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Pathology Section

Assessment of Haematological and Lipid Profile Parameters in Patients with Ischaemic Heart Disease: A Cross-sectional Study

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ABSTRACT

Introduction: Ischaemic Heart Disease (IHD) remains a leading cause of morbidity and mortality worldwide. Its multifactorial pathophysiology involves atherosclerosis, endothelial dysfunction, and alterations in haematological and lipid profile parameters. Evaluating these parameters may offer insight into disease progression and potential risk factors.

Aim: To evaluate the haematological variations and lipid profiles in patients with IHD.

Materials and Methods: The present retrospective cross-sectional study was conducted over 12 months from April 2024 to April 2025 at the Central Laboratory of Yenepoya Medical College Hospital, Mangalore, Karnataka, India after the approval of Yenepoya Ethics Committee-2 (YEC-2). Retrospective data of 95 patients diagnosed with Ischaemic heart disease, aged 25-70 years, were randomly retrieved from the Laboratory Information System (Backbone). Patients with diabetes, renal, autoimmune, or inflammatory conditions were excluded. Haematological (Haemoglobin(Hb), Red Blood Cell(RBC), White Blood Cell (WBC), Neutrophil, Lymphocyte, Packed Cell Volume (PCV), Erythrocyte Sedimentation Rate (ESR), Platelet, Red cell Distribution Width (RDW)) and Lipid profile (Total Cholesterol, High Density Lipoprotein(HDL), Low Density Lipoprotein(LDL), Very Low Density Lipoprotein(VLDL), Triglycerides) parameters were analysed to assess their association with IHD. Statistical analysis was carried out to evaluate the association between haematological parameters and lipid profiles in order to determine their correlation with IHD. Data were expressed as mean±standard deviation. Pearson's correlation (Independent sample t-test) was used to assess relationships between haematological parameters and lipid profiles. A p-value ≤0.05 was considered significant. The data were analysed using Statistical Package for Social Sciences (SPSS) software version 27.

Results: The mean patients age was 54.6±10 years, with 70 males (73.7%) and 25 females (26.3%). Anaemia was observed with a mean Hb of 12.25±2.245 g/dL. Elevated ESR (37.28±27.837 mm/hr) and increased RDW (15.03±6.308 %) were also noted. Lipid profiles showed low HDL (37.6±21.6 mg/dL) and high TG (165.3±84.7 mg/dL), particularly in males. Significant positive correlations were noted between Hb and TG (r=0.25, p=0.01), Hb and VLDL (r=0.23, p=0.02), LYMPH and HDL (r=0.27, p=0.01), and ESR and HDL (r=0.21, p=0.04). Females had significantly lower Hb and PCV; lipid differences by gender were not statistically significant.

Conclusion: Alterations in haematological indices and lipid profiles are prominent among IHD patients, suggesting their utility in early risk assessment. Hb and LYMPH count showed significant associations with lipid parameters, highlighting the interplay between inflammation and lipid metabolism. Incorporating haematological and lipid evaluation in routine screenings may enhance early detection and management of IHD. Further large-scale, multicentre, prospective studies are recommended.

Keywords: Atherosclerosis, Coronary artery disease, Endothelial dysfunction

INTRODUCTION

Ischaemia refers to insufficient blood supply to a specific area, typically due to the blockage of blood vessels. Ischaemic Heart Disease (IHD), also known as Coronary Heart Disease (CHD) or Coronary Artery Disease (CAD), occurs when the heart muscle does not receive enough blood and oxygen. This condition is primarily caused by narrowed coronary arteries, often due to the accumulation of plaque, a condition known as Atherosclerosis [1]. An imbalance in the blood supply and the oxygen demand of the heart induces the great majority of cases of IHD [2].

Heart diseases, like IHD, are the primary causes of worldwide fatalities, accounting for 17.7 million deaths [3]. India's Cardiovascular Disease (CVD) death rate (272 per 100,000 population) is higher than the global average (235), with Indians experiencing cardiovascular issues a decade earlier than those in Western countries [4].

The growing occurrence of IHD is expected to persist due to the increasing prevalence of obesity, diabetes, and metabolic syndrome, as well as the aging population [5]. IHD constitutes over 50% of cardiovascular events in individuals under the age of 75 years, with a lifetime risk of 49% for men and 32% for women after the age of 40 years [1]. Factors such as challenges in social relationships, psychological distress, and insufficient sleep (less than six hours a night) also contribute to IHD in the current generation [6].The incidence and prevalence of IHD vary by age, gender, and geographic location [7].The risk factors for IHD include non-modifiable risk factors such as age, gender, and family history, as well as modifiable factors like high blood cholesterol.For efficient health care planning and prevention, it is essential to identify both modifiable and non-modifiable risk factors for IHD [8].

