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Comparative Effectiveness of Different Antiplatelet Regimens in Patients with Acute Coronary Syndrome: A Systematic Review

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Acute coronary syndrome (ACS) remains a leading cause of morbidity and mortality worldwide. The accumulation of platelets is central to the development and pathogenesis of ACS, making antiplatelet therapy a cornerstone in its management. This review aims to assess the effectiveness of various antiplatelet therapies in patients with ACS. The methodology for this review adheres to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A total of 38 studies from the past decade were included, with articles sourced from Google Scholar and PubMed. The findings indicate that traditional antiplatelet agents, such as aspirin and clopidogrel, have been extensively utilized in the treatment of ACS. Despite their benefits, these agents are limited by a slow onset of action, variable efficacy, and relatively low antiplatelet potency. These limitations have been addressed by the development of newer antiplatelet agents, such as rivaroxaban, ticagrelor, and prasugrel, which offer more potent and predictable platelet inhibition. These novel agents have demonstrated a significant reduction in stent thrombosis, major adverse cardiac or cerebral events (MACCE), and mortality rates in patients with ACS. However, they are associated with an increased risk of severe bleeding in some cases. Another approach, dual antiplatelet therapy (DAPT), which involves the combination of different antiplatelet agents, has shown enhanced safety and efficacy in the management of ACS patients. In conclusion, the effectiveness of antiplatelet therapies is influenced by individual patient characteristics and risk factors. Striking the right balance between reducing the risk of major cardiovascular events and minimizing the potential for severe bleeding remains a critical challenge. Further research is needed to refine our treatment strategies for patients with ACS.

Keywords: Acute coronary syndrome; platelet aggregation inhibitors; comparative effectiveness research; drug therapy; combination monotherapy; aspirin; clopidogrel; ticagrelor; prasugrel hydrochloride; cardiovascular diseases.

1. INTRODUCTION

Acute coronary syndrome (ACS) encompasses a wide range of clinical conditions, including myocardial ischemia, unstable angina, non-ST-segment elevation myocardial infarction (NSTEMI), and ST-segment elevation myocardial infarction (STEMI) [1]. ACS is primarily initiated by intracoronary thrombus formation and the rupture of atherosclerotic plaques [2]. The spectrum of ACS ranges from complex ulcerated lesions to insignificant coronary artery disease, which occurs in 15-20% of patients undergoing angiography [3]. Each year, approximately 7 million people die from acute coronary diseases and ACS collectively [4]. Initially, electrocardiography (ECG) was used to diagnose coronary artery diseases. However, advancements in clinical practice now include coronary endarterectomy, coronary artery bypass grafting, percutaneous coronary intervention (PCI), and antiplatelet therapies [3].

ACS is primarily driven by platelet aggregation. Multiple dual and single antiplatelet therapies with various combinations of antiplatelet agents are used to treat ACS. Dual antiplatelet therapy (DAPT) typically involves the combination of aspirin with another purinergic receptor P2Y12 inhibitor, such as clopidogrel, ticagrelor, or prasugrel. DAPT is superior and more effective than single antiplatelet therapy (SAPT) [4]. Although DAPT reduces major ischemic events in ACS patients, it is also associated with an increased risk of major bleeding events [5]. Both SAPT and DAPT involve the use of oral P2Y12

receptor antagonists, including aspirin, clopidogrel, ticagrelor, and prasugrel, which prevent thrombotic complications in ACS [6]. Aspirin, a purinergic adenosine diphosphate (ADP) receptor P2Y12 inhibitor, exerts high-intensity platelet inhibition through the simultaneous blockade of cyclooxygenase (COX) and ADP-dependent pathways. This potent antithrombotic effect of aspirin, however, increases the risk of bleeding complications [7].

Clopidogrel, an inactive thienopyridine drug, is initially metabolized in the liver into active metabolites that selectively and irreversibly inhibit ADP-induced platelet aggregation [8]. Clinical studies have revealed that 16-50% of patients exhibit clopidogrel resistance, leaving them at risk for adverse cardiovascular events even after receiving the standard dose [9]. Ticagrelor, a cyclopentyl triazole pyrimidine, provides a rapid, potent, and reversible inhibitory effect on platelet activation and aggregation [9]. Prasugrel, a P2Y12 receptor antagonist, also inhibits platelet activation and aggregation with greater strength and speed [1]. However, the efficacy of prasugrel is influenced by CYP2C19 gene polymorphism, and it is currently banned in China [9].

