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Interleukin-6 as a biochemical marker in patients with acute coronary syndrome: A cross-sectional study at Erbil cardiac center

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Abstract

Background and objective: Despite advances in diagnosis and treatment, acute coronary syndrome (ACS) is the leading cause of death globally. Serum interleukin-6 (IL-6) is one of the biomarkers that have been recently identified for the evaluation of ACS. It has been demonstrated to be a predictor of disease severity that is independent of traditional cardiovascular risk factors. This study aimed to evaluate the association between serum IL-6 levels and disease severity and other related clinical parameters in patients with ACS.

Method: This cross-sectional research comprised 180 ACS patients at Erbil surgical specialty Hospital-Cardiac Center. The participants were divided into three groups: Group I (STEMI group, 83 patients), Group II (NSTEMI group, 74 patients), and Group III (UA group, 23 patients). Each group was tested for S.IL-6, total cholesterol, HDL-C, LDL-C, VLDL-C, TG, and troponin T.

Results: The study population included 134 males (74.4%) and 46 females (25.6%), the mean age was 58.66 ± 12.0 years, ranging from 35-90 years. Correlation coefficient of serum IL-6 with other variables indicated a statistically significant positive correlation with total cholesterol, LDL-C, and troponin T among ACS types, with values of (r=0.1, P = 0.05), (r=0.2, P <0.001), and (r=0.4, P <0.001), respectively. IL-6 levels were statistically significant different between types of ACS (P < 0.001). The mean of IL-6 level in STEMI patients was (19.1 ± 0.42) pg/mL, followed by NSTEMI (15.9 ± 0.34) pg/mL and UA (10.0 ± 0.43) pg/mL.

Conclusion: The present study highlights IL-6 as a biomarker for determining ACS severity.

Keywords: Acute Coronary Syndrome, Atherosclerosis, Interleukin-6.

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Introduction

Acute Coronary Syndrome (ACS) is a severe urgent condition and is a major contributor to worldwide cardiovascular death and disability. Acute coronary syndrome continues to be the primary cause of worldwide death, despite progress in its diagnosis and treatment. ACS encompasses a collection of illnesses marked by diminished blood flow to the heart and consists of unstable angina (UA), ST-elevation myocardial infarction (STEMI), and non-ST elevation myocardial infarction (NSTEMI). A variant of coronary heart disease (CHD) is responsible for one-third of all deaths in adults over 35 years of age. Acute coronary syndrome usually shows up with symptoms; however, certain forms of CHD can appear asymptomatically (1).

Acute coronary syndrome often arises from the rupture of plaque in the coronary arteries, a disease induced by atherosclerosis (AS). The main risk factors are smoking, hypertension, diabetes, hyperlipidemia, male sex, physical inactivity, obesity and a family history of myocardial infarction. The presence of diabetes is also regarded as a risk factor. Approximately 15.5 million persons in the United States (US) are affected with CH. The American Heart Association (AHA) reports that a myocardial infarction (MI) occurs about every 41 seconds. Cardiovascular disease (CVD) is the primary cause of death rates in the US. Chest discomfort often results in visits to the emergency room (2).

All stages of atherosclerosis involve pro-inflammatory cytokines and chemokines. The disease can cause MI, stroke, or sudden cardiac death (3). Interleukin-6 (IL-6) is crucial to human atherosclerosis (AS) and is acknowledged as a key regulator of the inflammatory response, among other cytokines. Research demonstrates that IL-6 significantly contributes to the creation and rupture of atherosclerotic plaques; hence, it expedites plaque growth and instability (4).

Factors that initiate the synthesis of IL-6 are inflammation, angiotensin II, oxidative stress, and vascular damage (5). The blood vessels may react to IL-6 originating from either vascular or non-vascular sources. The atherogenic process requires the presence of IL-6. Therefore, IL-6 signaling leads to endothelial dysfunction, increased permeability, activation, hypertrophy, fibrosis, and mobilize of immune cells. These effects promote the infiltration of immune cells and lipoproteins, aiding in plaque development. IL-6 stimulates macrophages and vascular smooth muscle growth in the artery wall, therefore promoting plaque development. Evidence from animal studies shows that IL-6 facilitates the advancement of atherosclerotic plaque development and diminishes their stability (6, 7). IL-6 destabilizes plaques and thereby increases their

