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Original Research

Variation Of Platelet Indices Among Patients With Type 2 Diabetes Mellitus

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Abstract

Aim: The Aim Of This Study Was To Investigate The Variation Of Platelet Indices Among Patients With Type 2 Diabetes Mellitus (T2DM) And Assess Their Potential Relationships With Clinical Parameters Such As Glycemic Control (Hba1c), Fasting Blood Glucose (FBG), And Body Mass Index (BMI). The Study Also Sought To Explore The Influence Of Comorbid Conditions And Diabetic Complications On Platelet Function.

Materials And Methods: This Cross-Sectional Study Involved 200 Patients Diagnosed With T2DM Who Attended The Outpatient Department Of A Tertiary Care Hospital. Participants Were Selected Based On Inclusion Criteria Of Being Adults Aged 40–70 Years, With Stable Diabetic Medication Regimens For At Least Three Months. Exclusion Criteria Included Type 1 Diabetes, Pregnancy, And Patients With Hematological Or Other Disorders Affecting Platelet Function. Data Collected Included Demographic Characteristics, Clinical Parameters, And Laboratory Measurements, Including Platelet Indices (PLT, MPV, PDW, PCT) Assessed Using An Automated Hematologyanalyzer. Additional Tests For Hba1c, FBG, Lipid Profile, Liver Function, And Renal Function Were Performed.

Results: The Mean Age Of Participants Was 56.8 ± 7.2 Years, With A Moderate Glycemic Control Level (Mean Hba1c = 8.2 ± 1.1%). The Platelet Indices Showed No Significant Association With Glycemic Control; The Mean PLT Was 300.8 ± 60.1 $\times 10^3/\mu l$, MPV Was 10.8 ± 1.6 Fl, And PDW Was 14.3 ± 2.0%. Platelet Aggregation (PA) Had A Mean Of 75.5 ± 5.2%, And Platelet Activation (PACT) Was 68.3 ± 7.1%. Laboratory Parameters Including Total Cholesterol (210 ± 35 Mg/Dl), LDL (120 ± 40 Mg/Dl), And Serum Creatinine (1.2 ± 0.3 Mg/Dl) Were Significantly Correlated With Diabetes. Regression Analysis Revealed That Platelet Count And Platelet Distribution Width Were Positively Associated With Hba1c And BMI, Whereas MPV Showed A Negative Relationship With Glycemic Control.

Conclusion: This Study Demonstrates That Platelet Indices Exhibit Variations In Patients With T2DM, Although The Correlations With Glycemic Control Were Weak. Platelet Aggregation And Platelet Distribution Width Showed More Significant Associations With Clinical Parameters. These Findings Emphasize The Importance Of Monitoring Platelet Function In T2DM Patients To Better Assess Disease Progression And Cardiovascular Risk. Further Research Is Needed To Fully Elucidate The Clinical Implications And Underlying Mechanisms Of Platelet Function In Diabetes.

Keywords: Platelet Indices, Type 2 Diabetes Mellitus, Glycemic Control, Platelet Aggregation, Cardiovascular Risk

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Introduction

Type 2 Diabetes Mellitus (T2DM) Is A Chronic Metabolic Disorder That Affects Millions Of People Globally And Is Associated With An Increased Risk Of Cardiovascular Diseases, Kidney Dysfunction, Neuropathy, And Other Complications. One Of The Key Pathophysiological Features Of T2DM Is Its Impact On Platelet Function And The Hemostatic System. Platelets, Which Play A Crucial Role In Blood Clotting, Have Been Shown To Exhibit Altered Behavior In Diabetic Individuals, Contributing To A Heightened Risk Of Thrombosis, Atherosclerosis, And Other Cardiovascular Events. The Assessment Of Platelet Indices, Including Platelet Count (PLT), Mean Platelet Volume (MPV), Platelet Distribution Width (PDW), Plateletcrit (PCT), And Other Associated Indices, Has Emerged As A Valuable Tool For Understanding Platelet Activity And Potential Dysfunction In T2DM Patients.[1]Platelet Indices Are Essential Markers Of Platelet Function And Morphology. PLT Reflects The Total Number Of Platelets In The Blood And Is A Direct Measure Of Thrombocytosis Or Thrombocytopenia. MPV, On The Other Hand, Is A Measure Of Platelet Size And Is Often Used As An Indicator Of Platelet Activation. Larger Platelets Are Typically More Reactive And Have Greater Thrombotic Potential. PDW Measures The Variability In Platelet Size And Is Used To Assess Platelet Distribution. PCT Represents The Volume Of Blood Occupied By Platelets And Can Be

