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A Systematic Review of Eculizumab as a Treatment for Shiga Toxin-Producing Escherichia coli Hemolytic Uremic Syndrome (STEC-HUS): Clinical Efficacy, Challenges, and Long-Term Outcomes

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Objectives : Hemolytic Uremic Syndrome (HUS) caused by Shiga toxin-producing Escherichia coli (STEC) is a life-threatening condition, and is characterized by acute kidney injury, thrombocytopenia, and microangiopathic hemolytic anemia. Severe cases often involve neurological complications, leading to long-term disability or mortality. While supportive care remains the mainstay treatment, Eculizumab, a complement C5 inhibitor, has emerged as a potential therapeutic option, particularly for patients with severe neurological involvement. However, its efficacy and long-term benefits remain controversial. This systematic review evaluates the clinical impact of Eculizumab on renal recovery, neurological outcomes, and overall prognosis in STEC-HUS patients.

Methods : Following PRISMA guidelines, a systematic literature search was conducted in PubMed, Embase, and Web of Science. Keywords included "Eculizumab," "STEC-HUS," "Hemolytic Uremic Syndrome," "Shiga toxin," and "renal and neurological outcomes." Studies were screened based on predefined inclusion criteria, selecting clinical trials, observational studies, and case series that assessed Eculizumab's effects on renal and neurological function. Risk of bias was evaluated using the Cochrane Risk of Bias Tool and Newcastle-Ottawa Scale. Due to heterogeneity in study designs and patient populations, a qualitative synthesis was performed.

Results : Fourteen studies met the inclusion criteria, with findings suggesting that Eculizumab may improve short-term neurological recovery but has inconsistent effects on long-term renal function and mortality. Some studies reported reduced neurological sequelae, while others found no significant impact on chronic kidney disease progression or dialysis dependence. High costs and unclear long-term benefits remain key challenges.

Conclusions : While Eculizumab shows potential in mitigating severe neurological complications, its role in STEC-HUS treatment remains inconclusive. Further randomized controlled trials are essential to establish long-term efficacy, safety, and cost-effectiveness. Standardized treatment protocols and deeper mechanistic insights will be crucial for optimizing patient outcomes.