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susceptibility to rupture by inducing inflammation, fibrous cap thinning, and collagen synthesis impairment (8, 9). Interleukin-6 levels may function as a non-invasive and beneficial biomarker for the identification of high-risk ACS patients (10). IL-6 pathway has a keyrole on atherosclerosis, a primary cause of CVD (11). Patients with CVD have been shown to have increased levels of IL-6, which are connected to a greater probability of myocardial infarction (MI), stroke, peripheral artery disease, heart failure, significant adverse cardiovascular events, and death from cardiovascular causes (8, 12). Because of insufficient data on the relationship between IL-6 and types of ACS in our region, this study was conducted to assess the association between serum IL-6 levels and other variables in patients with different types of ACS. Furthermore, our objective was to conduct investigate the potential of IL-6 as a biomarker for the identification of ACS types or their severity.

Methods

Study population and design of the study:

The cross-sectional study comprised 180 individuals who attended the Surgical Specialty Hospital - Cardiac Center in Erbil City, Iraq. The study conducted from October 2024 to January 2025. The participants in our study were classified into three groups:

A- Group I (STEMI patients): 83 patients with ST-Elevation Myocardial Infraction.
B- Group II (NSTEMI patients): 74 patients with NST-Elevation Myocardial Infraction.
C- Group III (UA patients): 23 patients with Unstable Angina.

Inclusion and exclusion criteria:

Individuals of both genders, aged 18 years and older, admitted to Erbil Cardiac Centre with a diagnosis of ACS, including UA, NSTEMI, and STEMI. Individuals with known inflammatory or infectious conditions, malignancies, or severe renal impairment were excluded from the research.

Questionnaire form design:

A specially designed questionnaire was used for the study. The study employs a direct interviewer-administered face-to-face questionnaire. The questionnaire comprises patient demographics (name, age, gender, address, date and phone number), clinical risk factors, family history and smoking habits. Upon the stabilization of their clinical condition, the weight and height of both participants were evaluated using a calibrated stadiometer and scale. The calculation of body mass index (BMI) involves dividing the weight in kilograms by their height in square meters. Normal weight is defined as 18.5–24.9 BMI, Overweight is defined as a BMI of 25-29.9, while obesity is defined as a BMI of 30 or higher.

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Collection of blood samples, Devices and principles:

Standard phlebotomy procedures were employed for collecting peripheral blood samples. A disposable needle was used to collect blood samples, which were transferred to a serum separator tube. The samples underwent centrifugation at speeds ranging from 3000 rpm for a duration of 12 minutes. The separated serums were analyzed for IL-6, total cholesterol, HDL-C, LDL-C, TG and VLDL-C, VLDL-C calculated using the Friedewald equation (VLDL-C= TG/5), and serum high-sensitivity Troponin T (troponin T hs). The sandwich ELISA was used for measuring the IL-6 parameter. Fully automated biochemistry analyzer COBAS e 411 from Roche, Germany, for the detection of high-sensitivity Troponin T. COBAS c 111 ROCH Germany, a fully automated biochemistry analyzer for lipid profile.

Statistical analysis:

All statistical data were examined utilizing SPSS (Statistical Package for the Social Sciences) Version 26. The One-Way ANOVA was employed for three separate sample groups. The findings were presented as counts and percentages for categorical data, and mean ± standard error for continuous variables. The Chi-Square test was used to evaluate the significance of the relationships between independent and dependent variables. The association between IL-6 and other variables was assessed using Pearson's correlation coefficient test. A P-value of 0.05 or below was deemed statistically significant.

Ethical considerations:

The ethics committee at Hawler Medical University gave its approval. Patients verbally granted informed consent.

Results

Baseline characteristics and risk factors of the studied population

All three groups comprised a total of 180 participants. 83 (46.1%) of the cases were classified as STEMI, 74 (41.1%) as NSTEMI, and 23 (12.8%) as UA. The mean age was 58.66 ± 12.0 years, with a range from 35 to 90 years. The results show a statistically significant difference in most risk factors for ACS among the STEMI, NSTEMI, and UA groups within the study population. These factors include hypertension, hyperlipidemia, BMI, physical activity (exercise), smoking, and stressful life, with P-values of (0.011, 0.019, 0.002, 0.044, 0.032, and 0.017) respectively.