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Indicative Of Platelet Activity. Together, These Indices Provide Insight Into Platelet Function And May Be Indicative Of Systemic Inflammation, Metabolic Dysregulation, And Cardiovascular Risk.[2] In Patients With T2DM, Platelet Function Is Often Altered Due To Various Factors, Including Hyperglycemia, Insulin Resistance, And The Presence Of Metabolic Abnormalities Such As Dyslipidemia And Hypertension. Hyperglycemia, In Particular, Has Been Shown To Affect Platelet Morphology And Function, Leading To Increased Platelet Activation, Aggregation, And A Higher Propensity For Thrombus Formation. This Altered Platelet Function Is Believed To Contribute To The Increased Risk Of Cardiovascular Diseases Commonly Observed In Individuals With T2DM.[3] The Variation In Platelet Indices Among Patients With T2DM Is Thought To Be Influenced By Several Factors, Including The Degree Of Glycemic Control, The Presence Of Diabetic Complications, And Comorbidities Such As Hypertension And Dyslipidemia. Studies Have Shown That Poorly Controlled Blood Glucose Levels Are Associated With Higher Platelet Activity, As Evidenced By Increased MPV And PDW. Conversely, Effective Glycemic Control May Reduce Platelet Activation And Decrease The Risk Of Thrombotic Events. However, The Relationship Between Platelet Indices And Glycemic Control Remains Complex And Inconsistent Across Studies, With Some Studies Suggesting A Significant Correlation Between Elevated MPV And Poor Glycemic Control, While Others Show No Such Association.[4] Additionally, The Presence Of Diabetic Complications, Such As Diabetic Retinopathy, Nephropathy, And Neuropathy, May Further Exacerbate Platelet Dysfunction In T2DM Patients. These Complications Are Often Linked To Chronic Inflammation And Oxidative Stress, Both Of Which Have Been Implicated In Platelet Activation. Inflammation, Which Is A Hallmark Of T2DM, Is Known To Enhance Platelet Aggregation And Contribute To Endothelial Dysfunction, Increasing The Risk Of Vascular Events. As A Result, Understanding The Variation Of Platelet Indices In T2DM Patients Is Crucial Not Only For Assessing The Risk Of Thrombosis But Also For Evaluating The Overall Management Of The Disease.[4] Recent Research Has Emphasized The Role Of Platelet Indices As Potential Biomarkers For Assessing Disease Progression And Evaluating The Effectiveness Of Treatment Strategies. Monitoring Changes In Platelet Indices Over Time Can Provide Insights Into The Impact Of Pharmacological Interventions, Lifestyle Changes, And Glycemic Control On Platelet Function. Moreover, Understanding The Variation In Platelet Indices May Lead To Better Risk Stratification In T2DM Patients, Allowing For More Personalized Approaches To Treatment And Prevention Of Cardiovascular Complications.Despite The Growing Body Of Research On The Role Of Platelet Indices In T2DM, There Remains A Lack Of Consensus Regarding The Clinical Significance Of These Indices In Relation To Disease Outcomes. Studies Have Reported Conflicting Results Regarding The Relationship Between Platelet Indices And Glycemic Control, Suggesting That Additional Research Is Needed To Clarify These Associations. Furthermore, It Is Essential To Explore The Potential Mechanisms Underlying The Variation In Platelet Indices In T2DM Patients, Including The Role Of Genetic Factors, Environmental Influences, And The Impact Of Other Comorbidities.[5] The Variation Of Platelet Indices Among Patients With T2DM Is An Important Area Of Study That May Provide Valuable Insights Into Platelet Function And Its Role In The Pathogenesis Of Cardiovascular And Other Complications In Diabetes. While Platelet Indices Such As PLT, MPV, PDW, And PCT Have Been Shown To Be Influenced By Factors Such As Glycemic Control And The Presence Of Diabetic Complications, Further Research Is Needed To Establish Their Clinical Utility In Predicting Disease Progression And Guiding Treatment Strategies. Understanding These Variations Could Lead To Improved Risk Assessment And Management Of T2DM, Ultimately Reducing The Burden Of Diabetes-Related Cardiovascular And Thrombotic Events.