Figure 1. PRISMA Flowchart.jpg

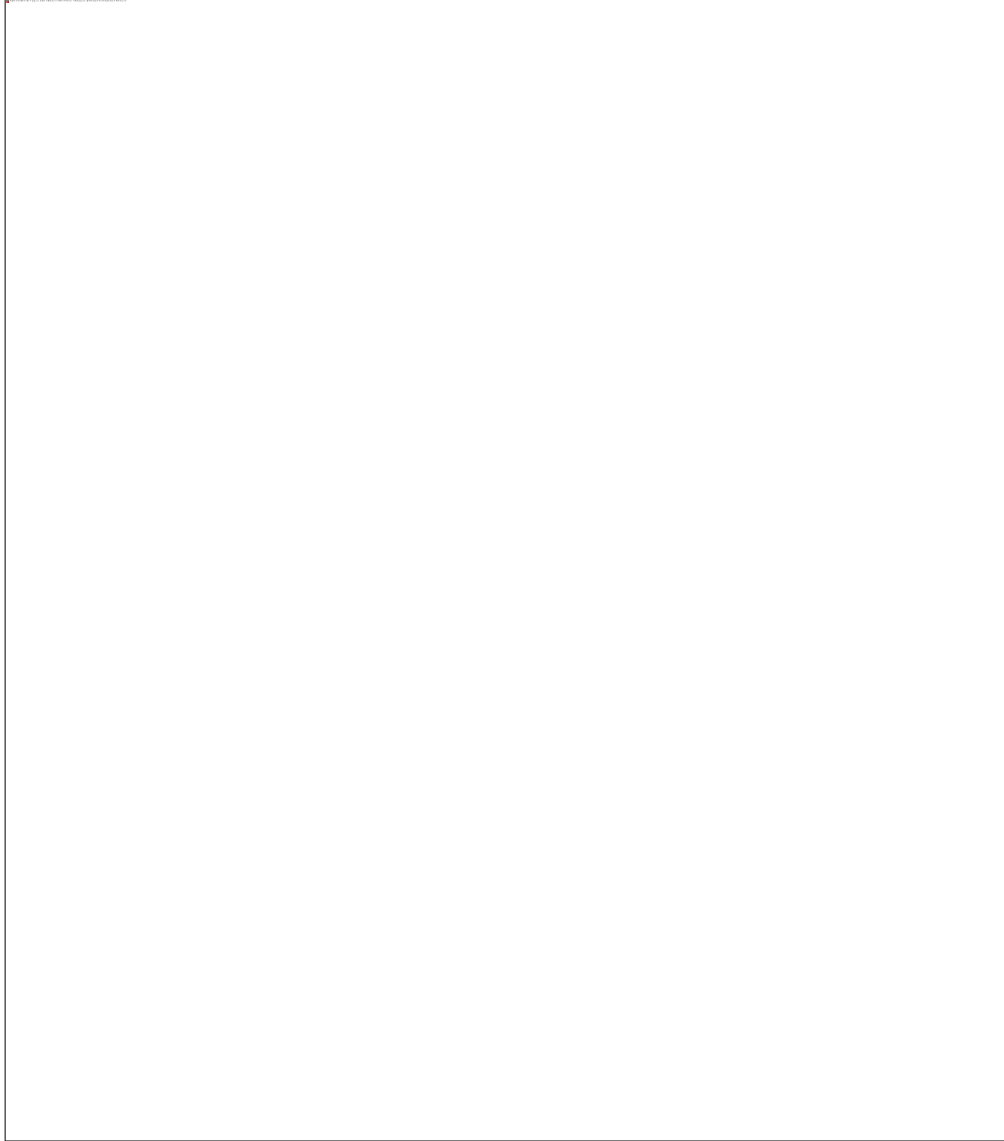


Figure 1. PRISMA Flowchart.jpg

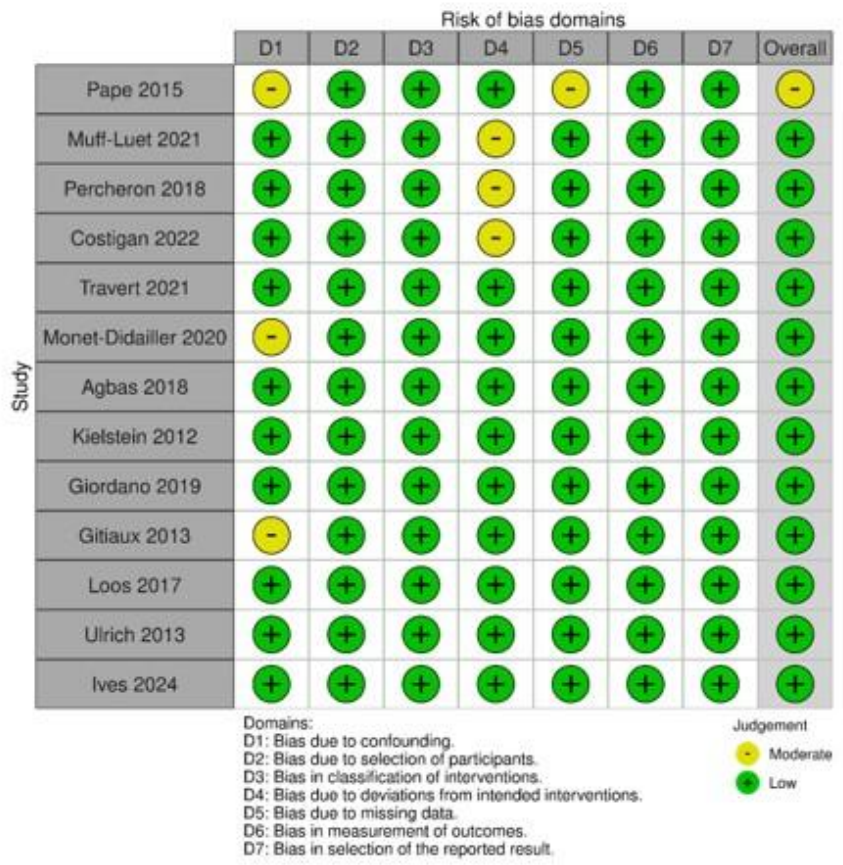


Figure 2. ROBINS-I

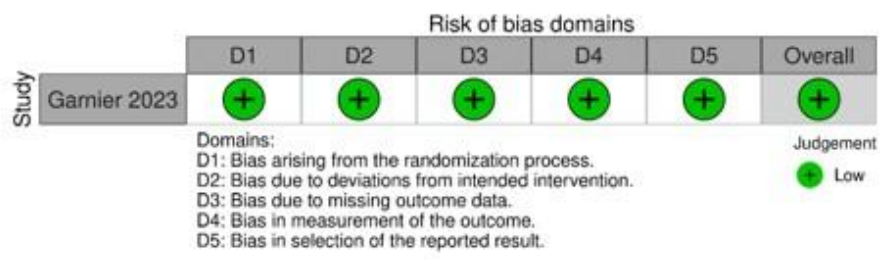


Figure 3. RoB 2