Open Access

ISSN: 2663-9491 e-ISSN: 2789-6897

ORIGINAL ARTICLE

Assessment of Efficacy and Safety of Tirofiban in Acute Coronary Syndrome Patients Following Percutaneous Coronary Intervention: A Prospective Observational Study

S A M Husnayen[1], Qamrul Huda Mohammad Sohel[2], Sultana Parvin[3], Abdullah Al Mamun[4], Afsana Moury Shohani[5], Rokeya Sultana Akhi[6], Ujjwal Sarker[7], Saiful Islam[8]

Received: 12 Mar 2026
Accepted: 14 Mar 2026
Published Online: 17 Mar 2026

Published by:
Gopalganj Medical College, Gopalganj, Bangladesh

Correspondence to
S A M Husnayen

DOI: dx.doi.org

ABSTRACT

Background: *Cardiovascular disease ranks as a top global cause of mortality, with acute coronary syndrome (ACS) necessitating urgent treatment like percutaneous coronary intervention (PCI) to lower complications. Glycoprotein IIb/IIIa inhibitors such as tirofiban efficiently avert thrombotic occurrences during PCI while maintaining a positive safety profile. Although there is international evidence, data from Bangladesh are scarce; this study assesses the effectiveness and safety of tirofiban in ACS patients receiving PCI in a Bangladeshi coronary care unit.* ***Methods & Materials:*** *This observational study at Khwaja Yunus Ali Medical College Hospital, Sirajganj, Bangladesh (Nov 2024–Oct 2025) assessed the effectiveness and safety of Inj. Tirofiban for ACS patients receiving PCI. Adult patients treated with Tirofiban were included, and data on demographics, risk factors, clinical presentation, angiography, stents, procedural results, and complications were gathered. Ethical clearance was secured, and data were examined descriptively with SPSS v26.* ***Results:*** *Among 120 ACS patients undergoing PCI with Inj. Tirofiban, primarily involved males between the age group of 50 and 59. Hypertension, smoking, and diabetes were the most prevalent risk factors, with NSTEMI and STEMI being the main manifestations. Angiographically, single-vessel disease was the most common. All procedures were successfully finished, with minor thrombus occurring in 2.7% of cases and resolved using tirofiban, while complications related to the procedure were minimal, restricted to 2.5% of minor gum bleeding.* ***Conclusion:*** *Tirofiban is both safe and effective for ACS patients receiving PCI, ensuring a high success rate in procedures, effective control of thrombus, and few complications.*

Keywords: *Tirofiban, Acute Coronary Syndrome, Percutaneous Coronary Intervention, Coronary Care Unit*

(The Insight 2026; 9(1): 167-171)

1. *Associate Professor, Department of Cardiology, Khwaja Yunus Ali Medical College Hospital, Sirajganj, Bangladesh (ORCID: 0009-0008-7087-9758)*
2. *Assistant Professor, Department of Cardiology, Khwaja Yunus Ali Medical College Hospital, Sirajganj, Bangladesh (ORCID: 0009-0000-7189-1320)*
3. *Senior Staff Nurse, Cath lab Incharge, Khwaja Yunus Ali Medical College Hospital, Sirajganj, Bangladesh (ORCID: 0009-0008-8729-684X)*
4. *Assistant Professor, Department of Cardiology, Khwaja Yunus Ali Medical College Hospital, Sirajganj, Bangladesh (ORCID: 0009-0006-2391-9660)*
5. *Assistant Professor, Department of Cardiology, Khwaja Yunus Ali Medical College Hospital, Sirajganj, Bangladesh (ORCID: 0009-0000-8889-8369)*
6. *Medical Officer, Department of Cardiology, Khwaja Yunus Ali Medical College Hospital, Sirajganj, Bangladesh (ORCID: 0009-0008-1967-9953)*
7. *Registrar, Department of Cardiology, Khwaja Yunus Ali Medical College Hospital, Sirajganj, Bangladesh (ORCID: 0009-0007-3470-0004)*
8. *Professor and Head, Department of Cardiology, Khwaja Yunus Ali Medical College Hospital, Sirajganj, Bangladesh (ORCID: 0009-0009-1060-8718)*

