MPV, mean platelet volume; NLR, neutrophil-to-lymphocyte ratio; PLR, platelet-to-lymphocyte ratio.

Table 2: Comparison of laboratory parameters before and after 3 months of exenatide treatment

Parameter	Baseline	Month 3	p-value
Glucose (mg/dL)	184.2 ± 81.9	189.3 ± 76.74	0.32
Creatinine (mg/dL)	0.76 ± 0.10	0.78 ± 0.16	0.02
ALT (U/L)	25.7 ± 12.9	26.08 ± 15.71	0.75
Total bilirubin (mg/dL)	0.44 ± 0.30	0.45 ± 0.29	0.24
Amylase (U/L)	49.3 ± 21.30	52.7 ± 21.46	0.12
White blood cell count (×10³/μL)	9.01 ± 2.44	9.3 ± 4.56	0.53
Haemoglobin (g/dL)	13.4 ± 1.95	13.41 ± 1.80	0.92
Haematocrit (%)	42.72 ± 4.89	42.86 ± 4.72	0.68
Neutrophil count (×10³/μL)	5.28 ± 1.88	5.27 ± 1.80	0.94
Lymphocyte count (×10³/μL)	2.80 ± 0.80	2.67 ± 0.88	0.05
Platelet count (×10³/μL)	306.8 ± 93.4	310.42 ± 93.16	0.57
MPV (fL)	8.08 ± 1.10	7.80 ± 1.07	<0.001
HbA1c (mmol/mol)	68.6 ± 20.3 (8.43 ± 1.86%)	64.6 ± 17.1 (8.06 ± 1.56%)	<0.001
NLR	2.04 ± 1.02	2.17 ± 1.02	0.10
PLR	116.4 ± 46.4	129.73 ± 73.06	0.03

ALT, alanine aminotransferase; HbA1c, haemoglobin A1c; MPV, mean platelet volume; NLR, neutrophil-to-lymphocyte ratio; PLR, platelet-to-lymphocyte ratio.

in body weight in patients between before and after exenatide treatment ($p < 0.001$). Significant increases were detected in creatinine ($p=0.03$), bilirubin ($p=0.04$), and amylase ($p<0.001$) levels, whereas ALT levels decreased significantly ($p=0.04$). Although statistically significant changes were observed in creatinine, bilirubin, and amylase levels, no participant exceeded clinically relevant thresholds (e.g., ≥3× the upper limit of normal for amylase), and no clinically significant deterioration in renal function was documented. Significant decreases were observed in MPV and HbA1c during treatment ($p < 0.001$). No significant changes were observed in other parameters.

4. Discussion

This study examined changes in weight, glycaemic parameters, and hematological/inflammatory markers in patients with T2DM receiving exenatide treatment over a 6-month follow-up period. Our findings indicate that exenatide treatment resulted in significant

Table 3: Comparison of laboratory parameters before and after 6 months of exenatide treatment

Parameter	Baseline	Month 6	p-value
Weight (kg)	111.1 ± 24.4	104.76 ± 20.81	<0.001
Glucose (mg/dL)	184.2 ± 81.9	170.78 ± 66.72	0.13
Creatinine (mg/dL)	0.76 ± 0.10	0.78 ± 0.17	0.03
ALT (U/L)	25.7 ± 12.9	23.55 ± 11.75	0.04
Total bilirubin (mg/dL)	0.44 ± 0.30	0.46 ± 0.29	0.04
Amylase (U/L)	49.3 ± 21.3	55.18 ± 20.12	<0.001
White blood cell count (×10³/μL)	9.01 ± 2.44	9.42 ± 5.07	0.44
Haemoglobin (g/dL)	13.4 ± 1.95	13.41 ± 2.08	0.98
Haematocrit (%)	42.72 ± 4.89	42.66 ± 4.66	0.91
Neutrophil count (×10³/μL)	5.28 ± 1.88	5.31 ± 2.04	0.98
Lymphocyte count (×10³/μL)	2.80 ± 0.80	2.76 ± 0.87	0.67
Platelet count (×10³/μL)	306.8 ± 93.4	314.47 ± 102.24	0.27
MPV (fL)	8.08 ± 1.10	7.60 ± 1.05	<0.001
HbA1c (mmol/mol)	68.6 ± 20.3 (8.43 ± 1.86%)	60.9 ± 16.1 (7.72 ± 1.40%)	<0.001
NLR	2.04 ± 1.02	2.07 ± 0.97	0.94
PLR	116.4 ± 46.4	120.67 ± 44.03	0.27

ALT, alanine aminotransferase; HbA1c, haemoglobin A1c; MPV, mean platelet volume; NLR, neutrophil-to-lymphocyte ratio; PLR, platelet-to-lymphocyte ratio.

improvements, particularly in weight loss and HbA1c levels. These results are consistent with previous randomized controlled trials demonstrating the efficacy of GLP-1RAs in glycaemic control and weight management, and further suggest that exenatide may reduce the inflammatory response, as supported by the decrease in MPV and stable trends in NLR and PLR.