Nearly all cellular components of blood, including White Blood Cells, Red Blood Cells, and Platelets (PLTs), contribute to the pathogenesis of atherosclerosis and its associated complications. Haematological parameters influence the pathogenesis of IHD by altering blood viscosity, oxygen delivery, and inflammatory status. Changes in Hb, RBC indices, WBC counts, ESR, RDW, and PLT contribute to atherosclerosis, plaque instability, and thrombosis, thereby driving

disease progression and clinical outcomes.These elements are not only involved in the progression of CHD but also serve as potential predictors of recurrent cardiovascular events and mortality in individuals with a prior CHD diagnosis [9]. Routine blood tests play a key role in early disease detection, providing valuable information to doctors about inflammatory processes. Consequently, monitoring these haematological parameter changes can play a vital role in the diagnosis and risk stratification of IHD [10].

There is a growing need for readily accessible, cost-effective, and universally applicable clinical parameters that can help identify patients at risk of mortality. The lipid profile is a commonly performed set of tests used to assess the risk of CVD. As reliable biomarkers, lipid profile parameters are crucial in cardiovascular risk stratification [11]. Various haematological parameters are being studied as diagnostic and prognostic markers for ACS. These haematological indices are readily accessible, cost-effective, and have been evaluated for their diagnostic and prognostic significance in various diseases, including CAD [12].

Numerous studies have been concerned about abnormal levels of lipid profiles, which is the main reason for the progression of IHD [13,14]. Various studies are estimating the haematological parameters in patients with IHD but there is a paucity of studies correlating both parameters in these patients. Hence, the present study aimed to bridge this gap by evaluating the haematological and lipid profiles parameters in patients with IHD and to correlate the results between these parameters among the patients. Accordingly, the objectives of the study were: (1) To estimate the haematological parameters in IHD patients in a tertiary care hospital, (2) To estimate the lipid profiles in IHD patients in a tertiary care hospital, and (3) To correlate the haematological parameters and lipid profiles in IHD patients in a tertiary care hospital. In addition, gender-based comparisons were carried out, since haematological and lipid variations are known to differ between males and females, which may influence cardiovascular risk and disease presentation.

MATERIALS AND METHODS

The present retrospective cross sectional study was conducted in the Central Laboratory of Yenepoya Medical College Hospital, Mangalore, Karnataka, India. The study was carried out over 12 months, from April 2024 to April 2025. Ethical clearance for the study was obtained from the Yenepoya Ethics Committee – 2 (2024/131) following approval from the Scientific Review Board. A waiver of consent was granted as the study involved retrospective data collection.

Inclusion and Exclusion Criteria: The study included patients diagnosed with IHD, aged between 25 and 70 years, of both sexes, who were admitted to the inpatient department. Patients with comorbid conditions such as diabetes mellitus, chronic muscle disease, renal disease, autoimmune disorders, arthritis, any inflammatory condition, recent surgery, or any other illness apart from IHD were excluded from the study.

Sample size calculation: The sample size for the present study was computed based on the estimates of haematological parameters reported by Rathore A et al., [15]. The sample size was based on the most inconsistent parameter, which was decided based on the coefficient of variation. The following formula was used to compute the sample size:

$$n=\frac{(Z^2\ \sigma^2)}{E^2}$$

Where Z=1.96, the standard normal score

σ=9.7, the anticipated variation of Lymphocyte

E=1.95, 10% relative precision of mean Lymphocyte

In order to estimate the haematological parameters, with a 95% level of confidence, and 10% relative precision, 95 subjects must be included in the study.

Study Procedure

Patient identities were delinked to ensure confidentiality. Data from the period of January 2022 to January 2023 were retrieved from the Laboratory Information System (LIS)at XXXX Medical College Hospital using the Backbone software. Computerized haematological and lipid profile data, generated by the automated analysers- including the SYSMEX XN-1000 Haematology analyser, Vesmatic Cube 30 ESR analyser and Vitros 5600 Biochemical analyser-were obtained through the Central Laboratory and the Medical Record Department.