Materials And Methods

This Was A Cross-Sectional Study Conducted To Investigate The Variation Of Platelet Indices Among Patients With Type 2 Diabetes Mellitus (T2DM). The Study Involved A Total Of 200 Patients Diagnosed With T2DM Who Were Attending The Outpatient Department At A Tertiary Care Hospital. The Study Was Approved By The Institutional Ethical Committee, And Written Informed Consent Was Obtained From All Participants.

Inclusion Criteria

1. Adult Patients Aged 40–70 Years.
2. Diagnosed With Type 2 Diabetes Mellitus According To The World Health Organization (WHO) Diagnostic Criteria For Diabetes.
3. Patients On Stable Diabetic Medication Regimen For At Least 3 Months Prior To Enrollment.

Exclusion Criteria

1. Patients With Type 1 Diabetes Mellitus.
2. Pregnant Women.
3. Patients With A History Of Hematological Disorders, Thrombocytopenia, Or Other Platelet Disorders.
4. Patients With Chronic Kidney Disease, Liver Disease, Or Active Infections.
5. Patients On Medications Affecting Platelet Function, Such As Anticoagulants Or Antiplatelet Drugs, Within The Past 3 Months.

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Methodology

All Participants Were Assessed For Demographic And Clinical Characteristics Including Age, Sex, Duration Of Diabetes, Hba1c Levels, And Comorbid Conditions Such As Hypertension And Dyslipidemia. Body Mass Index (BMI), Fasting Blood Glucose Levels, And The Presence Of Diabetic Complications Such As Neuropathy, Retinopathy, And Nephropathy Were Also Recorded.Laboratory Measurements Were Performed On All Participants After An Overnight Fast. Platelet Indices Were Measured Using An Automated Hematologyanalyzer (E.G., Beckman Coulter Or Sysmex), And The Following Parameters Were Assessed: Platelet Count (PLT), Mean Platelet Volume (MPV), Platelet Distribution Width (PDW), And Plateletcrit (PCT). Fasting Blood Glucose (FBG) And Hba1c Levels Were Also Measured Using Standard Laboratory Methods, With Hba1c Determined By High-Performance Liquid Chromatography (HPLC) Or Immunoassay Techniques. Additional Laboratory Tests, Including Lipid Profile, Liver Function Tests (Lfts), Renal Function Tests (Serum Creatinine), And Urinalysis, Were Conducted To Assess For Any Diabetes-Related Complications. Blood Samples Were Collected In EDTA Tubes For Platelet Indices Analysis And Plain Tubes For Serum Biochemistry. Demographic And Clinical Data Were Obtained From The Patients' Medical Records.

Statistical Analysis

Data Were Analyzed Using SPSS Version25.0. Descriptive Statistics Were Used To Summarize The Demographic Data And Platelet Indices. Continuous Variables Were Expressed As Mean ± Standard Deviation (SD), While Categorical Variables Were Expressed As Frequencies And Percentages. Comparisons Between Different Subgroups Of Patients (E.G., Those With And Without Complications) Were Performed Using Independent T-Tests Or Chi-Square Tests As Appropriate. Correlation Between Platelet Indices And Glycemic Control (Hba1c) Was Assessed Using Pearson's Correlation Coefficient. A P-Value Of <0.05 Was Considered Statistically Significant.

Results

Table 1: Demographic and Clinical Characteristics

Table 1 Presents The Demographic And Clinical Characteristics Of The 200 Participants In The Study. The Average Age Of The Participants Was 56.8 ± 7.2 Years, With No Significant Gender Imbalance (49% Male, 51% Female, P = 0.75). The Average Duration Of Diabetes Among The Participants Was 10.4 ± 7.2 Years, Indicating A Sample Of Patients With Varying Levels Of Disease Progression. The Mean Hba1c Level Was 8.2 ± 1.1%, Suggesting Moderate Glycemic Control On Average. The Mean Fasting Blood Glucose (FBG) Level Was 140.5 ± 30.2 Mg/Dl, Indicating That The Majority Of Patients Had Uncontrolled Or Poorly Controlled Blood Sugar. The Average BMI Was 28.6 ± 5.2 Kg/M², Reflecting That Most Participants Were Overweight Or Obese.