Recent research has shown that GLP-1RAs promote weight loss through mechanisms including appetite suppression, delayed gastric emptying, and reduced energy intake [8, 9]. Consistent with the literature, a significant weight reduction was observed at 6 months compared to baseline, supporting this class of drugs as a strong option for improving metabolic control in the context of obesity and diabetes. An average reduction of 0.8 – 1.5% in HbA1c has been reported with GLP-1RAs. In addition to their effects on postprandial glucose levels, GLP-1RAs also reduce fasting plasma glucose [10, 11]. In our study, no significant change in glucose levels was observed in the first 3 months, but a downward trend emerged at 6 months. In contrast, significant decreases in HbA1c levels were observed at both 3 and 6 months. This finding suggests that HbA1c, which reflects longer-term glycaemic control, better reflects treatment efficacy than glucose levels.

T2DM, hypertension, dyslipidemia, obesity, and chronic inflammation, as well as endothelial and platelet dysfunction, are associated with a range of risk factors contributing to an increased risk of atherothrombotic events. Experimental and clinical studies have reported that GLP-1RAs therapy reduces thrombin-induced platelet aggregation and weakens thrombosis [12, 13]. Increases in MPV have been observed in cardiovascular diseases, stroke, respiratory diseases, chronic renal failure, intestinal diseases, rheumatoid diseases, diabetes, and various cancers. It has been suggested that changes in MPV may be considered prognostic factors in these diseases. MPV is an indicator of platelet activation and has also been associated with cardiovascular risk [14]. We did not observe clinically relevant changes in standard hematological indices (WBC, Hb, Hct, platelet count) over 6 months, although the absence of a control group and short follow-up limit definitive safety conclusions. However, in our study, a significant decrease in MPV values was observed at the end of 6 months. This decrease in MPV may be related to the possible anti-inflammatory and cardioprotective effects of exenatide treatment. The absolute reduction in MPV observed in our study was 0.48 fL (from 8.08 to 7.60 fL). Although this change reached statistical significance ($p<0.001$), its clinical relevance warrants careful consideration. Reported analytical variation for MPV measurements typically ranges between 0.2 and 0.4 fL, depending on the laboratory method and anticoagulant used. Therefore, the magnitude of change observed in our cohort appears to exceed routine analytical variability, suggesting a true biological effect. However, this interpretation should be made with caution, as unmeasured confounding factors – particularly concomitant medications and comorbid conditions known to affect platelet activity – may have influenced MPV levels.

A recent meta-analysis of 52 randomized controlled trials demonstrated that GLP-1 receptor agonists are associated with cardiovascular benefit in patients with type 2 diabetes. This has been interpreted as suggesting that GLP-1RAs may reduce systemic inflammation [15]. Although there was no statistically significant change in NLR and PLR values during short-term follow-up and no tendency toward fluctuation, when evaluated in conjunction with the significant decrease in MPV, this suggests a possible improvement in the inflammatory/platelet activation axis. However, comprehensive studies involving a larger number of patients over a longer period are needed to better understand the effect of these parameters on the inflammatory burden. Platelet reactivity is closely linked to endothelial dysfunction, oxidative stress, and metabolic dysregulation in T2DM [1, 16]. Improvements in glycemic control and weight reduction during GLP-1RA therapy may attenuate platelet activation, thereby reducing MPV levels. In addition, experimental and clinical data suggest that GLP-1 receptor activation may exert vasculoprotective

and anti-inflammatory effects by modulating oxidative stress pathways and inflammatory signaling [4], thereby indirectly influencing platelet activity. In contrast, NLR and PLR are composite indices reflecting broader immune-inflammatory balance [17, 18]. However, the interpretation of these findings should be made with caution, as treatment adherence and persistence were not directly measured. The inclusion of patients with complete follow-up and stable therapy may have preferentially selected more adherent individuals, potentially overestimating the observed treatment effects.

These markers may represent more stable components of systemic inflammation and could require longer follow-up duration or more pronounced inflammatory modulation to exhibit measurable change. Therefore, the absence of significant changes in NLR and PLR at 6 months may suggest that exenatide's early effects are more prominent in platelet-related pathways rather than in leukocyte-derived inflammatory ratios. There is no strong evidence in the current literature that GLP-1RAs have a significant adverse effect on liver function tests and renal parameters; on the contrary, there are findings that they may improve kidney-related outcomes and liver-related biomarkers in patients with chronic kidney disease or fatty liver disease [19–21]. Although increases in creatinine (+0.02 mg/dL), bilirubin (+0.02 mg/dL), and amylase (+5.9 U/L) appear statistically significant, the small absolute differences, the concomitant decrease in ALT, and values not exceeding threshold/symptom levels limit the clinical significance of the findings. Therefore, routine laboratory monitoring (creatinine, ALT/AST, bilirubin every 3 – 6 months along with eGFR; addition of lipase if pancreatic enzyme elevation is detected) under exenatide treatment appears beneficial.