Diagnosis of IHD was established based on clinical records, which incorporated cardiologist-confirmed evaluation using standard criteria: history of angina or myocardial infarction, supportive ECG changes (ST-segment/T-wave abnormalities), elevated cardiac biomarkers (Troponin I/T, CK-MB), and/or evidence from echocardiography or coronary angiography where available.

The haematological parameters assessed included Hb (M:13-17g/dL; F:12-15g/dL), RBC count (M:4.4-6.0 million/cumm; F:3.8-5.0 million/cumm), WBC count (4-11×10^9/μL), NEU count (40-75%), LYMPH count (25-40%), PCV (M: 38-47% ; F: 36-46%), ESR (M:0-10mm/hr; F:0–20 mm/hr), PLT count (150-450 ×10^9 /μL), and RDW (11-15%).The Lipid profile parameters included TC (0-200mg/dL), HDL(40-60mg/dL), LDL(0-100mg/dL), VLDL(0-30mg/dL), and TG(0-150mg/dL).

STATISTICAL ANALYSIS

Data entry was performed using Microsoft Excel. The collected data were summarised by using the descriptive statistics: frequency, percentage; mean and S.D. The Pearson correlation coefficient ("r") was used to find the relation between the haematological parameters and lipid profiles. The Independent sample "t" test was used to compare haematological parameters, as well as lipid profiles; between males and females. The p value ≤0.05 was considered as significant. The data were analysed using SPSS software version 27.

RESULTS

Sociodemographic characteristics: The study included 95 patients diagnosed with IHD, comprising 70 males (73.7%) and 25 females (26.3%). The mean age of participants was 54.6±10 years, with a range of 25-70 years. Most participants were in the 51-60 years (n=44; 46.3%) age group, followed by 61-70 years (n=25; 26.3%) [Table/Fig-1].

Age group (years)	Frequency	Percentage
25-34	5	5.3%
35-40	5	5.3%
41-50	16	16.8%
51-60	44	46.3%
61-70	25	26.3%

[Table/Fig-1]: Age distribution of IHD patients.

Haematological parameter assessments: The mean Hb level was 12.25±2.25 g/dL, while the mean PCV was 38.26±6.97%. The mean PLT count was observed to be 296.39±147.53×10^3/μL, and the mean total WBC count was 10.59±4.20×10^3/μL. The mean RBC count was 4.50±0.80×10^6/μL. The mean NEU percentage was 63.38±12.55%, while the LYMPH percentage was 25.18±10.97%. The RDW showed a mean value of 15.03±6.31%. The ESR was notably elevated, with a mean value of 37.28±27.84 mm/hr.

Since haematological variations between males and females may influence the risk, presentation, and progression of IHD, a gender-based comparison was carried out. The analysis showed significantly lower levels of Hb (p=0.003), PCV (p=0.020), and RBC (p=0.010)

in females compared to males, indicating a higher prevalence of anaemia among female patients. No statistically significant gender differences were observed for PLT, WBC, NEU, LYMPH, RDW, or ESR [Table/Fig-2].

Haematological parameters	Male	Female	T	p-value
	Mean±S.D.	Mean±S.D.		
Hb (gm/dL)	12.66±2.31	11.11±1.62	3.09	0.003*
PCV (%)	39.25±7.14	35.49±5.73	2.37	0.020*
Platelet (µL)	277.66±98.25	302.72±75.70	-1.16	0.250
WBC (µL)	10.72±4.25	10.23±4.12	0.49	0.624
RBC (Million/cumm)	4.63±0.81	4.15±0.66	2.62	0.010*
Neutrophil (%)	63.69±12.49	62.52±12.95	0.40	0.693
Lymphocyte (%)	24.48±9.93	27.13±13.50	-1.04	0.301
RDW (%)	15.27±7.29	14.36±1.61	0.62	0.535
ESR (mm/hr)	35.45±27.70	42.40±28.14	-1.07	0.287

[Table/Fig-2]: Haematological parameters between male and female participants.
*p-value ≤0.05 considered to be statistically significant.

Lipid profiles assessments: The lipid profile showed a pattern consistent with cardiovascular risk. Mean LDL (109.2±42.1 mg/dL), VLDL (33.2±17.3 mg/dL), and TG (165.3±84.7 mg/dL) were borderline to elevated. HDL levels were reduced (37.6±21.6 mg/dL), indicating diminished cardio protective effect. TC averaged (179.5±46.5 mg/dL), approaching the borderline high range.

The gender-wise comparison showed mean TC and HDL levels were higher in females than males, only HDL showed a near-significant difference (p=0.057), suggesting a trend toward more favourable HDL levels among females. Other lipid parameters (LDL, VLDL, and TG) showed no significant gender differences [Table/Fig-3].