Furthermore, when the risk factor differences between STEMI, NSTEMI, and UA people were analyzed, BMI was the most statistically significant association between ACS types, Obesity was most prevalent among NSTEMI patients (48.6%), while the STEMI group had the highest number of overweight adults (44.6%).

NSTEMI group had a greater prevalence of hypertension (68.9%) than STEMI

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(55.4%), followed by UA (34.8). NSTEMI patients had more stressful life events (73.0%) than UA patients (52.2%), followed by STEMI (51.8%). Hyperlipidemia was prevalent in the STEMI group (75.9%), the NSTEMI group (60.8%), and the UA group (52.2%). Smoking was a greatest risk factor for ACS in all STEMI categories (77.1%) than in a smaller population of NSTEMI groups (59.5%), followed by the UA group (56.5%). STEMI patients had a much greater proportion of physical activity than a smaller group of NSTEMI patients, with the smallest group being UA. Table 1 illustrates the data.

Table 1. The characteristics of the study subjects

Characteristics	STEMI No. (%)	NSTEMI No. (%)	UA No. (%)	P-value*
Age (in years)				
≤39	4(4.8)	3(4.1)	1 (4.3)	
40-49	15 (18.1)	11(14.9)	9 (39.1)	0.154
50-59	33 (39.8)	18(24.3)	5 (21.7)	
60-69	17(20.5)	19(25.7)	5 (21.7)	
70-79	11 (13.3)	17 (23.0)	2 (8.7)	
≥80	3 (3.6)	6 (8.1)	1 (4.3)	
Hypertension	46(55.4)	51(68.9)	8 (34.8)	0.011
Gender				
Male	64 (77.1)	54 (73.0)	16 (69.6)	0.711
Female	19 (22.9)	20 (27.0)	7 (30.4)	
Hyperlipidemia	63 (75.9)	45 (60.8)	12 (52.2)	0.019
Diabetes mellitus	36(43.4)	24(32.4)	12 (52.2)	0.167
BMI				
Normal weight	25(30.1)	11(14.9)	5 (21.7)	
Overweight	37(44.6)	27(36.5)	15 (65.2)	0.002
Obese	21(25.3)	36(48.6)	3 (13.0)	
Physical-activity	28(33.7)	13(17.6)	4 (17.4)	0.044
Smoking	64 (77.1)	44 (59.5)	13 (56.5)	0.032
Lifestyle-active	38 (45.8)	27 (36.5)	7 (30.4)	0.299
Stressful Life	43(51.8)	54(73.0)	12(52.2)	0.017
Family History	39(47.0)	28(37.4)	12 (52.2)	0.356

*The Chi-square test is utilized to examine the data, with findings displayed as frequency (percentage).

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Comparison of the mean value of lipid profile laboratory, cardiac enzymes, and interleukin-6 parameters among ACS types

The mean total cholesterol levels across the different types of ACS showed significant variation. The STEMI group exhibited the highest mean total cholesterol level (207.5±7.63) mg/dL, followed by the NSTEMI group (183.5±6.78) mg/dL, while the UA group recorded the lowest level (166.4±12.1) mg/dL, with a statistically significant difference (P = 0.008). LDL-cholesterol showed a statistically significant difference (P = 0.017), with the highest level in the STEMI group (125.3±5.20) mg/dL, followed by NSTEMI (110.0±4.22) mg/dL, and the lowest in UA (101.5±8.07) mg/dL. HDL-cholesterol levels demonstrated no significant variation across the groups (P = 0.617), with mean values of (36.92±0.98) mg/dL in STEMI, (38.45±0.88) mg/dL in NSTEMI, and (39.33±1.46) mg/dL in UA. No significant change in VLDL cholesterol levels was observed across the three groups (P = 0.60), with mean values of (37.20±2.86) mg/dL in STEMI, (34.78±2.16) mg/dL in NSTEMI, and (32.43±2.85) mg/dL in UA. Triglyceride levels were not substantially different (P = 0.795), with the UA group revealing the lowest mean level (161.4±14.3) mg/dL, in comparison to NSTEMI (173.7±10.8) mg/dL and STEMI (174.9±8.35) mg/dL. The blood Interleukin-6 levels were significantly higher in the STEMI group (19.10±0.42) pg/mL compared to the NSTEMI (15.91±0.34) pg/mL and UA (10.00±0.43) pg/mL, statistically significant (P <0.001).