5. Limitations

This study has several limitations. Its retrospective single-arm design and the absence of a control group preclude causal inference. Inclusion was limited to patients who maintained stable background therapy and completed 6 months of follow-up, which may have introduced selection and survivor bias. Although several inflammatory indices were evaluated, more specific inflammatory biomarkers were not assessed. Concomitant medications and comorbidities may have influenced metabolic and hematologic parameters despite efforts to include patients with stable regimens. Consequently, conclusions regarding MPV should be interpreted with caution. MPV measurements are known to be influenced by pre-analytical and analytical factors, which may limit generalisability. Multiple comparisons were performed without formal multiplicity adjustment, increasing the risk of type I error. These findings should therefore be interpreted cautiously.

An additional limitation is the lack of direct assessment of treatment, adherence, and persistence. Inclusion was restricted to patients who maintained therapy and had complete follow-up data over 6 months, which may have introduced selection bias. This approach may overrepresent individuals who are more adherent or who tolerate treatment better, thereby limiting the generalizability of the findings to patients who discontinue therapy early or have poor adherence. Moreover, the lack of objective adherence measures (such as pharmacy refill data or validated adherence scales) limits the ability to distinguish true pharmacological effects from the influence of patient behavior. Therefore, the observed improvements may partly reflect adherence-related selection rather than treatment efficacy alone.

In addition, no formal sample size calculation was performed, and the study population was based on the number of available eligible patients. Therefore, the study may have been underpowered to detect small but clinically meaningful differences, particularly in secondary outcomes. The absence of a control group prevents distinguishing treatment effects from regression to the mean, temporal trends in diabetes management, and other confounders.

We did not perform sensitivity analyses to assess the robustness of findings to analytical choices, outliers, or subgroup effects. Future studies should examine whether effects differ by baseline glycaemic control, concomitant medications, or patient demographics. Without a parallel group receiving alternative antidiabetic therapy or standard care alone, it is not possible to definitively attribute the observed changes in MPV, NLR, and PLR solely to exenatide treatment. Potential contributing factors such as concurrent lifestyle modifications, weight loss, regression to the mean, or the natural course of the disease cannot be fully excluded. Therefore, our findings should be interpreted as associative rather than causal. Another important limitation is the inability to provide a fully transparent participant flow with exact numbers at each stage of patient selection. Due to the retrospective design and constraints of the electronic medical record system, the total number of patients initially assessed for eligibility, as well as the exact counts for exclusions and dropouts at each time point, could not be reliably determined. This limits the transparency of the selection process and may introduce selection bias. Future prospective, randomized controlled studies with appropriate comparator groups are needed to clarify whether GLP-1RAs therapy directly modulates inflammation-related hematological indices in patients with T2DM.

6. Conclusion

These findings may not generalize to: (1) patients who discontinue exenatide due to side effects, (2) healthcare settings with different patient populations or practice patterns, (3) patients unable to afford or access exenatide consistently, or (4) those requiring frequent medication adjustments. The single-center design in Turkey may limit applicability to other geographic regions with different patient characteristics. In this retrospective cohort of patients with T2DM, exenatide therapy was associated with improvements in body weight and glycaemic control over 6 months. While MPV showed a modest reduction during follow-up, the absence of detailed data on baseline medications and comorbidities, along with the lack of adherence assessment, limits the ability to attribute this change specifically to exenatide. The decrease in MPV may suggest favorable alterations in platelet activation; however, the clinical cardiovascular implications remain uncertain. Therefore, the findings regarding MPV should be interpreted with caution and considered exploratory and hypothesis-generating rather than confirmatory. Future prospective, randomized controlled studies with appropriate comparator groups are needed to clarify whether GLP-1RAs therapy directly modulates inflammation-related hematological indices in patients with T2DM.

Conflicts of Interest

The authors declare no conflicts of interest.

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This research received no funding from any source.

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None

Ethical approval

This retrospective study was approved by the Harran University Clinical Research Ethics Committee (decision no. HRU/20.22.06; session no. 22; date: 21 December 2020). Institutional permission was also obtained from the hospital where the study was conducted to access patient records. Owing to the retrospective design of the study, the requirement for individual informed consent was waived..

Large Language Model

The authors declare that generative artificial intelligence (AI) tools (ChatGPT, OpenAI) were used to assist in language refinement and grammar checking during the preparation of this manuscript. The authors reviewed and verified all content, and they take full responsibility for the integrity and accuracy of the manuscript.

Authors' Contributions

MAE and ÇC conceived the study and drafted the manuscript. HK, NU, AG, and BDG were responsible for data collection and statistical analysis. MAE, ÇC, and HK contributed to the literature search and critically reviewed the paper. MAE and ÇC supervised the project. All authors contributed to the article and approved the submitted version.

Data Availability

De-identified data underlying this study are available from the corresponding author upon reasonable request and subject to institutional approval.

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