Lipid profile	Male	Female	T	p-value
	Mean±S.D.	Mean±S.D.		
TC (mg/dL)	177.40±42.10	185.32±57.55	-0.73	0.467
HDL (mg/dL)	35.07±10.97	44.64±37.63	-1.93	0.057
LDL (mg/dL)	108.33±38.75	111.72±51.12	-0.34	0.731
VLDL (mg/dL)	34.60±18.64	29.40±12.12	1.30	0.197
TG (mg/dL)	173.51±92.31	142.44±53.35	1.59	0.116

[Table/Fig-3]: Lipid profile parameters between male and female participants.

Correlation between haematological parameters & lipid profiles in IHD patients: Pearson correlation analysis revealed significant associations. Hb showed a positive correlation with VLDL (r=0.23, p=0.02) and TG (r=0.25, p=0.01), and a negative correlation with HDL (r=-0.20, p=0.05). LYMPH percentage was positively correlated with HDL (r=0.27, p=0.01) and VLDL (r=0.23, p=0.03). ESR showed a significant positive correlation with HDL (r=0.21, p=0.04) [Table/Fig-4].

DISCUSSION

The present retrospective study evaluated haematological variations and lipid profiles in patients diagnosed with IHD at a tertiary care hospital. The study's aims were achieved through detailed analyses, including gender-based comparisons and correlation assessments. The findings provide valuable insights into gender-specific patterns, biochemical laboratory trends, and potential pathophysiological mechanisms underlying cardiovascular risk in IHD.

Sociodemographic characteristics: The study population consisted of 95 IHD patients with a male predominance (73.7%). The mean age was 54.6±10 years. The age group of 51-60 years accounted for the largest proportion (46.3%), followed by the 61-70 years (26.3%).

The average age of onset for CVD is notably lower among the Indian population compared to global averages. While CVD typically affects individuals over 45 years in developed countries, in India, it affects individuals between 35 and 64 years [16]. The Global Burden of Disease Study 2020 reported a significant increase in IHD incidence after age 45, peaking between 50 and 70 years, especially in men [17]. Male predominance may be due to higher exposure to behavioural risk factors such as tobacco use, alcohol consumption, and sedentary lifestyles, along with lower protective estrogenic effects compared to premenopausal females. Premenopausal women typically have lower systolic blood pressure, higher HDL cholesterol, and lower TG levels, likely influenced by oestrogen. After 75 years, women tend to show higher rates of hypertension and CVD than men [18]

Haematological parameter assessment: The study observed a mean Hb level of 12.25 ± 2.245 g/dL, which falls at the lower end of the normal reference range, indicating a trend toward mild anaemia in a subset of patients. A reduction in Hb concentration has been linked to a higher risk of coronary atherosclerosis, with studies indicating that even a one gram decrease in Hb is an independent risk factor for cardiac disease and mortality [19]. These findings are consistent with those of Zeidman et al., who described anaemia (low Hb and PCV) as a risk factor for worsening ischaemia due to impaired oxygen delivery [20].

Additionally, the mean RDW was 15.03±6.308%, which is elevated above the normal range, reflecting anisocytosis. Elevated RDW reflects increased variability in RBC size, commonly linked to conditions like iron deficiency anaemia. The most widely accepted explanation for the association between RDW and CVDs involves systemic factors such as inflammation and oxidative stress which disrupt erythropoiesis, promote anisocytosis, and trigger premature release of immature RBCs into circulation [21]. A meta-analysis by Su C et al., provided evidence supporting the association between elevated RDW levels and a higher risk of future cardiovascular events and mortality in patients with established CAD [22].

The mean platelet count in this study was 296.39±147.525 $\times 10^3$/µL, showing considerable variability. Though within normal range

Parameters	TC		HDL		LDL		VLDL		TG	
	"r"	p value	"r"	p value	"r"	p value	"r"	p value	"r"	p value
Hb	0.06	0.59	-0.20	0.05*	0.06	0.56	0.23	0.02*	0.25	0.01*
PCV	-0.03	0.81	-0.17	0.10	0.004	0.97	0.12	0.25	0.14	0.19
PLT	-0.03	0.77	-0.02	0.88	0.102	0.94	-0.03	0.77	-0.04	0.72
WBC	0.19	0.07	-0.003	0.98	0.16	0.11	0.07	0.52	0.06	0.58
RBC	-0.01	0.96	-0.20	0.06	0.03	0.80	0.15	0.14	0.17	0.11
NEU	-0.06	0.56	-0.20	0.06	0.08	0.42	-0.15	0.16	-0.11	0.30
LYMPH	0.12	0.25	0.27	0.01*	-0.09	0.38	0.23	0.03*	0.18	0.09
RDW	-0.06	0.58	-0.03	0.74	-0.02	0.86	-0.07	0.53	-0.07	0.53
ESR	0.07	0.48	0.21	0.04*	-0.02	0.85	-0.02	0.87	-0.03	0.80