INTRODUCTION

Cardiovascular disease remains the leading cause of mortality worldwide, with ischemic heart disease accounting for nearly half of these deaths and representing 12% of global disability-adjusted life-years lost [1–3]. Approximately 40% of individuals who experience a coronary event die within five years, and those who suffer recurrent events face a 5–6-fold increased risk of mortality [4,5]. Coronary disease is influenced by genetic factors, with heritability estimated at 40–60%, and is further affected by age, sex, and socioeconomic status [6,7]. Traditional risk factors such as hypertension, diabetes mellitus, dyslipidemia, smoking, obesity, and family history contribute to atherosclerosis and subsequent coronary events [8].

Clinically, coronary disease presents with chest discomfort, dyspnea, fatigue, or nausea, while acute coronary syndrome (ACS) manifests as sudden severe chest pain, diaphoresis, and dizziness [9,10]. Early diagnosis and management, including percutaneous coronary intervention (PCI), are critical in reducing morbidity and mortality [11,12]. However, post-PCI complications such as stent thrombosis and reinfarction remain significant concerns, particularly in high-risk ACS patients [13].

Glycoprotein IIb/IIIa inhibitors, such as Tirofiban, play a key role in reducing platelet aggregation and minimizing thrombotic complications. Tirofiban is a non-peptide, reversible GP IIb/IIIa inhibitor that blocks fibrinogen and von Willebrand factor binding, providing potent antiplatelet effects [14,15]. Although its initial platelet inhibition is slower than that of abciximab, intravenous administration as a bolus followed by infusion ensures rapid and effective platelet inhibition in high-risk ACS patients undergoing PCI [16–18].

Several international studies have demonstrated that Tirofiban is both safe and effective in ACS patients undergoing PCI, significantly reducing platelet aggregation and major adverse

ISSN: 2663-9491 e-ISSN: 2789-6897

cardiac events (MACE) without markedly increasing bleeding risk [19,20]. Low-dose Tirofiban combined with dual antiplatelet therapy has been shown to provide effective platelet inhibition with minimal bleeding complications, while higher doses may increase bleeding without additional short-term benefits [21].
Despite global evidence supporting Tirofiban's efficacy and safety, data from Bangladesh are limited, with most local studies focusing on general PCI outcomes or other antithrombotic therapies. Therefore, this study aims to assess the efficacy and safety of Tirofiban in ACS patients following PCI in a Bangladeshi coronary care unit.

METHODS & MATERIALS

Study Design and Setting

This was a prospective observational study conducted at Khwaja Yunus Ali Medical College Hospital, Sirajganj, Bangladesh from November 2024 to October 2025. The study aimed to assess the efficacy and safety of Inj. Tirofiban in patients with acute coronary syndrome (ACS) undergoing percutaneous coronary intervention (PCI).

Study Population

The study included all adult patients diagnosed with ACS who received Inj. Tirofiban (Fibanix) as part of their PCI procedure during the study period. Patients with incomplete medical records, those with known bleeding disorders, or those who received alternative antiplatelet therapy without Tirofiban were excluded.

Data Collection

Data for this study were prospectively collected from the medical records and catheterization laboratory logs of patients who underwent PCI and received Inj. Tirofiban during the study period. Information retrieved included patients' socio-demographic characteristics such as age, sex, and occupation, as well as their baseline clinical profile, including cardiovascular risk factors (hypertension, diabetes mellitus, smoking, dyslipidemia) and clinical diagnosis at presentation (STEMI, NSTEMI, unstable angina, chronic stable angina, or old myocardial infarction). Angiographic findings, including the number of diseased vessels and stent implantation details, were also recorded. Additionally, procedural outcomes, such as PCI completion, the number of stents implanted, and minor thrombus formation with resolution, were documented. Safety outcomes, including any procedure-related complications such as bleeding, thrombocytopenia, or other adverse cardiovascular events, were carefully extracted to evaluate the efficacy and safety of Tirofiban in this patient population.