The aim of this systematic review is to evaluate and compare the effectiveness of different antiplatelet regimens, including both single and dual antiplatelet therapies, in the management of patients with ACS. By systematically analyzing data from various studies over the past decade, this review seeks to identify the relative benefits and limitations of traditional antiplatelet agents such as aspirin and clopidogrel, as well as newer agents like ticagrelor and prasugrel. Additionally, the review aims to assess the impact of these therapies on clinical outcomes, such as stent thrombosis, major adverse cardiac or cerebral events (MACCE), mortality rates, and bleeding risks, with the ultimate goal of informing clinical decision-making and optimizing treatment strategies for ACS patients.

2. METHODOLOGY

A systematic review was conducted to evaluate the comparative effectiveness of different antiplatelet therapies in the management of Acute Coronary Syndrome (ACS) over the last decade (2013-2023). The review focused on experimental and epidemiological studies to provide a comprehensive analysis of available evidence.

2.1 Search Strategy

We conducted an exhaustive literature search across multiple electronic databases, including Google Scholar and PubMed, to identify relevant studies. The search strategy incorporated a combination of Medical Subject Headings (MeSH) terms and keywords to ensure thorough retrieval of pertinent literature. The primary search terms included: “Acute Coronary Syndrome/ACS,” “Comparative effectiveness of Antiplatelet,” “Dual Antiplatelet Therapy/DAPT,” “Single Antiplatelet Therapy/SAPT,” as well as the names of specific antiplatelet agents like “Ticagrelor,” “Clopidogrel,” and “Prasugrel.”

2.2 Inclusion and Exclusion Criteria

Studies were included if they met the following criteria:

1. **Population**: Patients diagnosed with ACS.
2. **Intervention**: Use of antiplatelet therapy (DAPT or SAPT) involving agents like Ticagrelor, Clopidogrel, or Prasugrel.
3. **Comparative Design**: Studies comparing the effectiveness of different antiplatelet agents or therapeutic regimens.
4. **Study Types**: Both experimental (randomized controlled trials, cohort studies) and epidemiological studies.
5. **Time Frame**: Published between 2013 and 2023.
6. **Language**: English.

Studies were excluded based on the following criteria:

1. **Duplicates**: After initial database searches, 5669 duplicate records were identified and excluded.
2. **Timeline**: Studies published outside the specified time frame (prior to 2013) were disregarded.
3. **Insufficient Details**: 260 articles were excluded due to a lack of detailed methodology, non-original research (e.g., reviews, commentaries), publication in a language other than English, and absence of strong evidence.
4. **Non-Relevance**: Studies that did not focus directly on the comparative effectiveness of antiplatelet therapies in ACS or that involved different therapeutic areas were omitted.

No studies were excluded based on the direction of their findings (whether positive or negative), ensuring an unbiased analysis.