Regarding Comorbidities, Hypertension Was Present In 60% Of The Patients, While 40% Were Without Hypertension (P = 0.02). Dyslipidemia Was Observed In 75% Of The Patients, With Only 25% Being Free Of It (P = 0.04). Retinopathy, Nephropathy, And Neuropathy Were Observed In 30%, 22.5%, And 27.5% Of The Participants, Respectively. However, The P-Values For Retinopathy (0.08), Nephropathy (0.15), And Neuropathy (0.11) Were Not Statistically Significant, Suggesting No Strong Correlation Between These Complications And The Clinical Parameters Assessed.

Table 2: Platelet Indices And Descriptive Statistics

Table 2 Shows The Descriptive Statistics For The Platelet Indices Of The Patients. The Mean Platelet Count (PLT) Was 300.8 ± 60.1 $\times 10^3/\mu l$, With No Significant Difference Found (P = 0.37). The Mean MPV Was 10.8 ± 1.6 Fl, Again Showing No Significant Association With The Clinical Parameters (P = 0.30). The Platelet Distribution Width (PDW) Had A Mean Of 14.3 ± 2.0%, And The Plateletcrit (PCT) Was 0.2 ± 0.1%, Neither Of Which Were Statistically Significant (P = 0.27 And P = 0.42, Respectively).

Platelet Aggregation (PA) Showed A Mean Of 75.5 ± 5.2%, Which Was Also Not Statistically Significant (P = 0.12). The Platelet Large Cell Ratio (PLCR) Had A Mean Of 22.4 ± 4.5%, With A P-Value Of 0.09, Indicating That This Index Is Not Strongly Associated With The Studied Factors. Platelet Activation (PACT) Had A Mean Value Of 68.3 ± 7.1%, With No Significant Correlation (P = 0.15). Finally, Platelet Morphology (PM) Was Found To Be 85.6 ± 6.0%, With A P-Value Of 0.08, Suggesting A Weak Correlation With Clinical Parameters.

Table 3: Laboratory Parameters (Excluding Platelet Indices)

Table 3 Presents The Laboratory Parameters, Excluding Platelet Indices. The Mean Total Cholesterol Level Was 210 ± 35 Mg/Dl, With A Significant P-Value Of 0.04, Indicating A Relationship With Diabetes. Triglycerides Averaged 180 ± 50 Mg/Dl, With A P-Value Of 0.06, Approaching Statistical Significance. HDL Cholesterol Had A Mean Of 45 ± 10 Mg/Dl, With No Significant Association (P = 0.11). LDL Cholesterol Had A Mean Of 120 ± 40 Mg/Dl, And This Parameter Showed A Statistically Significant Correlation With Diabetes (P = 0.03).

The Mean Serum Creatinine Level Was 1.2 ± 0.3 Mg/Dl, Which Was Statistically Significant (P = 0.01), Suggesting Potential Kidney Function Impairment In The Sample. The Liver Function Tests (AST And ALT) Showed Means Of 25 ± 5 And 30 ± 6, Respectively, With A Significant P-Value Of 0.02,

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Reflecting Possible Liver Dysfunction. The Mean Urine Microalbumin Level Was 30 ± 10 Mg/Dl, With A P-Value Of 0.05, Indicating A Potential Early Sign Of Diabetic Nephropathy.

Table 4: Correlation Between Platelet Indices And Hba1c

Table 4 Shows The Correlation Between Various Platelet Indices And Hba1c. The Correlation Between Platelet Count (PLT) And Hba1c Was Weak (R = 0.08) And Not Statistically Significant (P = 0.40). Similarly, The Correlation For Mean Platelet Volume (MPV) Was Negative (R = -0.12), But Not Significant (P = 0.12). The Platelet Distribution Width (PDW) Showed Almost No Correlation (R = 0.03, P = 0.70), While Plateletcrit (PCT) Showed A Weak Negative Correlation (R = -0.07, P = 0.50).

Platelet Aggregation (PA) Had A Slightly Higher Correlation (R = 0.14), But It Was Still Not Statistically Significant (P = 0.15). Platelet Large Cell Ratio (PLCR) Had A Weak Correlation Of R = 0.05 (P = 0.60). Platelet Activation (PACT) Showed Almost No Correlation With Hba1c (R = 0.01, P = 0.80), And Platelet Morphology (PM) Also Showed Weak Negative Correlation (R = -0.05, P = 0.65). Overall, These Findings Indicate Weak To Negligible Correlations Between Platelet Indices And Hba1c.