Ethical Consideration

The study was conducted in accordance with the Declaration of Helsinki. Formal written informed consent was waived, but patient confidentiality was strictly maintained. Ethical approval was obtained from the Institutional Review Board (IRB) of Khaja Yunus Ali Medical College Hospital.

Statistical Analysis

Data were entered into Microsoft Excel 2019 and analyzed using SPSS version 26.0. Descriptive statistics were used to summarize categorical variables as frequencies and percentages, and continuous variables as mean ± standard deviation (SD). Since this was a prospective observational study, no inferential statistical tests were performed.

RESULTS

A total of 120 patients with acute coronary syndrome (ACS) undergoing percutaneous coronary intervention (PCI) received Inj. Tirofiban (Fibanix) and were included in this hospital-based prospective observational study to evaluate its safety and efficacy.

Socio-demographic Characteristics

Table I shows the socio-demographic profile of the participants. The mean age of the cohort was 53.8 ± 8.5 years, with the majority in the 50–59 years age group (37.5%). The study population was predominantly male (80.8%). Among occupational groups, businessmen (24.7%) and government service employees (19.7%) were the most frequent.

Table – I: Socio-demographic characteristics of ACS patients receiving Inj. Tirofiban during PCI (*n* = 120)

Characteristics	Frequency	Percentage (%)
Age group (years)		
<40	12	10.0
40–49	36	30.0
50–59	45	37.5
≥60	27	22.5
Sex		
Male	97	80.8
Female	23	19.2
Employment status		
Business	29	24.7
Government service	23	19.7
Private service	18	15.0
Farmer	14	11.7
Labour	10	8.3
Housewife	16	13.3
Others	10	8.3

Baseline Clinical Profile

Table II presents Baseline cardiovascular risk factors and clinical diagnosis at presentation. The most prevalent risk factors were hypertension (61.7%), smoking (56.7%), and diabetes mellitus (44.7%).

ISSN: 2663-9491 e-ISSN: 2789-6897

Table – II: Baseline clinical profile of ACS patients (*n* = 120)

Variable	Frequency	Percentage (%)
Clinical History		
Hypertension	74	61.7
Diabetes Mellitus	53	44.7
Smoking	68	56.7
Dyslipidaemia	31	25.8
Hypothyroidism	18	15.0
Dyslipidaemia	31	25.8

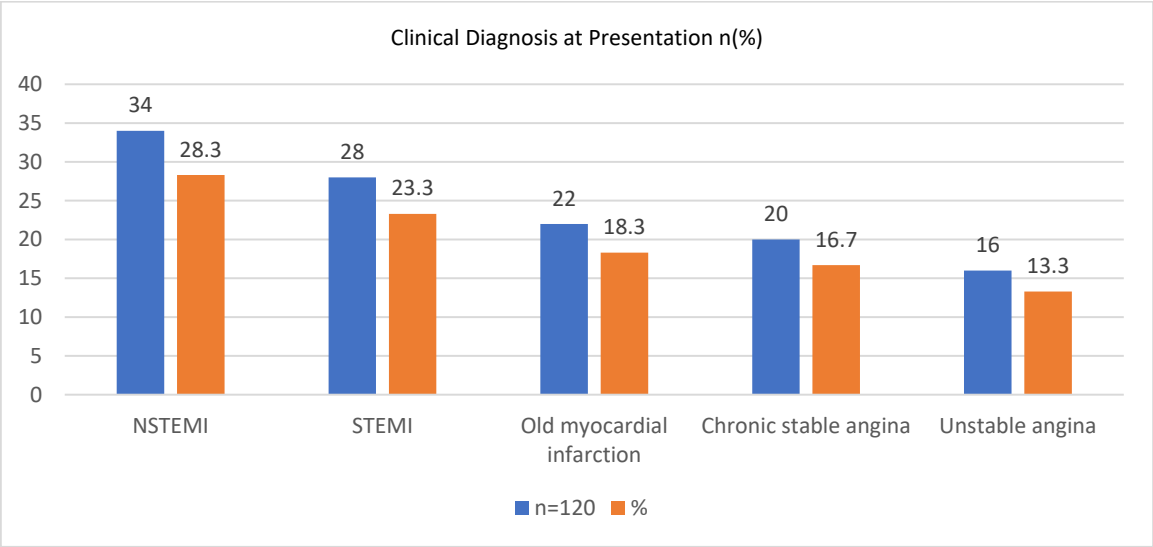

Figure – 2: Clinical Diagnosis at Presentation of ACS patients (*n* = 120)