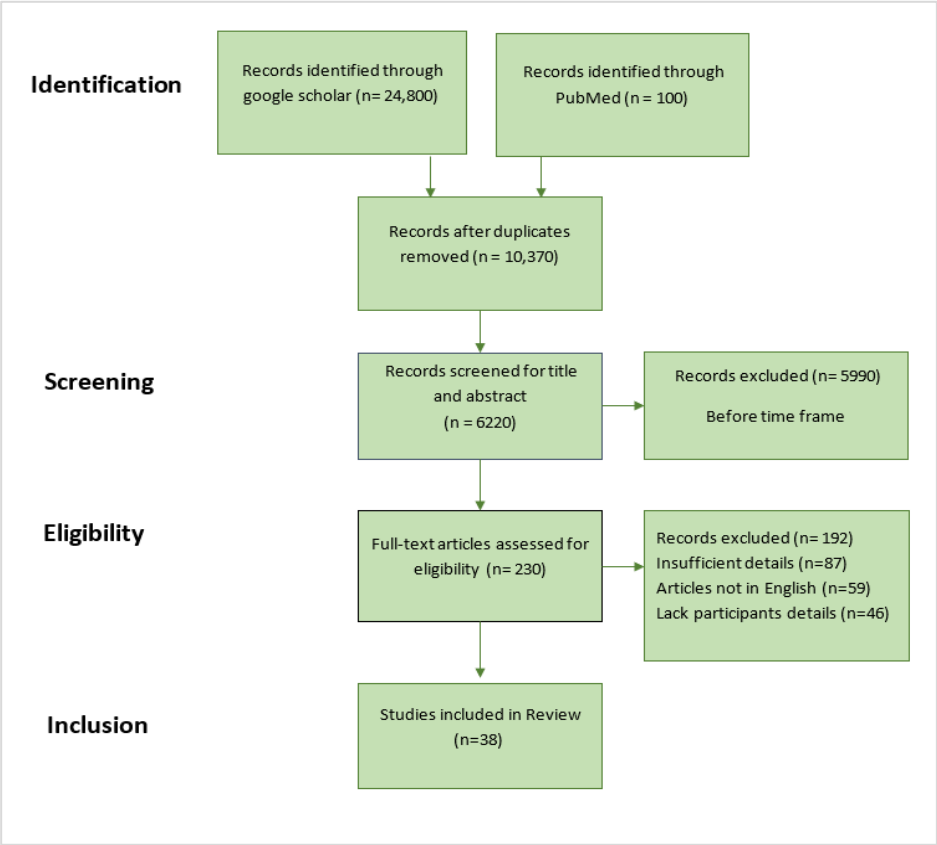

Fig. 1. PRISMA flowchart depicting the study selection process

2.3 Data Extraction and Quality Assessment

Data from the selected studies were extracted using a predefined template. The extracted information included study design, population characteristics, type and duration of antiplatelet therapy, outcomes measured, and key findings. To ensure the reliability of the results, we performed a rigorous quality assessment of each included study using established criteria for evaluating the risk of bias and the overall quality of evidence.

2.4 Synthesis and Analysis

The final selection consisted of 38 studies that met all inclusion criteria (Fig. 1). These studies were reviewed following the 2020 Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) protocols. The findings from these studies were synthesized to draw conclusions about the relative efficacy of different antiplatelet therapies in the management of ACS, taking into account both clinical outcomes and adverse effects.

3. RESULTS AND DISCUSSION

3.1 Mono Antiplatelet Therapy

1. **Cilostazol** A study conducted on ACS patients evaluated the efficacy and safety of individually tailored antiplatelet therapy. Patients with low responsiveness to clopidogrel were treated with additional cilostazol for six months. The results demonstrated a reduction in cardiovascular deaths, myocardial infarction, and strokes compared to the standard group. However, further studies are required to validate these findings [10].
2. **Aspirin** To demonstrate that aspirin desensitization is an effective and safe treatment for ACS patients, a study was conducted on 24 ACS patients with a history of aspirin hypersensitivity. All patients were successfully treated using an aspirin desensitization protocol, with only one patient experiencing a urticarial reaction. Among the patients, five with STEMI were administered abciximab until desensitization was complete. All patients

underwent catheterization, and upon follow-up, only two patients discontinued aspirin due to gastrointestinal bleeding, with no hypersensitivity reactions reported. This study confirms the safety and efficacy of aspirin desensitization in ACS patients, both in the short and long term [11].