[Table/Fig-4]: Pearson's correlation between haematological parameters and lipid profiles.
*p-value≤0.05 considered to be statistically significant.

on average, the widespread suggests possible thrombocytopenia or thrombocytosis in specific individuals. Previous studies have similarly observed decreased platelet counts in ACS patients [23]. Several studies have also investigated platelet indices and found a significant association with the severity of CAD [24].

Elevated WBC levels are a known independent predictor of atherosclerotic disease and reflect systemic inflammation and endothelial dysfunction. Several studies have identified increased WBC counts as an independent risk factor for atherosclerotic vascular disease [25]. The mean ESR was 37.28 mm/hr (SD=27.837), which is considerably elevated. These findings are consistent with the work of Erikssen G et al. and Andresdottir MB al., who highlighted ESR as a predictive marker for CHD mortality and disease severity [26,27].

In the present study, significant gender differences were observed in Hb, PCV, and RBC counts, with males showing higher values compared to females ($p<0.05$). These findings align with established physiological patterns, where males typically have higher erythropoietic activity due to hormonal influences.

Gender-related differences observed in the present study results may be attributed to the variation in Hb levels between men and women, which reflects hormonal and physiological variations. One possible explanation for this sex-specific difference is the concept of hormesis-repeated exposure to low Hb levels, such as those occurring due to menstruation, may condition the female cardiovascular system to better tolerate anaemia or lower Hb concentrations [28]. Terplan M. highlighted the role of menstruation in female lower haematological indices and potential cardiovascular vulnerability [29]. Comparison of haematological parameters in IHD patients of current study with some previous studies has been shown in [Table/Fig-5] [10,30].

Parameters	Reference range	Current Study (Mean±SD)	Adam AM et al., [30]	Wang H et al., [10]
Hb (g/dL)	M:13-17g/dL; F:12-15g/dL	12.25±2.245	12.48±1.62	144.76±15.02
PCV (%)	M: 38-47%; F: 36-46%	38.26±6.968	38.09±6.04	42.67±4.18
PLT (µL)	150-450×10^3	296.39± 147.525	259.68± 65.61	234.20± 62.51
WBC (µL)	4-11×10^9	10.59±4.2	10.48±3.24	7.49±2.46
RBC (million/cumm)	M:4-46.0million/cumm; F:3.8-5.0million/cumm	4.5±0.796	4.27±0.58	4.77±0.47
NEU (%)	40-75%	63.38±12.554	7.40±0.95	55.78±7.77
LYMPH (%)	25-40%	25.18±10.969	3.20±0.68	29.43±9.00
RDW (%)	11-15%	15.03±6.308	15.9 (2.84)	12.57±0.84

[Table/Fig-5]: Comparison of haematological parameters in ihd patients with previous studies [10,30].

Lipid profile assessment: In the present study, the mean HDL level was 37.6±21.6 mg/dL, which is below the recommended range, indicating a potential risk for atherosclerosis and IHD. HDL, known as "good cholesterol," ideally should be >40 mg/dL in males and >50 mg/dL in females. Serum HDL-C levels are inversely associated with the development of CAD. Notably, an increase of just 1 mg/dL in HDL-C is estimated to lower the risk of CVD by approximately 2-3% [31].

The mean TG level was 165.3±84.7 mg/dL, which is above the normal reference threshold of <150 mg/dL. Elevated TG is a well-established independent risk factor for CAD, metabolic syndrome, and endothelial dysfunction. The findings of the present study are in line with those of Rosenman R et al., who reported significantly elevated TG levels in patients with angiographically proven CAD [32].