Figure 1 shows at presentation, NSTEMI (28.3%) and STEMI (23.3%) were the most frequent presentations, reflecting high-risk ACS cases in whom Tirofiban was administered as part of the interventional strategy. Old myocardial infarction (18.3%), chronic stable angina (16.7%), and unstable angina (13.3%) were also observed.

Angiographic Findings

Table III shows the distribution of angiographic disease patterns. Single vessel disease (SVD) was most common (40.0%), followed by double vessel disease (31.7%) and triple vessel disease (28.3%).

Table – III: Angiographic patterns among ACS patients receiving Inj. Tirofiban during PCI (*n* = 120)

Angiographic pattern	Frequency	Percentage (%)
Single Vessel Disease (SVD)	48	40.0
Double Vessel Disease (DVD)	38	31.7
Triple Vessel Disease (TVD)	34	28.3

Table IV shows that of the 120 patients, 110 underwent PCI—all completed successfully (100%)—while the remaining 10 patients underwent only coronary angiography (CAG), indicating that Tirofiban administration did not compromise procedural completion. Single stent implantation was most common (41.8%), followed by two stents (33.6%), three stents (14.5%), and four or more stents (10.0%), reflecting the distribution of coronary artery disease severity and procedural complexity. Minor thrombus formation occurred in only 3 patients (2.7%) and was effectively resolved with Tirofiban, demonstrating its efficacy in intra-procedural thrombus control. No major thrombotic complications were observed. Overall, these findings suggest that Tirofiban is effective in facilitating smooth PCI and controlling thrombus formation in ACS patients.

Table – IV: Procedural efficacy of Tirofiban during PCI (*n* = 120)

Efficacy Indicator	Frequency	Percentage (%)
PCI completed successfully	120	100
Single stent implanted	46	41.8
Two stents implanted	37	33.6
Three stents implanted	16	14.5
Four or more stents implanted	11	10.0
No procedural thrombotic complications	107	97.3
Minor thrombus resolved with Tirofiban	3	2.7

ISSN: 2663-9491 e-ISSN: 2789-6897

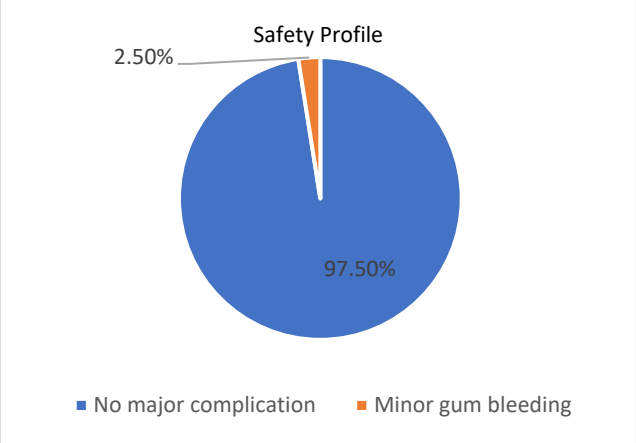

Figure – 2: Complications or safety profile following Inj. Tirofiban administration (*n* = 120)

Safety Profile

Figure 1 shows procedure-related complications following Tirofiban administration were rare. Only 3 patients (2.5%) developed minor gum bleeding, while no major bleeding, thrombocytopenia, or adverse cardiovascular events were observed.

DISCUSSION

In this group of 120 ACS patients treated with tirofiban during PCI, the majority were aged 50–59. This is consistent with a Saudi study indicating ACS prevalence in the 46–65 age group, but it differs from the Euro Heart ACS survey, which found that most patients were aged 65–74—approximately ten years older than our study [22,23].