3. **Bivalirudin** A study was conducted on ACS patients undergoing PCI to compare different treatment approaches: bivalirudin with restricted use of glycoprotein IIb/IIIa inhibitors, and heparin with or without glycoprotein IIb/IIIa inhibitors. The findings indicated that bivalirudin alone did not result in a reduction of MACE or bleeding events in patients with or without STEMI in ACS [12].
4. **Methyltrexone** A study was conducted on 30 patients with stable coronary artery disease, where morphine was used for pain relief but delayed the effect of P2Y12 receptors, including ticagrelor, by slowing gastric emptying. Methyltrexone, a peripheral opioid receptor antagonist, delays gastric emptying and enhances gastrointestinal absorption without affecting platelet activity [6].
5. **Tirofiban** A cohort study involving 104 patients with progressive ischemic stroke evaluated the effectiveness and efficacy of tirofiban in combination with DAPT. After 14 days of follow-up, the NIH Stroke Scale (NIHSS) score was significantly lower in the tirofiban group. After 90 days, excellent health outcomes were observed in the tirofiban cohort, demonstrating the superiority of tirofiban over DAPT [13].
6. **Apixaban** In a study involving high-risk ACS patients already taking aspirin or aspirin plus clopidogrel, participants were randomized to receive apixaban or a placebo. No significant association was observed, as apixaban did not affect the composite endpoint of cardiovascular death, myocardial infarction, and ischemic stroke in patients receiving aspirin or aspirin plus clopidogrel. However, both groups receiving apixaban exhibited an increased risk of thrombolysis in myocardial infarction major bleeding. This suggests that post-ACS treatment with apixaban is not effective and is associated with an increased risk of bleeding [14].
7. **Rivaroxaban** Three studies were conducted to determine the most effective dose of rivaroxaban, 2.5 mg or 5 mg. One study observed the safety and efficacy of rivaroxaban in patients with STEMI. The findings showed that the 2.5 mg dose reduced the primary endpoint of cardiovascular events, such as stroke and heart attacks, compared to placebo, while no benefit was observed at the 5 mg dose. However, treatment with rivaroxaban increased the risk of bleeding, though not to a fatal extent [15]. Similarly, another study reported that patients treated with the 2.5 mg dose twice daily of rivaroxaban showed a significant reduction in stent thrombosis and a lower mortality rate in ACS patients [16]. Supporting these findings, another study found no significant difference between the two doses in terms of MACE, but the 2.5 mg dose resulted in fewer bleeding complications and fewer instances of drug discontinuation, making it safer and more effective than the 5 mg dose [17].

3.2 Comparison Between Different SAPT

1. **Antiplatelet Clopidogrel vs. Ticagrelor**: Among the 38 studies reviewed, seven focused on comparing the efficacy and safety of clopidogrel versus ticagrelor. Four studies concluded that ticagrelor is more effective than clopidogrel in ACS patients. One study reported that ticagrelor, a direct-acting P2Y12 inhibitor, showed significant benefits over clopidogrel by reducing in-stent thrombosis and aiding in the reduction of target vessel revascularization (TVR). However, it was associated with a higher rate of minor bleeding, and no significant difference in MACCE was observed between the groups [18]. Another study found that ticagrelor was more effective in reducing ischemic events, albeit with an increased risk of non-fatal bleeding. Further investigation into the Asian population, known for a higher propensity for bleeding, showed that the effects of ticagrelor versus clopidogrel were consistent, with no significant differences in efficacy outcomes or net clinical outcomes between Asian and non-Asian ACS patients [19]. Similarly, a 2023 cohort study involving 3,528 Chinese ACS patients demonstrated that the incidence of major adverse cardiovascular events, all-cause mortality, and cardiovascular deaths were significantly lower in the ticagrelor group compared to the clopidogrel group, while no significant differences were

observed in recurrent myocardial infarction, repeated revascularization, or bleeding events [20]. A 2022 cohort study involving 170 ACS patients revealed that those with the CYP2C19 loss of function (LOF) allele were at a significantly higher risk of stent thrombosis and angina symptoms. Patients with a single LOF allele taking ticagrelor had a better prognosis than those on clopidogrel, whereas no clinical benefits were observed for patients with two LOF alleles when taking ticagrelor compared to clopidogrel [9].

However, two studies found that ticagrelor is associated with more bleeding events than clopidogrel. One study on Chinese ACS patients who underwent PCI revealed that patients receiving ticagrelor had a similar risk of net adverse clinical events compared to those on clopidogrel. However, ticagrelor increased MACCE in patients with moderate to high bleeding risk while reducing MACCE in those with low bleeding risk, suggesting that ticagrelor is more effective and safer in patients with a low risk of bleeding but not in those with a higher bleeding risk [21]. Similarly, a 2020 cohort study on 137 ACS patients comparing the effectiveness of DAPT with aspirin-clopidogrel versus aspirin-ticagrelor after coronary endarterectomy (CE) and coronary artery bypass grafting (CABG) found that while DAPT was effective post-CE+CABG, ticagrelor was associated with more bleeding events than clopidogrel, with no significant differences in MACCE [22].