In the present study, no statistically significant differences were observed in lipid profile parameters between males and females. TC and HDL were slightly higher in females, consistent with previous studies suggesting hormonal influences, particularly oestrogen, on lipid metabolism of post-menopause [33,34]. LDL and VLDL showed marginal gender variations without statistical significance, TG levels were elevated in males, though not significant, reflecting possible gender-based differences in diet and fat distribution. Similar trends have been noted by Goldstein LJ et al., who reported lower IHD prevalence in premenopausal women [35], while Rubins HB et al., found significantly lower HDL and higher TG in men with CAD [36]. Comparison of lipid profiles of current study with some previous studies has been depicted in [Table/Fig-6] [11,37].

Parameters	Current study (Mean±SD)	Mohapatra TK and Mohapatra RK [37]	Cheema HA et al., [11]
TC(mg/dL)	179.5±46.5	317.12±63.02	201.42±8.65
HDL(mg/dL)	37.6±21.6	32.01±5.01	50.90±9.36
LDL (mg/dL)	109.2±42.1	1175.21±21.50	201.42±8.65
TG (mg/dL)	165.3±84.7	289.02±61.23	214.84±65.23

[Table/Fig-6]: Comparison of lipid profile parameters in ihd patients with previous studies [11,37].

Correlation between haematological and lipid profile parameters: In the present study, Hb exhibited a significant positive correlation with VLDL and TG. This association is consistent with reports indicating that elevated Hb may contribute to increased blood viscosity, thereby impairing endothelial function and promoting atherogenesis. People with lower Hb levels had a higher risk of dying from a heart attack compared to those whose Hb levels were between 14.0-14.9 g/dL for men and 12.0-12.9 g/dL for women [38].

PLT count showed consistently weak and non-significant correlations with all lipid parameters, indicating that platelet levels may not be directly influenced by lipid abnormalities in IHD patients. This aligns with studies suggesting that platelet activation, rather than count, plays a more critical role in atherothrombosis. In the present study, PCV did not exhibit any statistically significant correlations with lipid profile parameters. Nonetheless, previous studies have reported an association between PCV levels and increased cardiovascular risk [39].

WBC count exhibited a positive but statistically non-significant correlation with TC and LDL. For instance, Huang et al. reported no significant association between total WBC count and the short-, mid-, or long-term occurrence of major adverse cardiac events, nor with the severity of coronary atherosclerosis in patients diagnosed with ACS [40]. In contrast, Ates AH et al. identified a strong positive correlation between elevated WBC counts and the severity of CAD, highlighting its potential role as an inflammatory marker in the progression of atherosclerosis [41].

LYMPH count was significantly positively correlated with both HDL and VLDL. Lymphocytes play a critical role as key regulators of the body's immune system [42]. RDW showed no statistically significant correlations with lipid profile parameters. However, ESR had a borderline positive correlation with HDL, which is unusual given that ESR is typically considered a marker of inflammation, while HDL generally exhibits anti-inflammatory properties. This unexpected finding warrants further exploration in larger studies.

Based on the findings of this study, it is recommended that routine assessment of both haematological and lipid profile parameters be incorporated into standard clinical protocols for theearly identification and management of IHD. In addition, a more holistic approach to cardiovascular risk stratification is warranted, incorporating emerging biomarkers such as pro-inflammatory cytokines and genetic risk indicators. These could offer enhanced predictive value and a more nuanced understanding of the multifactorial nature of IHD.

Limitation(s)

A key limitation is the retrospective design of the study, which restricts the ability to draw causal conclusions about the relationship between haematological parameters, lipid profiles, and IHD. Moreover, the relatively small and demographically homogenous sample restricts the generalisability of the results to broader populations. Additionally, the lack of consideration for confounding factors, such as lifestyle habits (e.g., diet, exercise, smoking) and medication use, poses another limitation, as these factors could significantly influence the haematological and lipid profiles in IHD patients. Further studies with larger, more diverse cohorts and longitudinal designs would be beneficial to overcome these limitations.

CONCLUSION(S)

The findings of the study underscore the clinical relevance of integrating haematological and lipid profile assessments in the evaluation of patients with suspected ischaemic heart disease. The observed gender-specific variations and significant correlations between haematological and lipid parameters highlight the complex interplay of metabolic and inflammatory pathways in cardiovascular pathophysiology. Routine inclusion of cost-effective haematological indices may enhance diagnostic precision and risk stratification, particularly in critical care settings. This integrated approach supports the development of gender-sensitive preventive and therapeutic strategies tailored to individual risk profiles. However, larger multicentric prospective studies are essential to validate these findings and determine the prognostic value of haematological markers in IHD. Future research should also incorporate additional biochemical and lifestyle factors to refine cardiovascular risk prediction models and contribute to more personalized, evidence-based care.

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