The study group consisted mainly of males, aligning with results from southern Saudi Arabia that indicate a higher prevalence of CAD in men, which may be attributed to their increased risk of ACS stemming from dyslipidemia, smoking, hypertension, and diabetes [24,25]. Businessmen and government workers comprised the predominant occupational categories, highlighting socio-economic trends that could affect cardiovascular risk, health-seeking behavior, and accessibility to PCI [26].

In this study of ACS patients treated with tirofiban during PCI, hypertension, smoking, and diabetes mellitus emerged as the predominant cardiovascular risk factors, reflecting results from extensive observational studies that indicate a high occurrence of conventional risk factors like hypertension, smoking, and diabetes among ACS groups globally [27]. The most common clinical presentations were NSTEMI and STEMI, indicating high-risk groups of ACS often found in invasive procedures and aligning with previous study data that reveals significant rates of both NSTEMI and STEMI cases among ACS patients [28].

In this group, single-vessel disease was the most prevalent, succeeded by double-vessel and triple-vessel disease, illustrating the varied coronary involvement observed in ACS patients. This pattern corresponds with earlier research indicating that ACS frequently manifests with both single and multivessel disease, where multivessel involvement is linked to more extensive atherosclerosis and an elevated risk [29,30].

Every PCI procedure was successfully completed, with single-stent implantation being the most prevalent. Minor thrombus was observed in just 2.7% of instances and was successfully treated with tirofiban, with no significant thrombotic issues. These findings affirm the effectiveness of tirofiban in promoting smooth PCI and managing intra-procedural thrombus in patients with ACS [31].

Complications related to the procedure after tirofiban were infrequent, with only 2.5% experiencing minor gum bleeding and no occurrences of major bleeding, thrombocytopenia, or negative cardiovascular events. This aligns with previous research indicating that tirofiban is typically safe during PCI, resulting mainly in minor bleeding and posing minimal risk of major complications [31,32].

In summary, tirofiban is both safe and effective for ACS patients receiving PCI, promoting successful procedures, managing intra-procedural thrombus, and resulting in few complications.

CONCLUSION

Tirofiban is a secure and efficient addition for ACS patients having PCI, aiding in the successful execution of procedures and effective management of thrombus during the procedure. Most patients had few complications, with only occasional minor bleeding and no significant thrombotic or cardiovascular incidents. Its application seems especially advantageous in high-risk ACS situations involving NSTEMI or STEMI and different severities of coronary artery disease, reinforcing its contribution to enhanced procedural results while ensuring a positive safety record. In summary, these results support tirofiban as an important treatment choice for improving PCI results in ACS patients

REFERENCES

1. *Roth GA, Abate D, Abate KH, Abay SM, Abbafati C, Abbasi N, Abbastabar H, Abd-Allah F, Abdela J, Abdelalim A, Abdollahpour I. Global, regional, and national age-sex-specific mortality for 282 causes of death in 195 countries and territories, 1980–2017: a systematic analysis for the Global Burden of Disease Study 2017. The lancet. 2018 Nov 10;392(10159):1736-88.*
2. *Tsao CW, Aday AW, Almarzooq ZI, Alonso A, Beaton AZ, Bittencourt MS, Boehme AK, Buxton AE, Carson AP, Commodore-Mensah Y, Elkind MS. Heart disease and stroke statistics—2022 update: a report from the American Heart Association. Circulation. 2022 Feb 22;145(8):e153-639.*
3. *Virani SS, Alonso A, Aparicio HJ, Benjamin EJ, Bittencourt MS, Callaway CW, Carson AP, Chamberlain AM, Cheng S, Delling FN, Elkind MS. Heart disease and stroke statistics-2021 update: a report from the American Heart Association.*
4. *Rogers WJ, Canto JG, Lambrew CT, Tiefenbrunn AJ, Kinkaid B, Shoultz DA, Frederick PD, Every N, Investigators in the National Registry of Myocardial Infarction 1 2 and 3¶. Temporal trends in the treatment of over 1.5 million patients with myocardial infarction in the US from 1990 through 1999: the National Registry of Myocardial Infarction 1, 2 and 3. Journal of the American College of Cardiology. 2000 Dec;36(7):2056-63.*
5. *Writing Group Members, Thom T, Haase N, Rosamond W, Howard VJ, Rumsfeld J, Manolio T, Zheng ZJ, Flegal K, O'Donnell C, Kittner S. Heart disease and stroke statistics—2006 update: a report from the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Circulation. 2006 Feb 14;113(6):e85-151.*
6. *Vinkhuyzen AA, Wray NR, Yang J, Goddard ME, Visscher PM. Estimation and partition of heritability in human populations using whole-genome analysis methods. Annual review of genetics. 2013 Nov 23;47(1):75-95.*
7. *Lloyd-Jones DM, Nam BH, D'Agostino Sr RB, Levy D, Murabito JM, Wang TJ, Wilson PW, O'Donnell CJ. Parental cardiovascular disease as a risk factor for cardiovascular disease in middle-aged adults: a prospective study of parents and offspring. Jama. 2004 May 12;291(18):2204-11.*
8. *Shao C, Wang J, Tian J, Tang YD. Coronary artery disease: from mechanism to clinical practice. Coronary Artery Disease: Therapeutics and Drug Discovery. 2020 Mar 26:1-36.*
9. *Iyengar SS, Gupta R, Ravi S, Thangam S, Alexander T, Manjunath CN, Keshava R, Patil CB, Sheela A, Sawhney JP. Premature coronary artery disease in India: coronary artery disease in the young (CADY) registry. Indian heart journal. 2017 Mar 1;69(2):211-6.*