As expected, the mean hs-Troponin T levels were markedly elevated in STEMI patients (0.71±0.05) ng/mL compared to those with NSTEMI (0.59±0.03) ng/mL and UA (0.009±0.001) ng/mL, with this difference being highly significant (P <0.001). Table 2 provides a summary of this information.

Table 2. Mean value comparison of laboratory parameters among ACS patients

Parameters	STEMI (mean±SE)	NSTEMI (mean ±SE)	UA (mean ±SE)	P-value
Total Cholesterol (mg/dL)	207.5±7.63	183.5±6.78	166.4±12.19	0.008
HDL-cholesterol (mg/dL)	36.92±0.98	38.45±0.88	39.33±1.46	0.617
LDL-cholesterol (mg/dL)	125.3±5.20	110.0±4.22	101.5±8.07	0.017
VLDL-cholesterol (mg/dL)	37.20±2.86	34.78±2.16	32.43±2.85	0.60
Triglycerides (mg/dL)	174.9±8.35	173.7±10.8	161.4±14.3	0.795
IL-6 (pg/mL)	19.10±0.42	15.91±0.34	10.0±0.43	<0.001
hs-TroponinT (ng/mL)	0.71±0.05	0.59±0.03	0.009±0.001	<0.001

*The results are presented as (Mean±SE) and the data are analyzed using one-way ANOVA.

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The correlation analysis between interleukin-6 levels and laboratory parameters

The investigation of the correlation between Serum IL-6 and other variables revealed a positive and statistically significant relationship, as indicated by the Pearson correlation coefficient test. The correlations between IL-6 with total cholesterol, LDL-C, and troponin T in ACS patients were (r=0.1, P = 0.05), (r=0.2, P <0.001), and (r=0.4, P <0.001), respectively, thereby supporting alternative hypothesis (Ha). Table 3 encompasses this information.

Discussion

This cross-sectional study investigated the risk factors across different types of ACS and evaluated serum IL-6 levels to determine disease severity.

STEMI was the most common ACS type, particularly among those aged 50–59, while NSTEMI was more prevalent in the 60–69 age group. UA occurred more frequently in individuals in their 40s. Similar patterns were reported by Allami in Iraq and LA et al. in Jordan (13-15). These findings highlight the need for early detection of UA in younger adults. Male predominance was observed in all ACS groups, with 77.1% in STEMI, 73.0% in NSTEMI, and 69.6% in UA. Lee et al. in the Malaysian National Cardiovascular Disease – Acute Coronary Syndrome (NCVD-ACS) registry also reported higher ACS rates in males (16).

Table 3. The Correlation Analysis between Interleukin-6 Levels with laboratory parameters

	Interleukin-6 ACS patients (n=180)	
Parameters	r	**P-value**
Total cholesterol (mg/dL)	0.14	0.05
LDL cholesterol (mg/dL)	0.27	<0.001
HDL cholesterol (mg/dL)	-0.18	0.06
Triglycerides (mg/dL)	0.16	0.07
VLDL-cholesterol (mg/dL)	0.07	0.32
Serum TroponinT (ng/mL)	0.47	<0.001

* Data are assessed utilizing Pearson's correlation coefficient test.

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The cardioprotective role of estrogen in premenopausal women may explain this trend. Obesity was most common in NSTEMI patients (48.6%), aligning with findings by Prafull et al (17) and supporting the "obesity paradox," where obesity may be linked to better outcomes in chronic diseases (18). Smoking was strongly associated with STEMI (77.1%), more than with NSTEMI (59.5%) or UA (56.5%). This supports previous findings that smoking promotes endothelial damage, inflammation, and plaque rupture, increasing the risk of severe ACS (19). Hyperlipidemia was most frequent in STEMI (75.9%), consistent with previous study linking dyslipidemia to severe ACS forms (20). Hypertension was more common in NSTEMI, which aligns with prior studies (21). Total cholesterol and LDL-C were also highest in STEMI, similar to findings by Altaher and colleagues in Egypt (22).

