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Cardiovascular Safety of Long-term Use of Biologic Therapies: A Meta-Analysis of Clinical Trials

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Abstract

This meta-analysis examines the cardiovascular safety of long-term biologic therapy use across various autoimmune and inþammatory conditions. Through systematic review and analysis of clinical trial data, we investigate the incidence of cardiovascular events, including myocardial infarction, stroke, and heart failure, among patients receiving biologic therapies compared to controls. Despite concerns regarding the potential cardiovascular risks associated with chronic inþammation and biologic therapy use, our comprehensive analysis reveals no signiýcant increase in cardiovascular events with long-term biologic therapy use. These ýndings o er reassurance regarding the cardiovascular safety of biologic therapies in the management of autoimmune and inþammatory conditions, though ongoing monitoring and comprehensive cardiovascular risk management remain essential.

Ke ords: Biologic therapies; Cardiovascular safety; Autoimmune diseases; In ammatory conditions; Meta-analysis; Clinical trials; Myocardial infarction; Stroke; Heart failure; Chronic in ammation; Cardiovascular risk

In od c on

Biologic therapies have revolutionized the landscape of treating various autoimmune and in ammatory conditions, o ering targeted treatments that o en provide signi cant relief to patients. However, concerns have been raised about their potential impact on cardiovascular health, especially with long-term use. To address these concerns, researchers have conducted numerous clinical trials, but the ndings have been varied. In this article, we delve into a meta-analysis that seeks to provide a comprehensive assessment of the cardiovascular safety of long-term biologic therapy use [1].

Unders nding biologic erapies

Biologic therapies are medications derived from living organisms or substances found in living organisms. ey target speci c molecules involved in the in ammatory process, such as cytokines or immune cells, to modulate the immune response. ese therapies have transformed the management of conditions like rheumatoid arthritis, psoriasis, in ammatory bowel disease, and others, o ering improved outcomes and quality of life for many patients [2].

Ra onale for cardio asc lar safe e al a on

While biologic therapies have demonstrated e cacy in controlling in ammation and disease progression, concerns have arisen regarding their potential cardiovascular e ects. Chronic in ammation, a hallmark of autoimmune and in ammatory conditions, is intricately linked with cardiovascular disease (CVD) development and progression. erefore, understanding how biologic therapies impact cardiovascular health is of paramount importance, especially given their long-term use in chronic conditions [3].

Me -anal sis me odolog

e meta-analysis under scrutiny aimed to consolidate evidence from multiple clinical trials assessing the cardiovascular safety of long-term biologic therapy use. Researchers systematically reviewed relevant literature, identi ed eligible trials, and extracted data regarding cardiovascular events, such as myocardial infarction, stroke, and heart failure, among patients receiving biologic therapies compared to placebo or conventional treatments.

Ke ndings

e meta-analysis encompassed data from diverse biologic therapies across various autoimmune and in ammatory conditions. Surprisingly, the overall analysis revealed no signi cant increase in the risk of cardiovascular events associated w()l, long-termbiologic

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Ma[illegible]rials and Me[illegible]ods

Li[illegible]ra[illegible]re search s[illegible]a[illegible]g

- A systematic literature search was conducted across multiple electronic databases, including PubMed/MEDLINE, Embase, Cochrane Library, and ClinicalTrials.gov.
- Search terms included combinations of keywords related to biologic therapies (e.g., adalimumab, in iximab, etanercept, rituximab, etc.), autoimmune and in ammatory conditions (e.g., rheumatoid arthritis, psoriasis, in ammatory bowel disease, etc.), and cardiovascular outcomes (e.g., myocardial infarction, stroke, heart failure, etc.).
- e search was restricted to clinical trials published in peer-reviewed journals, with no language restrictions imposed.

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- Eligible studies included randomized controlled trials (RCTs) evaluating the cardiovascular safety of long-term biologic therapy use in patients with autoimmune and in ammatory conditions.
- Trials with a minimum duration of 6 months and reporting cardiovascular events as primary or secondary outcomes were included.
- Non-randomized studies, observational studies, case reports, and reviews were excluded [6].

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Two independent reviewers screened the search results based on prede ned eligibility criteria.

Data extraction was performed using a standardized form to collect information on study characteristics (e.g., study design, duration, sample size, etc.), participant demographics, biologic therapies administered, and cardiovascular outcomes reported.

Any discrepancies or disagreements were resolved through consensus or consultation with a third reviewer.

Risk of bias assessmen[illegible]

e risk of bias within included studies was evaluated using established tools such as the Cochrane Collaboration's Risk of Bias tool for RCTs.

Key domains assessed included random sequence generation, allocation concealment, blinding of participants and personnel, incomplete outcome data, selective reporting, and other sources of bias [7].

Da[illegible]s n[illegible]esis and anal sis

Extracted data were synthesized to provide descriptive summaries of study characteristics and cardiovascular outcomes across included trials.

Meta-analysis was performed using appropriate statistical methods (e.g., Mantel-Haenszel method for dichotomous outcomes) to calculate pooled risk estimates (e.g., relative risk, odds ratio) and corresponding 95% con dence intervals (CIs).

Subgroup analyses were conducted to explore potential sources of heterogeneity, such as speci c biologic agents, duration of therapy, and underlying conditions [8].

Sensi[illegible]i[illegible] anal ses

Sensitivity analyses were conducted to 5(ly)4v0.86 Tw 9ustnv0.5(of)0.86 T

their treatment regimen.

Limitations and Future Directions: Despite the strengths of our meta-analysis, several limitations warrant consideration. e included trials varied in terms of study design, patient populations, and outcome de nitions, which may have introduced heterogeneity and in uenced the overall ndings. Additionally, the majority of trials had relatively s.ely
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