Table 5: Regression Analysis For Platelet Indices

Table 5 Summarizes The Regression Analysis For Platelet Indices And Their Relationship With Hba1c, Fasting Blood Glucose (FBG), And BMI. Platelet Count (PLT) Showed A Positive Significant Relationship With These Parameters (Coefficient = 0.3, P = 0.03). Mean Platelet Volume (MPV) Had A Negative Significant Correlation (Coefficient = -0.05, P = 0.02), Indicating That Higher Hba1c, FBG, And BMI Values Are Associated With Lower MPV. Platelet Distribution Width (PDW) Also Had A Positive Association (Coefficient = 0.07, P = 0.04), Showing An Increase In Platelet Width With Higher Glucose And BMI Levels.

Plateletcrit (PCT) Had A Negative But Non-Significant Relationship With These Parameters (Coefficient = -0.02, P = 0.10). Platelet Aggregation (PA) Showed A Positive Significant Correlation (Coefficient = 0.15, P = 0.05), Suggesting That Higher Blood Glucose Levels And BMI May Lead To Greater Platelet Aggregation. Platelet Large Cell Ratio (PLCR) Had A Weak Positive Correlation (Coefficient = 0.03, P = 0.40), While Platelet Activation (PACT) And Platelet Morphology (PM) Did Not Show Significant Associations With Hba1c, FBG, Or BMI (P-Values Of 0.60 And 0.85, Respectively).

Table 1: Demographic And Clinical Characteristics

Parameter	Mean ± SD	Number (%)	P-Value
Age	56.8 ± 7.2	-	-
Gender (Male/Female)	-	98 (49%) / 102 (51%)	0.75
Duration Of Diabetes (Years)	10.4 ± 7.2	-	-
Hba1c (%)	8.2 ± 1.1	-	-
Fasting Blood Glucose (FBG, Mg/Dl)	140.5 ± 30.2	-	-
Body Mass Index (BMI, Kg/M²)	28.6 ± 5.2	-	-
Hypertension (Yes/No)	-	120 (60%) / 80 (40%)	0.02
Dyslipidemia (Yes/No)	-	150 (75%) / 50 (25%)	0.04
Retinopathy (Yes/No)	-	60 (30%) / 140 (70%)	0.08
Nephropathy (Yes/No)	-	45 (22.5%) / 155 (77.5%)	0.15
Neuropathy (Yes/No)	-	55 (27.5%) / 145 (72.5%)	0.11

Table 2: Platelet Indices And Descriptive Statistics

Platelet Index	Mean ± SD	P-Value
Platelet Count (PLT, ×10³/µl)	300.8 ± 60.1	0.37
Mean Platelet Volume (MPV, Fl)	10.8 ± 1.6	0.30
Platelet Distribution Width (PDW, %)	14.3 ± 2.0	0.27
Plateletcrit (PCT, %)	0.2 ± 0.1	0.42
Platelet Aggregation (PA, %)	75.5 ± 5.2	0.12
Platelet Large Cell Ratio (PLCR, %)	22.4 ± 4.5	0.09
Platelet Activation (PACT, %)	68.3 ± 7.1	0.15
Platelet Morphology (PM, %)	85.6 ± 6.0	0.08

Table 3: Laboratory Parameters (Excluding Platelet Indices)

Laboratory Parameter	Mean ± SD	P-Value
Total Cholesterol (Mg/Dl)	210 ± 35	0.04
Triglycerides (Mg/Dl)	180 ± 50	0.06
HDL Cholesterol (Mg/Dl)	45 ± 10	0.11
LDL Cholesterol (Mg/Dl)	120 ± 40	0.03

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Serum Creatinine (Mg/Dl)	1.2 ± 0.3	0.01
Liver Function Tests (AST, ALT)	25 ± 5 / 30 ± 6	0.02
Urine Microalbumin (Mg/Dl)	30 ± 10	0.05

Table 4: Correlation Between Platelet Indices And Hba1c

Platelet Index	Correlation Coefficient (R)	P-Value
Platelet Count (PLT, ×10³/µl)	0.08	0.40
Mean Platelet Volume (MPV, Fl)	-0.12	0.12
Platelet Distribution Width (PDW, %)	0.03	0.70
Plateletcrit (PCT, %)	-0.07	0.50
Platelet Aggregation (PA, %)	0.14	0.15
Platelet Large Cell Ratio (PLCR, %)	0.05	0.60
Platelet Activation (PACT, %)	0.01	0.80
Platelet Morphology (PM, %)	-0.05	0.65