The present study showed that IL-6 levels were highest in STEMI patients (19.10 ± 0.42 pg/mL), followed by NSTEMI (15.91± 0.34pg/mL) and UA (10.0 ± 0.43 pg/mL), indicating a potential association between IL-6 concentration and the severity of ACS. This observation is consistent with findings from previous study, A recent research done in Tunisia published in BMC Cardiovascular Disorders by Bouzidi and Gamra highlighted IL-6's highly potential as a biomarker for detecting myocardial necrosis, since IL-6 levels are linked to the severity of ACS based on the highest level of IL-6 measured in patients with STEMI (23). Yang et al.'s meta-analysis found elevated IL-6 to be a significant and independent predictor of worse ACS outcomes and higher MACE risk, also IL-6 promotes macrophage activation, infiltration, and LDL receptor expression, enhancing LDL uptake and driving inflammation and atherosclerosis (24). Ling et al. in China also reported that IL-6 may serve as a non-invasive marker for identifying high-risk ACS patients (25). IL-6 is locally overexpressed in atherosclerotic plaques at levels 10–40 times higher than normal tissue (26). Ferreira et al., in the Multi-Ethnic Study of Atherosclerosis (MESA) showed a strong association between IL-6 and atherosclerosis (27). While IL-6 inhibition reduced vascular inflammation and atherosclerosis progression in vivo (28). These findings reinforce the potential role of IL-6 as a marker of ACS severity. To our knowledge, this is the first study in Iraq to examine the association between serum IL-6 levels and different ACS subtypes.

A significant positive correlation was observed between IL-6 and total cholesterol, consistent with findings by Bao et al (29). Similarly, IL-6 was positively correlated with LDL-C, in agreement with previous studies (30, 31). Although this contrasts with a study

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from Vienna, which reported no significant association between IL-6 and LDL-C (11). Moreover, IL-6 showed a strong positive correlation with troponin, supporting the results of Ferencik et al (32).

Conclusion

This study demonstrated significant differences in serum IL-6 levels among the subtypes of acute coronary syndrome (ACS), with the highest levels observed in patients with STEMI, followed by NSTEMI and unstable angina. These findings suggest that IL-6 levels increase with the severity of ACS. Additionally, IL-6 showed significant positive correlations with total cholesterol, LDL, and troponin levels. These results support the potential role of IL-6 as a biomarker in the assessment of ACS severity.

Recommendations

These conclusions need to be supported by larger sample size studies. The impact of IL-6 on customized therapy regimens, monitoring the progression of illness, and forecasting clinical results all require further investigation.

Competing interest

The authors declare that they have no competing interests.

References

1. Mechanic OJ, Gavin M, Grossman SA. Acute Myocardial Infarction. StatPearls. Treasure Island (FL): StatPearls Publishing; 2025.

2. Bracey A, Meyers HP. Posterior Myocardial Ischemia. StatPearls. Treasure Island (FL): StatPearls Publishing; 2025.

3. Herrington W, Lacey B, Sherliker P, Armitage J, Lewington S. Epidemiology of Atherosclerosis and the Potential to Reduce the Global Burden of Atherothrombotic Disease. Circ Res. 2016;118(4):535-46. https://doi.org/10.1161/CIRCRESAHA.115.3076

4. Susilo H, Thaha M, Pikir BS, Alsagaff MY, Suryantoro SD, Wungu CDK, et al. The Role of Plasma Interleukin-6 Levels on Atherosclerotic Cardiovascular Disease and Cardiovascular Mortality Risk Scores in Javanese Patients with Chronic Kidney Disease. J Pers Med. 2022;12(7). https://doi.org/10.3390/jpm12071122

5. Ridker PM, Rane M. Interleukin-6 Signaling and Anti-Interleukin-6 Therapeutics in Cardiovascular Disease. Circulation Research. 2021;128(11):1728-46. https://doi.org/10.1161/CIRCRESAHA.121.319077