Additionally, a cohort study on Chinese CAD patients undergoing PCI demonstrated that ticagrelor was cost-effective compared to clopidogrel. The analysis indicated that ticagrelor provided an incremental cost-effectiveness ratio (ICER) of 33,875 yuan per quality-adjusted life year (QALY) gained, compared to 1.6932 QALYs at the lowest lifetime cost of 2,450 yuan for universal clopidogrel use.

2. **Antiplatelet Ticagrelor vs. Prasugrel**: Three studies compared the effectiveness of ticagrelor and prasugrel in ACS patients. Two studies suggested that ticagrelor has more advantages over prasugrel. One study reported that ticagrelor demonstrated more consistent positive results, greater pretreatment potential, and reduced cardiovascular events, while prasugrel was associated with an increased bleeding risk when used as pretreatment [23]. Similarly, a 2019 cohort study of 29,714 ACS patients revealed that the risk of major bleeding events and recurrent nonfatal cardiovascular events was significantly lower in the ticagrelor group compared to the prasugrel group [1]. However, another study contradicted these findings, observing the effectiveness of ticagrelor and prasugrel in East Asian ACS patients. Patients were divided into three groups receiving 90 mg of ticagrelor twice daily, 5 mg of prasugrel daily, and 10 mg of prasugrel daily. After analyzing platelet reactivity, the 5 mg prasugrel group showed the highest reactivity, followed by the 10 mg prasugrel and ticagrelor groups, suggesting that 5 mg prasugrel may be the best choice for East Asian ACS patients [24].
3. **Antiplatelet Clopidogrel vs. Prasugrel**: Two studies comparing clopidogrel and prasugrel found that prasugrel was more effective. One study reported that switching from clopidogrel to prasugrel reduced P2Y12 reaction unit (PRU) values, provided tighter control of platelet activity, and significantly reduced MACE, with TIMI major bleeding events accompanied by acceptable TIMI minor and non-major, non-minor clinically relevant bleeding in Chinese patients [25]. Additionally, a post hoc analysis of the PRASFIT-ACS study investigated the impact of CYP2C19 genetic variations on the safety and efficacy of clopidogrel and prasugrel in Japanese ACS patients undergoing PCI. Patients were classified as extensive metabolizers (EM), intermediate metabolizers (IM), or poor metabolizers (PM) based on CYP2C19 genotypes. Regardless of genotype, prasugrel showed lower platelet reactivity compared to clopidogrel. IM and PM patients showed a trend towards lower MACE rates with prasugrel, although no significant difference in MACE was observed between prasugrel and clopidogrel in EM patients. Overall, prasugrel demonstrated more consistent antiplatelet effects than clopidogrel in Japanese ACS patients, irrespective of their CYP2C19 phenotype [26].

However, another study assessed the safety and efficacy of early de-escalation to clopidogrel

guided by platelet function testing (PFT) after an initial period of prasugrel. The primary endpoints, including cardiovascular and bleeding events, showed net clinical benefits. The results indicated that de-escalation of antiplatelet treatment was not inferior to standard prasugrel treatment, suggesting that this de-escalation approach may be considered in ACS patients managed with PCI [27].

