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Diabetes Reversal in Adults with Type 2 Diabetes Mellitus: A Scoping Review

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Abstract: ***Background**: Type 2 diabetes mellitus (T2DM) has traditionally been viewed as a lifelong, progressive metabolic disorder. Recent scientific evidence, however, demonstrates that sustained remission of T2DM is achievable through targeted lifestyle, dietary, and metabolic interventions that address the underlying pathophysiology rather than only glycaemic control. **Aim**: This scoping review aims to map the available evidence on interventions facilitating diabetes reversal, summarize underlying physiological mechanisms, identify predictors of remission, and highlight implications for nursing practice. **Methods**: A scoping review was conducted following the Arksey and O'Malley framework with updates from the Joanna Briggs Institute methodology. Electronic databases including PubMed, Scopus, CINAHL, Cochrane Library, and Google Scholar were searched for studies published between 2010 and 2025. Key search terms included "type 2 diabetes remission", "diabetes reversal", "low-calorie diet", "intermittent fasting", "metabolic surgery", and "lifestyle intervention". Of 112 identified records, 48 studies met the inclusion criteria and were analysed thematically. **Results**: Five major intervention pathways were identified: dietary modification, weight loss strategies, intermittent fasting, physical activity with behavioural change, and bariatric/metabolic surgery. Successful remission was strongly associated with early disease duration, substantial weight reduction, improved insulin sensitivity, reduction in hepatic and pancreatic fat, gut microbiome modulation, and beta-cell functional recovery. **Conclusion**: Diabetes reversal is a feasible and clinically meaningful outcome in a significant proportion of adults with T2DM. Nurses play a critical role in early identification, patient education, lifestyle counselling, monitoring, and long-term follow-up. Further large-scale Indian studies are required to evaluate sustainability and nurse-led intervention models.*

Keywords: Type 2 diabetes mellitus, Diabetes remission, Diabetes reversal, Intermittent fasting, Low-carbohydrate diet, Lifestyle modification

1. Introduction

Type 2 diabetes mellitus (T2DM) represents one of the most significant public health challenges globally. According to recent estimates, over 537 million adults are affected worldwide, with India contributing more than 100 million cases. Conventionally, T2DM has been regarded as a chronic, irreversible disease requiring lifelong pharmacological management. This paradigm is now shifting due to growing evidence demonstrating that remission is possible when underlying metabolic dysfunction is corrected.

The concept of diabetes remission gained prominence following landmark trials such as the Diabetes Remission Clinical Trial (DiRECT), Look AHEAD study, and multiple dietary intervention studies. Diabetes remission is commonly defined as maintenance of glycated haemoglobin (HbA1c) below 6.5% for at least three months in the absence of glucose-lowering medication. This review synthesizes contemporary evidence on diabetes reversal strategies and examines their relevance to nursing practice.

Objectives

1) To explore interventions used for achieving diabetes remission.
2) To summarise physiological mechanisms contributing to reversal of T2DM.
3) To identify gaps in existing research literature.
4) To highlight implications for nursing practice and future research.

2. Methodology

A scoping review methodology was adopted based on the Arksey and O'Malley framework and Joanna Briggs Institute guidelines.

Search Strategy

Databases searched included PubMed, Scopus, CINAHL, Cochrane Library, and Google Scholar. Studies published between 2010 and 2025 were considered. Keywords and Boolean operators were applied to retrieve relevant literature.

Inclusion Criteria

- Adults diagnosed with T2DM
- Randomised controlled trials, cohort studies, systematic reviews, and clinical guidelines
- Studies reporting diabetes remission or reversal outcomes

Exclusion Criteria

- Type 1 diabetes mellitus
- Animal and in-vitro studies
- Opinion pieces and editorials without empirical data

Data Analysis

Data were charted and categorised into major thematic areas related to intervention type, physiological mechanisms, and predictors of remission

3. Results

Dietary Interventions

Low-calorie and very-low-calorie diets demonstrated the highest remission rates, primarily through reduction of hepatic and pancreatic fat. Low-carbohydrate and ketogenic

diets showed rapid improvements in glycaemic control and medication withdrawal, particularly in insulin-resistant individuals. Mediterranean and plant-based diets contributed to modest but sustained remission.

Intermittent Fasting
Intermittent fasting regimens improved insulin sensitivity and promoted metabolic flexibility. Evidence from Indian studies showed significant reductions in HbA1c and medication dependence.

Exercise and Behavioural Modification
Regular aerobic and resistance exercise enhanced glucose uptake and insulin sensitivity. Combined lifestyle interventions significantly increased remission probability.

Bariatric and Metabolic Surgery
Surgical interventions resulted in the highest remission rates, often independent of weight loss, due to hormonal and metabolic changes affecting glucose homeostasis.

Gut Microbiome and Beta-cell Recovery
Diet-induced changes in gut microbiota and reduction of glucose toxicity facilitated beta-cell rest and functional recovery.

4. Discussion

The findings confirm that T2DM remission is achievable and sustainable, particularly when interventions are initiated early. Weight loss and reduction of ectopic fat emerge as central mechanisms. In the Indian context, carbohydrate-heavy diets and abdominal obesity are major modifiable risk factors. Nurses are strategically positioned to lead lifestyle modification programs and ensure long-term adherence.

Gaps in Literature
- Limited long-term Indian studies on sustained remission
- Lack of uniform remission definitions
- Scarcity of nurse-led intervention trials
- Limited comparative studies across dietary models

Implications For Nursing Practice
- Development of nurse-led diabetes remission clinics
- Structured lifestyle and dietary counselling
- Monitoring and safe medication de-escalation
- Behavioural change support through motivational interviewing

5. Conclusion

Diabetes reversal is a realistic and evidence-based outcome for many adults with T2DM. Early diagnosis, intensive lifestyle modification, and sustained follow-up are crucial. Nursing professionals play a pivotal role in translating remission research into clinical practice. Future research should prioritise large-scale Indian trials and nurse-led intervention models.

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