10. *Krishnan MN. Coronary heart disease and risk factors in India–On the brink of an epidemic?. Indian heart journal. 2012 Jul;64(4):364.*
11. *Maskey A, Sayami A, Pandey MR. Coronary artery disease: an emerging epidemic in Nepal. Nepalese Heart Journal. 2003 Dec 31;2(2):2-6.*
12. *Shah I, Faheem M, Faheem S, Faheem R, Hafizullah M. Clinical profile, angiographic characteristics and treatment recommendations in patients with coronary artery disease. Journal of Pioneering Medical Sciences. 2013 Dec 30;3:94-100.*
13. *Tang X, Li R, Jing Q, Liu Y, Liu P. Efficacy and safety of intracoronary versus intravenous administration of tirofiban during percutaneous coronary intervention for acute coronary syndrome: a meta-analysis of randomized controlled trials. PloS one. 2015 Jun 11;10(6):e0129718.*
14. *Gigliotti DA, da Costa MG, Santos AH, Correia MG, Santos M. Tirofiban efficacy and safety for percutaneous coronary intervention in patients with acute coronary syndrome: protocol for a systematic review and meta-analysis. BMJ open. 2025 May 1;15(5):e093477.*
15. *Valgimigli M, Biondi-Zoccai G, Tebaldi M, van't Hof AW, Campo G, Hamm C, ten Berg J, Bolognese L, Saia F, Danzi GB, Briguori C. Tirofiban as adjunctive therapy for acute coronary syndromes and percutaneous coronary intervention: a meta-analysis of randomized trials. European Heart Journal. 2010 Jan 1;31(1):35-49.*
16. *Kabbani SS, Aggarwal A, Terrien EF, DiBattiste PM, Sobel BE, Schneider DJ. Suboptimal early inhibition of platelets by treatment with tirofiban and implications for coronary interventions. American Journal of Cardiology. 2002 Mar 1;89(5):647-50.*
17. *Schneider DJ, Herrmann HC, Lakkis N, Aguirre F, Lo MW, Yin KC, et al. Increased concentrations of tirofiban in blood and their correlation with inhibition of platelet aggregation after greater bolus doses of tirofiban. Am J Cardiol 2003; 91: 334 – 336.*
18. *Valgimigli M, Percoco G, Barbieri D, Ferrari F, Guardigli G, Parrinello G, Soukhomovskaia O, Ferrari R. The additive value of tirofiban administered with the high-dose bolus in the prevention of ischemic complications during high-risk coronary angioplasty: the ADVANCE Trial. Journal of the American College of Cardiology. 2004 Jul 7;44(1):14-9.*
19. *Yan Z, Zhou Y, Zhao Y, Li Y, Nie X, Zhou Z, Jia D. Efficacy and safety of tirofiban in high-risk patients with non-ST-segment elevation acute coronary syndromes. Clinical Cardiology: An International Indexed and Peer-Reviewed Journal for Advances in the Treatment of Cardiovascular Disease. 2009 Sep;32(9):E40-4.*
20. *Wu TG, Zhao Q, Huang WG, Wei JR, Chen SW, Zhao J, Huang LP, Wang LX. Effect of intracoronary tirofiban in patients undergoing percutaneous coronary intervention for acute coronary syndrome. Circulation Journal. 2008;72(10):1605-9.*