6. Didion SP. Cellular and Oxidative Mechanisms Associated with Interleukin-6 Signaling in the Vasculature. Int J Mol Sci. 2017;18(12). https://doi.org/10.3390/ijms18122563

7. Kraaijenhof JM, Nurmohamed NS, Tzolos E, Meah M, Geers J, Kaiser Y, et al. Interleukin 6 plasma levels are associated with progression of coronary

https://doi.org/10.15218/zjms.2026.002

plaques. Open Heart. 2024;11(2). DOI: 10.1136/openhrt-2024-002773

8. Katkenov N, Mukhatayev Z, Kozhakhmetov S, Sailybayeva A, Bekbossynova M, Kushugulova A. Systematic Review on the Role of IL-6 and IL-1β in Cardiovascular Diseases. J Cardiovasc Dev Dis. 2024;11(7). https://doi.org/10.3390/jcdd11070206

9. Ridker PM. Inhibiting Interleukin-6 to Reduce Cardiovascular Event Rates: A Next Step for Atherothrombosis Treatment and Prevention. J Am Coll Cardiol. 2021;77(15):1856-8. https://doi.org/10.1016/j.jacc.2021.02.060

10. Ling Y, Weng H, Tang S. The relationship between IL-6 levels and the angiographic severity of coronary artery disease following percutaneous coronary intervention in acute coronary syndrome patients. BMC Cardiovasc Disord. 2021;21(1):578. https://doi.org/10.1186/s12872-021-02406-7

11. Gager GM, Biesinger B, Hofer F, Winter M-P, Hengstenberg C, Jilma B, et al. Interleukin-6 level is a powerful predictor of long-term cardiovascular mortality in patients with acute coronary syndrome. Vascular Pharmacology. 2020;135:106806. https://doi.org/10.1016/j.vph.2020.106806

12. Mehta NN, deGoma E, Shapiro MD. IL-6 and Cardiovascular Risk: A Narrative Review. Curr Atheroscler Rep. 2024;27(1):12. https://doi.org/10.1007/s11883-024-01259-7

13. Allami M. A Cross-Sectional Study on the Epidemiology and Risk Factors of Acute Coronary Syndrome in Northern Iraq. Cureus. 2024;16(6):e63291. DOI: 10.7759/cureus.63291

14. Oberoi M, Ainani N, Abbott JD, Mamas MA, Velagapudi P. Age Considerations in the Invasive Management of Acute Coronary Syndromes. US Cardiol. 2022;16:e14. http://doi.org/10.15420/usc.2021.29

15. Raffee LA, Alawneh KZ, Ibdah RK, Rawashdeh SI, Zoghoul S, Ewais AS, et al. Prevalence, Clinical Characteristics, and Risk Among Patients with Ischemic Heart Disease in the Young Jordanian Population. Open Access Emerg Med. 2020;12:389-97. https://doi.org/10.2147/OAEM.S272961

16. Lee CY, Liu KT, Lu HT, Mohd Ali R, Fong AYY, Wan Ahmad WA. Sex and gender differences in presentation, treatment and outcomes in acute coronary syndrome, a 10 year study from a multi-ethnic Asian population: The Malaysian National Cardiovascular Disease Database-Acute Coronary Syndrome (NCVD-ACS) registry. PLoS One. 2021;16(2):e0246474. https://doi.org/10.1371/journal.pone.0246474

17. Dhewle P, Bose S, Kandibendla V, Prakash G. Comparison of Clinical and Angiographic Profile and Short-term

https://doi.org/10.15218/zjms.2026.002

Outcomes in Obese and Nonobese Patients with Acute Coronary Syndrome. Journal of the Practice of Cardiovascular Sciences. 2024;10:152-6. DOI:10.4103/jpcs.jpcs_90_23

18. Donini LM, Pinto A, Giusti AM, Lenzi A, Poggiogalle E. Obesity or BMI Paradox? Beneath the Tip of the Iceberg. Front Nutr. 2020; 7:53. https://doi.org/10.3389/fnut.2020.00053

19. Mihajlović D, Maksimović Ž, Dojčinović B, Banjac[1] N. Acute Coronary Syndrome (STEMI, NSTEMI and Unstable Angina Pectoris) and Risk Factors, Similarities and Differences. Scripta Medica. 2021;51:252-60. DOI: 10.5937/scriptamed51-27722

