Stem Cell Transplantation as a Curative Treatment for Severe Combined Immunodeficiency: A Systematic Review

Mohammad Reza Moghaddasnejad[1], Negar Sadat Sherafat1[2*]

[1]Student Research Committee, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran
[2]Thalassemia & Hemoglobinopathy Research Center, Health Research Institute, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

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***Corresponding Author:**
Thalassemia & emoglobinopathy Research Center, Health Research Institute, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

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ABSTRACT

Introduction: One in every 50,000 to 100,000 live births is estimated to be affected by severe combined immunodeficiency (SCID). SCID is a primary immunodeficiency disorder characterized by severe cellular and humoral immunity defects, leading to increased susceptibility to infections. Typically, SCID presents in early infancy with recurrent and opportunistic infections, failure to thrive, and a high mortality rate if left untreated. Treatment options for SCID include allogeneic hematopoietic stem cell transplantation (HCT) or gene therapy to correct the function of immune cells. The purpose of this study was to systematically review the therapeutic effects of stem cell transplantation in patients with SCID.

Methods and Materials: The study was conducted based on the PICO criteria and aligned with the research objective, adhering to the PRISMA checklist. This systematic review included a comprehensive search from 2019 to March 2024 in the PubMed, SCOPUS, and Web of Science databases, the Google Scholar search engine, and the Persian databases SID and Magiran. The MESH keywords used for the search were "SCID", "Stem cell", "Transplantation", and "Therapy". Subsequently, two independent researchers screened the retrieved articles based on inclusion criteria.

Results: A total of 274 articles were identified during the initial search. After removing duplicates and screening titles and abstracts, the number of articles was reduced to 16. Finally, after considering the inclusion and exclusion criteria and reviewing the full text, six articles were included in this study. Most of the studies showed that stem cell transplantation is a treatment with minimal short- and long-term toxicity in patients with SCID and leads to improved immune system reconstitution, resistance to opportunistic infections, long-term survival in more than 70% of cases, and improved quality of life in patients with SCID.

Conclusion and Discussion: Stem cell transplantation can be an effective treatment for patients with SCID and can reduce disease complications, the burden of care, and associated healthcare costs. However, more research is needed to confirm this approach and establish its clinical application due to the limitations of the studies conducted in this field.

Keywords: SCID, Stem cells, Therapeutics, Transplantation

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