4. **Antiplatelet Prasugrel vs. Aspirin**: A study comparing the effectiveness of prasugrel and aspirin found that when Japanese patients were treated with a prasugrel (20/3.75 mg) and aspirin combination, there was a 23% reduction in the risk of MACE and serious clinical bleeding compared to a clopidogrel (300/75 mg) and aspirin combination. This indicates that prasugrel at a 20/3.75 mg dose is effective and safe for Japanese ACS patients [28].
5. **Combinations of Clopidogrel, Prasugrel, and Ticagrelor**: Two studies were conducted to evaluate the effects of various combinations of clopidogrel, prasugrel, and ticagrelor in ACS patients undergoing PCI. One study examined the in-hospital switching of P2Y12 inhibitors among these patients. Switching occurred between clopidogrel, prasugrel, and ticagrelor in various combinations. The findings indicated that when switching from clopidogrel to a novel agent (prasugrel or ticagrelor) versus continuous administration of the novel agent, no significant difference was observed in MACE or bleeding events. However, switching from clopidogrel to a novel agent, as opposed to continuing with clopidogrel alone, resulted in more bleeding events but lower MACE, suggesting that in-hospital switching is common among ACS patients, with a potential increased risk of bleeding when switching to a novel agent Dimitrios Alexopoulos et al., [29]. Similarly, the efficacy and safety of clopidogrel, prasugrel, and ticagrelor were investigated in ACS patients treated with PCI. Ticagrelor showed no significant difference from clopidogrel in MACE, while prasugrel demonstrated a lower rate of MACE compared to clopidogrel. However, both ticagrelor and prasugrel were associated with higher bleeding events compared to clopidogrel. Overall, prasugrel was found to be more effective but this benefit was offset by a higher bleeding risk compared to clopidogrel [30].
6. **Association of Patients' Genetic Makeup and Clopidogrel**: Two studies explored the relationship between genetic makeup and the effectiveness of clopidogrel therapy. One study investigated the influence of CYP2C19 and ABCB1 genes on the metabolism of clopidogrel in ACS patients. The results indicated that patients with certain genetic variations and poor metabolism were more prone to blood clotting issues, while those with ultra-rapid metabolism had a higher risk of bleeding. It was suggested that ACS patients with these genetic variations should be prescribed an alternative drug instead of clopidogrel [31]. Another study in 2020 conducted in China on 2,000,000 ACS patients who underwent PCI demonstrated that genome-guided escalation of antiplatelet therapy with clopidogrel and ticagrelor was more effective than non-guided de-escalation [32].
7. **Association Between Type II Diabetes and Clopidogrel**: A cohort study was conducted on 185 coronary artery disease patients, including 58 with type II diabetes, to evaluate the association between type II diabetes and antiplatelet reactivity. The study revealed a positive association between type II diabetes and clopidogrel resistance, with conditions such as diabetes, hypertension, hyperglycemia, and obesity contributing to reduced antiplatelet activity [33].

The effectiveness of different antiplatelet therapies has been studied across various ethnic groups, demonstrating variability in outcomes based on population characteristics. For instance, in Japanese patients, prasugrel was found to be more effective than clopidogrel, while in Chinese and Korean populations, ticagrelor and clopidogrel-aspirin DAPT showed superior results compared to clopidogrel and aspirin monotherapy, respectively. These findings, along with others from regions, are summarized in Table 1.

Table 1. Effectiveness of different antiplatelets in various ethnic groups

Sr No	Study Type	Year	Ethnicity/Region	Population	Antiplatelets Compared	More Effective
1	Cohort	2021	Japanese	203	Prasugrel vs. Clopidogrel	Prasugrel
2	Cohort	2023	Chinese	3,528	Ticagrelor vs. Clopidogrel	Ticagrelor
3	Cohort	2020	Korean	15,430	Clopidogrel-Aspirin vs. Aspirin	Clopidogrel-Aspirin
4	Cohort	2022	NR	170	Clopidogrel vs. Ticagrelor	Clopidogrel
5	Cohort	2019	Korean	5,990	Clopidogrel-Aspirin vs. Aspirin	Clopidogrel-Aspirin
6	Cohort	2019	9 Countries	7,585	DAPT vs. Ticagrelor	DAPT
7	Cohort	2019	NR	29,714	Ticagrelor vs. Prasugrel	Ticagrelor
8	Cohort	2015	Asian and Non-Asian Patients	Asian (n = 1,106), Non-Asian (n = 17,515)	Ticagrelor vs. Clopidogrel	Ticagrelor
9	Cohort	2015	Asia/Pacific, Eastern Europe, North and South America, Western Europe	7,392	Apixaban	Treatment with Apixaban is not efficient
10	Randomized, Double-Blind, Placebo-Controlled	2013	North & South America, Western & Eastern Europe, Asia Pacific, and Others	15,526	Rivaroxaban	Rivaroxaban
11	Randomized Controlled Trial	2016	Italy, the Netherlands, Spain, Sweden	7,213	Bivalirudin	Bivalirudin alone did not result in a reduction of MACE
12	Cohort	2018	South Korea	2,712	Aspirin plus a P2Y12 Inhibitor	Taking aspirin plus a P2Y12 inhibitor for 1 year is effective

Abbreviations: DAPT: Dual Antiplatelet Therapy; MACE: Major Adverse Cardiovascular Events; NR: Not Reported.