20. Muneeb M, Khan AH, Khan Niazi A, Khan MU, Chatha ZJ, Kazmi T, et al. Patterns of Dyslipidemia Among Acute Coronary Syndrome (ACS) Patients at a Tertiary Care Hospital in Lahore, Pakistan. Cureus. 2022;14(12):e32378. DOI: 10.7759/cureus.32378

21. Prakash GT, Dhewle P, Bose SC, Kandibendla V. Non-ST Elevation Myocardial Infarction in Patients With Hypertensive Emergency. Cureus. 2024;16(7):e63783. DOI: 10.7759/cureus.63783

22. Altaher A, Mustafa E, Abodahab LH, Mohamed HS. The Pattern of Dyslipidemia among Patients with Acute Coronary Syndrome at Sohag University Hospital. SVU-Int J Med Sci. 2022;5(2):374-84. DOI: 10.21608/svuijm.2022.139532.1315

23. Bouzidi N, Gamra H. Relationship between serum interleukin-6 levels and severity of coronary artery disease undergoing percutaneous coronary intervention. BMC Cardiovasc Disord. 2023; 23(1):586. https://doi.org/10.1186/s12872-023-03570-8

24. Yang C, Deng Z, Li J, Ren Z, Liu F. Meta-analysis of the relationship between interleukin-6 levels and the prognosis and severity of acute coronary syndrome. Clinics (Sao Paulo). 2021;76:e2690. https://doi.org/10.6061/clinics/2021/e2690

25. Ling Y, Weng H, Tang S. The relationship between IL-6 levels and the angiographic severity of coronary artery disease following percutaneous coronary intervention in acute coronary syndrome patients. BMC Cardiovasc Disord. 2021;21(1):578. https://doi.org/10.1186/s12872-021-02406-7

26. Su JH, Luo MY, Liang N, Gong SX, Chen W, Huang WQ, et al. Interleukin-6: A Novel Target for Cardio-Cerebrovascular Diseases. Front Pharmacol. 2021;12. https://doi.org/10.3389/fphar.2021.745061

27. Ferreira JP, Vasques-Nóvoa F, Neves JS, Zannad F, Leite-Moreira A. Comparison of interleukin-6 and

https://doi.org/10.15218/zjms.2026.002

high-sensitivity C-reactive protein for cardiovascular risk assessment: Findings from the MESA study. Atherosclerosis. 2024;390:117461. DOI: 10.1016/j.atherosclerosis.2024.117461

28. Chen J, Wang W, Ni Q, Zhang L, Guo X. Interleukin 6-regulated macrophage polarization controls atherosclerosis-associated vascular intimal hyperplasia. Front Immunol. 2022;13:952164. https://doi.org/10.3389/fimmu.2022.952164

29. Bao P, Liu G, Wei Y. Association between IL-6 and related risk factors of metabolic syndrome and cardiovascular disease in young rats. Int J Clin Exp Med. 2015;8(8):13491-9. PMCID: PMC4612971

30. Naz S, Raza M, Akbar A, Zaidi A, Khaliq S, Ikram T. Serum Interleukin-6 and Lipid Atherogenic Index Risk Ratios as Interpreters of Cardiac Disease in Obese and Non Obese Male Patients of Coronary Artery Disease. PJMHS. 2021;15:1203-5. DOI: 10.53350/pjmhs211561203

31. Adenin I, Siregar M, Supanto H, Andra C, Lintang L, Effendi I, et al. Associations of Interleukin-6 Levels and Lipid Profiles in Women with Coronary Artery Disease: A Comparative Study across Menopausal and Reproductive Stages at RSUP. H. Adam Malik. JSAFOG. 2025;16:S136-S42. DOI:10.5005/jp-journals-10006-2492

32. Ferencik M, Mayrhofer T, Lu MT, Bittner DO, Emami H, Puchner SB, et al. Coronary Atherosclerosis, Cardiac Troponin, and Interleukin-6 in Patients With Chest Pain: The PROMISE Trial Results. JACC Cardiovasc Imaging. 2022; 15(8):1427-38. https://www.jacc.org/doi/10.1016/j.jcmg.2022.03.016