21. *Guo YZ, Zhao ZW, Li SM, Chen LL. Clinical efficacy and safety of tirofiban combined with conventional dual antiplatelet therapy in ACS patients undergoing PCI. Scientific Reports. 2021 Aug 25;11(1):17144.*
22. *Alhassan SM, Ahmed HG, Almutlaq BA, Alanqari AA, Alshammari RK, Alshammari KT. Risk factors associated with acute coronary syndrome in Northern Saudi Arabia. J Cardiol Curr Res. 2017;8(3):00281.*
23. *Rosengren A, Wallentin L, Simoons M, Gitt AK, Behar S, Battler A, Hasdai D. Age, clinical presentation, and outcome of acute coronary syndromes in the Euroheart acute coronary syndrome survey. European heart journal. 2006 Apr 1;27(7):789-95.*
24. *Al-Ghamdi MA. Morbidity pattern and outcome of patients admitted in a coronary care unit: a report from a secondary hospital in southern region, Saudi Arabia. Journal of Community Hospital Internal Medicine Perspectives. 2018 Jul 4;8(4):191-4.*
25. *Bhalli MA, Kayani AM, Samore NA. Frequency of risk factors in male patients with acute coronary syndrome. J Coll Physicians Surg Pak. 2011 May 1;21(5):271-5.*
26. *Simoni AH, Frydenlund J, Kragholm KH, Bøggild H, Jensen SE, Johnsen SP. Socioeconomic inequity in incidence, outcomes and care for acute coronary syndrome: a systematic review. International journal of cardiology. 2022 Jun 1;356:19-29.*
27. *González-Pacheco H, Vargas-Barrón J, Vallejo M, Piña-Reyna Y, Altamirano-Castillo A, Sánchez-Tapia P, Martínez-Sánchez C. Prevalence of conventional risk factors and lipid profiles in patients with acute coronary syndrome and significant coronary disease. Therapeutics and clinical risk management. 2014 Oct 6:815-23.*
28. *El-Menyar A, Zubaid M, Shehab A, Bulbanat B, AlBustani N, Alenezi F, Al-Motarreb A, Singh R, Asaad N, Al Suwaidi J. Prevalence and impact of cardiovascular risk factors among patients presenting with acute coronary syndrome in the middle East. Clinical cardiology. 2011 Jan;34(1):51-8.*
29. *Quarella M, Toggweiler S, Müller DJ, Wyss CA, Corti R, Lüscher TF. Single-vessel versus multivessel PCI in patients with acute coronary syndrome and multivessel coronary artery disease. Cardiovascular medicine. 2011 May 25;14(5):141-7.*
30. *Ahmad F, Haq A, Khan SW. Angiographic findings in patients with Non-ST-elevation myocardial infarction. Pakistan journal of medical sciences. 2024 Nov;40(10):2228.*
31. *Gomma A, Collinson J, Purcell H, Flather M. The role of tirofiban in acute coronary syndromes. International journal of clinical practice. 2000 Mar;54(2):121-4.*
32. *Huynh T, Piazza N, DiBattiste PM, Snapinn SM, Wan Y, Pharand C, Theroux P. Analysis of bleeding complications associated with glycoprotein IIb/IIIa receptors blockade in patients with high-risk acute coronary syndromes: insights from the PRISM-PLUS study. International journal of cardiology. 2005 Apr 8;100(1):73-8.*