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INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/22580
DOI URL: http://dx.doi.org/10.21474/IJAR01/22580

RESEARCH ARTICLE

DELAY OR PREVENTION OF T1DM ONSET IN AT-RISK CHILDREN - A SYSTEMATIC REVIEW

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Manuscript Info

Manuscript History
Received: 04 October 2025
Final Accepted: 06 November 2025
Published: December 2025

Abstract

Type 1 diabetes in children is a genetic and environmental condition that results in immune-mediated loss of beta-cell function, hyperglycemia, and lifelong insulin need. Although type 1 diabetes can be identified at almost any age, its symptoms peak between the ages of 5 and 7 and around puberty. Ahmed et al (2023) The metabolic disease known as type 2 diabetes mellitus is typified by peripheral insulin resistance and beta cell inability to adjust, which results in hyperglycemia. According to estimates, one in three children diagnosed with diabetes today will develop type 2 diabetes mellitus (20% to 33%). Even while the prevalence of obesity in these age groups has plateaued, the risk of type 2 diabetes mellitus in children is still rising. Al-Rubeaan et al (2015)Saudi Arabia has seen a sharp increase in the prevalence of type 1 diabetes mellitus (T1DM), with national health registries showing a consistent rise in the disease's prevalence among children and teenagers.

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Introduction:-

Recent efforts have moved from reactive treatment to proactive treatments aiming at delaying or avoiding disease onset as a result of the lifetime nature of type 1 diabetes and its associated complications, especially in children who are genetically or immunologically at-risk. This conversation summarizes research findings from both local and international literature in light of Saudi Arabia's public health infrastructure, research agendas, and healthcare system. Aljohani et al (2019) The incidence of type 1 diabetes in children under the age of 15 is among the highest in Saudi Arabia, according to current epidemiological studies.Teplizumab is the immunotherapy agent leading this charge. Teplizumab is a paradigm-changing therapy ushering in an era of T1DM care that permits intervention in the pre-clinical phase of disease. It became the first and only drug approved for this purpose by the United States Food and Drug Administration (FDA) and importantly, the Saudi Food and Drug Authority (SFDA).Teplizumab, marketed as Tzield, is a humanized anti-CD3 monoclonal antibody used to modify the body's immune-mediated destruction of its own beta cells. The mechanism of action is complicated and involves sophisticated reprogramming of the immune system to achieve immune tolerance. Md. Alotaibi et al (2023)

Teplizumab binds to the CD3 protein complex on the surface of T-cells. T cells are a type of uncategorized T cells that are orchestrating the autoimmune attack against pancreatic beta cells. Teplizumab binds CD3, a critical component of T-cell activation, which will modulate how T-cells work and does not simply serve to suppress immunity, but rather, induces a state of anergy (a lack of response) or inactivation of autoreactive T-cells. Teplizumab binding to the CD3 complex, potential engages a cascade of events that promote differentiation and expansion of regulatory T-cells (or Tregs). Tregs are ultimately responsible for achieving and maintaining immune homeostasis, or preventing a posteriori autoimmunity. Teplizumab also changes the cytokine milieu in the immune system from pro-inflammatory to anti-inflammatory, making it potentially more difficult for the immune system to mount a response to destroy beta cells.B Alnashwan et al (2021)There are cultural and ethical ramifications to the adoption of preventative immunotherapy and pre-symptomatic diagnosis in children, especially in the Saudi environment. Given the uncertainty surrounding the long-term implications, parents may be reluctant to start medication therapy for asymptomatic children. This present study will focus on the ways and means for delaying or preventing T1Dm in children, then as discussed above, Teplizumab is the latest update in the line of the prevention; hence significance should be given to the process, development and effects of the same.

Objective of the Study:-

The objective of the study is to evaluate the delay or prevention of T1Dm onset in at-risk children; and also to focus on the respective reasons and and complication arousing after the detection of TID in children in Saudi Arabia.

Research Questions:-

Q1. What are the prevailing and future strategies to delay or prevent the T1DM onset in at risk children.
Q2. What is the effectiveness of Tepliuzumab in preventing or delaying the onset of T1DM and also the application of Teplizumab-based therapies in KSA healthcare sector.

Research Methodology:-

Research Design:-

This study uses exploratory research design, which is based on the accumulation and exploration of secondary data. Here secondary data refers to various studies conducted during a given period of time about the topic at hand. Considering the facts this study also touched a good number of studies conducted in the recent past and tried to find the development in treatment and prevention processes for T1DM in children of KSA. Appropriate significance is given to the Tepliuzumab. Most of the studies were considered from the period of 2015 to 2025.

Population: The population of the study was the total number of studies based on T1DM (specially children), detection and cure of the same and evaluation of social setting. Starting at the outset of global presence of T1DM in children, gradually the study flows down to Saudi Arabia. Researcher accumulated around 54 studies in this regard and after a thoughtful evaluation assessment of same was conducted.

Inclusion and Exclusion criteria:-

Inclusion:-

- Studies conducted on children and adolescents (≤18 years) at risk of T1DM
- Studies explaining the preventive or screening programs and the recent developments
- Results of the clinical trials, meta analysis and even the observational studies will be included.

- National or global studies focused on Saudi Arabia.
- Studies published or presented in English or Arabic will be included.
- Studies published between 2015 to 2025 will be included

Exclusion:-
- Studies conducted on adults or general population that is diabetic.
- Studies explaining non-preventive treatments
- Any type of editorials, general opinions, non-peer reviewed articles will be excluded.
- Studies not related to Saudi Arabia or MEA will be excluded
- Studies in other languages (without translation) will be excluded.
- Studies published before 2015 will be excluded.

Sources of Data and Keywords:-
Researcher has touched a number of sources for the collection of data. Some of the relevant sources are mentioned here:
- PubMed
- Cochrane Library
- ClinicalTrials.gov
- EMBASE
- Saudi Medical Journal
- King Saud University Repository

Keywords for the study were decided in advance and only those studies were touched that have the following keywords using boolian operators (AND, OR):
"Type 1 Diabetes Mellitus" AND "Prevention" OR "Delay", "Teplizumab" AND "Children" OR "Pediatric", "Saudi Arabia" AND "Autoantibodies" OR "HLA typing", "Immunotherapy" AND "T1DM onset".

Information Extraction:-
Researcher had prepared a format for recording the relevant information, main heading include, design of study and location, demographics of the respondents and number, specific measures of outcome, like time to T1DM onset, autoantibody levels, C-peptide preservation, etc. and relevance of the study to Saudi population.

Statistical Paradigms:-
The measures' distribution was evaluated using the Student's t-test will be employed to compare the mean values of the occurrence and cure of patients, across the studies reviewed in the given period of time. Broad results will be presented in the form of tables and charts.

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