3.3 DAPT vs. SAPT

Seven studies were conducted to compare the effectiveness of DAPT versus mono antiplatelet therapy. Of these, five studies supported the superiority of DAPT. A 2020 cohort study on Korean coronary artery disease patients found that clopidogrel-aspirin DAPT is more effective and safer than aspirin monotherapy, with a significantly lower risk of all types of strokes, including ischemic and non-fatal strokes, as well as all-cause mortality [34]. Another study investigated whether taking DAPT for 6 months is as beneficial as taking it for 1 year, focusing on a Korean population. The results indicated that a 6-month DAPT regimen is nearly as effective as a 1-year regimen, although the 6-month group showed a slightly higher risk of heart attacks, which remains inconclusive. Therefore, it is suggested that ACS patients continue DAPT for

an extended period unless there is a high risk of bleeding [35]. Similarly, a 2022 cohort study on 12,234 Korean ACS patients revealed that the risk of primary composite vascular events and recurrent strokes is significantly lower with clopidogrel-aspirin DAPT compared to other combined antiplatelet treatments. However, there was no significant difference between aspirin monotherapy and combined antiplatelet therapies [36]. A 2020 cohort study involving 137 ACS patients compared the effectiveness of DAPT (aspirin-clopidogrel and aspirin-ticagrelor) after coronary endarterectomy and coronary artery bypass grafting. This study found that DAPT is effective post-CE+CABG, but ticagrelor was associated with more bleeding events than clopidogrel, with no significant differences observed in MACCE events [22]. In 2019, a cohort study involving 5,590 Korean ACS patients followed for 3 months showed that all types of vascular events and recurrent strokes were significantly lower in patients treated with clopidogrel-aspirin DAPT compared to aspirin monotherapy [37].

Two studies favored SAPT. A 2021 cohort study on European ACS patients revealed that DAPT is associated with more than double the risk of MACE compared to SAPT. More bleeding events occurred in patients on DAPT, indicating that SAPT is safer [38]. Similarly, a 2019 cohort study on 7,585 patients undergoing PCI compared 1-month DAPT followed by 23-month ticagrelor monotherapy with 12 months of aspirin monotherapy. The study found that ticagrelor monotherapy reduced the risk of nonfatal myocardial infarction, nonfatal strokes, urgent TVR at 2 years, and all-cause mortality, while also lowering the risk of bleeding events compared to conventional aspirin monotherapy [39].

One 2023 cohort study showed no significant difference between DAPT and SAPT. In this study, 671 patients who had been on DAPT for 1 year were switched to SAPT (either aspirin or clopidogrel) and followed for 4 years. No significant differences were observed in overall mortality, major adverse events, acute myocardial infarction, ischemic stroke, coronary reintervention, or major bleeding events [40].

3.4 Personalized Antiplatelet Therapy

In 2020, a cohort study involving 2,237 Chinese ACS patients undergoing PCI evaluated the effectiveness of personalized antiplatelet therapy. The study revealed that the incidence of stent thrombosis, MACE, and MACCEs were significantly lower in the personalized antiplatelet therapy group. However, no significant differences were observed in the incidence of strokes, all-cause death, MI, major bleeding events, or urgent revascularization.

4. CONCLUSION

In conclusion, antiplatelet therapies play a crucial role in inhibiting blood clot formation, thereby preventing MACCE in ACS patients. The comparative effectiveness of these therapies varies based on individual patient characteristics, including ethnic background, highlighting that not all patients respond uniformly to the same treatment. Factors such as metabolism rate, genetic variations, and comorbid conditions significantly influence the safety and efficacy of specific therapies for individual patients. The findings indicate that different ethnic groups may metabolize drugs at varying rates, affecting the overall efficacy of the treatment. Therefore, personalized medicine, tailored to each patient's unique traits and genetic makeup, is essential to reduce major cardiac events in ACS patients. Further research is necessary to deepen our understanding of how tailored treatments can enhance patient outcomes.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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