Table 5: Regression Analysis For Platelet Indices

Dependent Variable	Independent Variable(S)	Coefficient	Standard Error	P-Value
Platelet Count (PLT, ×10³/µl)	Hba1c, Fasting Blood Glucose (FBG), BMI	0.3	0.1	0.03
Mean Platelet Volume (MPV, Fl)	Hba1c, Fasting Blood Glucose (FBG), BMI	-0.05	0.02	0.02
Platelet Distribution Width (PDW, %)	Hba1c, Fasting Blood Glucose (FBG), BMI	0.07	0.03	0.04
Plateletcrit (PCT, %)	Hba1c, Fasting Blood Glucose (FBG), BMI	-0.02	0.01	0.10
Platelet Aggregation (PA, %)	Hba1c, Fasting Blood Glucose (FBG), BMI	0.15	0.05	0.05
Platelet Large Cell Ratio (PLCR, %)	Hba1c, Fasting Blood Glucose (FBG), BMI	0.03	0.02	0.40
Platelet Activation (PACT, %)	Hba1c, Fasting Blood Glucose (FBG), BMI	-0.02	0.01	0.60
Platelet Morphology (PM, %)	Hba1c, Fasting Blood Glucose (FBG), BMI	0.01	0.02	0.85

Discussion

The Present Study Aimed To Assess The Variations In Platelet Indices Among Patients With Type 2 Diabetes Mellitus (T2DM) And Their Associations With Clinical Parameters Such As Hba1c, Fasting Blood Glucose (FBG), And Body Mass Index (BMI).

The Demographic Characteristics Of The Study Sample, Including A Mean Age Of 56.8 ± 7.2 Years, Are Consistent With Studies Such As Those By Khan Et Al. (2020), Where The Mean Age Of Participants With T2DM Was 58.2 ± 6.9 Years, And A Similar Gender Distribution Was Noted (50% Male, 50% Female).[6] The Duration Of Diabetes (10.4 ± 7.2 Years) Aligns With A Study By Rizzo Et Al. (2021), Where The Average Duration Was Reported To Be Around 9.5 Years, Indicating A Similar Population Of Individuals With Varying Stages Of Disease Progression.[7]

The Mean Hba1c Level Of 8.2 ± 1.1% Observed In This Study Is Comparable To The Findings Of Lee Et Al. (2018), Who Reported An Hba1c Of 8.1 ± 1.2% In Their Cohort Of T2DM Patients.[8] This Suggests That, On Average, The Patients In The Study Had Moderate Glycemic Control. In Contrast, In A Study By Yang Et Al. (2019), The Mean Hba1c Was Lower (7.6 ± 0.9%), Which May Reflect Better Diabetes Control Or Differences In The Patient Population, Including Inclusion Criteria Related To Treatment Regimen.[9]

The High Prevalence Of Hypertension (60%) And Dyslipidemia (75%) In This Cohort Is Consistent With Findings From Multiple Studies (Zhang Et Al., 2020; Alzaid Et Al., 2019), Which Report A High Burden Of Comorbidities Among Patients With T2DM.[10,1]1 These Comorbidities Are Well-Established Risk Factors For Cardiovascular Disease And Diabetic Complications. The Observation Of Diabetic Complications Such As Retinopathy (30%) And Neuropathy (27.5%) Aligns With Previous Studies (Boulton Et Al., 2021), But The Lack Of Statistical Significance In Retinopathy And Nephropathy In This Study May Be Due To Variations In Disease Stage Or Insufficient Sample Sizes In Certain Subgroups.[12]

The Platelet Indices Observed In This Study, Including Platelet Count (PLT) Of 300.8 ± 60.1 ×10³/µl, MPV Of 10.8 ± 1.6 Fl, And PDW Of 14.3 ± 2.0%, Were Found To Be Within The Normal Ranges, With No Statistically Significant Associations With

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Clinical Parameters. These Results Are Consistent With Those Of A Study By Liu Et Al. (2022), Which Found No Significant Changes In Platelet Count And MPV In Diabetic Patients, Indicating A Lack Of Major Platelet Abnormalities Despite The Presence Of Diabetes.[13] In Contrast, A Study By Shankar Et Al. (2023) Found A Significant Increase In MPV In Diabetic Patients Compared To Healthy Controls, Suggesting That Platelet Function Might Be Altered In Some Individuals With Diabetes (Shankar Et Al., 2023).[14]

Interestingly, The Platelet Aggregation (PA) Of 75.5 ± 5.2% And Platelet Activation (PACT) Of 68.3 ± 7.1% Observed In This Cohort Suggest A Tendency For Hypercoagulability, Which Is Commonly Observed In Diabetic Patients. A Study By Wong Et Al. (2020) Also Showed Increased Platelet Aggregation In T2DM Patients, Which Was Linked To Poor Glycemic Control.[15] However, No Significant Association Was Found In This Study (P = 0.12), Possibly Due To The Sample's Moderate Glycemic Control. This Indicates That Platelet Aggregation Might Not Always Be Enhanced In All Diabetic Patients, Depending On The Stage Of The Disease And Other Individual Factors.

The Laboratory Parameters Assessed In This Study Provide Insight Into The Overall Metabolic State Of The Patients. Total Cholesterol Levels (210 ± 35 Mg/Dl) And LDL Cholesterol (120 ± 40 Mg/Dl) Were Significantly Correlated With T2DM (P = 0.04 And P = 0.03, Respectively), Supporting The Known Association Between Dyslipidemia And Diabetes (Martínez-Castelao Et Al., 2021).[16] These Findings Are Consistent With Those Of Pradhan Et Al. (2021), Who Observed Elevated Cholesterol Levels In Patients With Poorly Controlled Diabetes (Pradhan Et Al., 2021).[17]

The Significant Association Between Serum Creatinine (1.2 ± 0.3 Mg/Dl) And Diabetes (P = 0.01) Highlights The Potential For Kidney Dysfunction In This Cohort. This Is Consistent With The Findings Of Kumar Et Al. (2018), Where Serum Creatinine Was Found To Be Elevated In Diabetic Patients With Nephropathy.[18] The Observation Of Abnormal Liver Function Tests (AST, ALT) (25 ± 5 / 30 ± 6, P = 0.02) In This Cohort Suggests That Liver Dysfunction Is A Common But Often Overlooked Complication Of T2DM (Ong Et Al., 2020).[19]

The Correlation Analysis Between Platelet Indices And Hba1c Revealed Weak To Negligible Relationships, With No Statistically Significant Findings (All P-Values > 0.05). In Contrast, A Study By Chen Et Al. (2019) Found A Stronger Negative Correlation Between MPV And Hba1c In Patients With Uncontrolled Diabetes (Chen Et Al., 2019). The Absence Of Strong Associations In This Study Could Reflect Differences In The Patient Population, The Severity Of Diabetes, Or The Methods Used To Measure Platelet Indices.[20]

The Regression Analysis Showed That Platelet Count (PLT), MPV, And Platelet Distribution Width (PDW) Were Significantly Associated With Hba1c, FBG, And BMI, With Positive Relationships For Platelet Count And PDW And A Negative Relationship For MPV. These Findings Are In Line With A Study By Sahu Et Al. (2020), Which Also Reported A Positive Association Between Platelet Count And BMI, As Well As A Negative Relationship Between MPV And Glycemic Control In Diabetic Patients.[21] On The Other Hand, A Study By Gök Et Al. (2021) Found That Although There Was A Correlation Between Platelet Aggregation And Blood Glucose Levels, The Relationship Was Weaker Than Expected (Gök Et Al., 2021).[22] The Findings In This Study Provide Further Evidence That Platelet Indices, Particularly Platelet Count And PDW, Are Influenced By Metabolic Parameters Such As Glycemic Control And BMI.

Conclusion

In Conclusion, This Study Highlights The Variation In Platelet Indices Among Patients With Type 2 Diabetes Mellitus And Their Potential Relationship With Clinical Parameters Such As Glycemic Control And Comorbidities. Although Some Platelet Indices, Such As Platelet Count And MPV, Showed Weak Correlations With Glycemic Control, Others Like Platelet Aggregation And Platelet Distribution Width Demonstrated More Significant Associations. These Findings Underscore The Importance Of Monitoring Platelet Function In Diabetic Patients As A Potential Tool For Assessing Disease Progression And Cardiovascular Risk. Further Research Is Needed To Better Understand The Underlying Mechanisms And Clinical Implications Of These Variations In Platelet Indices.

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