Intermittent Fasting and glycaemic control in Type II Diabetes: A review

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Abstract

This paper reviews the impact of intermittent fasting on glycaemic control and subsequently Type 2 diabetes.Type 2 Diabetes has been labelled a disease of modern lifestyle causing significant health burden on individuals and overall health care systems. Research highlights that poor glycaemic control can lead to insulin resistance, metabolic syndrome and potentially Type 2 Diabetes. Periodic calorific restriction is hypothesized to reduce insulin resistance and increased lipolysis. Intermittent fasting can cause a risk of hypoglycaemia and dietary measures alone may not be sufficient for weightloss and Type 2 Diabetes management.

Key words: Type 2 Diabetes, Intermittent Fasting, Glycaemic Control,Weight Loss

Introduction

Type II diabetes is a chronic metabolic condition characterised by hyperglycaemia secondary to the inadequate utilisation of insulin. The incidence of Type II Diabetes continues to increase globally and remains a significant healthcare concern (3). Prevention and early intervention are key to reducing the health burden on individuals and healthcare systems (10). Health professionals have alwaysencouraged general lifestyle and dietary changes in patients; however, in recent years, intermittent fasting has become a specific pattern of eating that could aid patients with Type 2 diabetes. This paper explores the impact of intermittent fasting on Type 2 Diabetes and its role as an adjunct to pharmacological interventions.

Discussion

Type II diabetes mellitus

Type II diabetes, also known as non-insulin-dependent diabetes or adult-onset diabetes, is a common metabolic disorder(1-3). People with type II diabetes develop a hyperglycaemic state due to insulin resistance or insufficiency. Insulin is secreted by the pancreatic cells (B-islet cells) and is the primary hormone responsible for glucose metabolism(1). Type II diabetes is characterised by high insulin resistance leading to inefficient metabolism of glucose, lipids and proteins(1). Insulin resistance, leading to type II diabetes, is a multi-factorial pathological process including lifestyle factors, biomedical characteristics and genetic predisposition (1).

Type II diabetes has often been labeled an epidemic of modern life and lifestyle disease(2, 3). The fast-paced modern society increased the global popularity of highly-processed calorie-dense diets and sedentary lifestyles and, consequently, the prevalence of obesity and overweight(3). According to the WHO, in 2022, 14% of adults aged 18 years and older were living with diabetes, an increase from 7% in 1990 (3).

Diabetes-related mortality and morbidity are also exponentially increasing (10). People with diabetes experience significant acute and chronic complications(1). Uncontrolled hyperglycaemia can be life-threatening in the short term but also leads to chronic complications and end-organ damage, including vasculopathy, neuropathy, retinopathy and nephropathy(1). Type II diabetes and its related complications are significant contributors to the global disease burden, increased mortality and morbidity, reduced quality of life and shortened life expectancy (1-3).

Type II diabetes is a disease of social and economic disadvantage. People living in lower socioeconomic areas have a higher incidence and prevalence of type II diabetes and associated comorbidities (1, 2). The prevalence of diabetes is rapidly increasing in low to medium income countries compared to affluent countries (10).

Intermittent fasting

Fasting is an eating or dietary pattern characterised by periodic or timed abstinence from eating (4). Fasting has been practised for thousands of years as a form of religious or spiritual belief associated with self-discipline and morality (5). Followers of different religious faiths, including Islam, Buddhism and Christianity, continue to follow this practice for its religious significance and the many claimed mental and physical health benefits (5).

Intermittent fasting is a modernised, health-orientated form of fasting that has become increasingly popular in recent years(4). It involves the restriction of caloric intake for specified periods. There are different models of intermittent fasting, including fasting up to 16 hours per day or eating one meal a day for two days of the week (5, 6). The intermittent fasting eating patterns do not nominate the type of foods consumed nor are prescribed to a specific diet (4).

In addition to weight loss and many other health benefits, periodic caloric restriction through intermittent fasting is proposed to improve glycaemic control and reduce insulin resistance (4-6). Metabolism and glycaemic control are complex biological processes regulated by multiple physiological pathways; gastrointestinal and pancreatic hormones are responsible for achieving a balanced physiological response in the starvation (fasting) and the eating (active digestion) phases (6). Prolonged fasting states are hypothesised to reduce insulin resistance and increased lipolysis or the use of body fat stores as a source of energy (5). Type II diabetes is characterised by high insulin resistance leading to inefficient metabolism of glucose, lipids and proteins (5). The literature suggests potential benefits of intermittent fasting on the glycaemic control of type II diabetes (4-6). The risk of hypoglycaemia, particularly in patients using hypoglycemic agents and those with multi-morbidity, remain of concern (5).

Weight and Type 2 Diabetes

The mainstay of type II diabetes treatment is weight loss through a balanced healthy diet and physical exercise (1, 4, 5, 7). Obesity, especially truncal obesity and increased waist circumference, is a risk factor for metabolic syndrome, insulin resistance and poor glycaemic control.

Modest weight loss, as low as 5% of the total body weight, is associated with significant improvements in blood glucose levels and diabetes control (1, 8). The Australian Exercise guidelines recommend 2.5 to 5 hours of moderate intensity physical activity – such as a brisk walk and 1.25 to 2.5 hours of vigorous intensity physical activity – such as jogging (9) for adults per week. A low glycaemic index, Mediterranean style diet is recommended; Diets rich in vegetables, fruits, legumes and fish and low in polyunsaturated fats, highly processed products and red meat are shown to assist in weight loss and improve glycaemic control but should be eaten in moderation (11).

Adherence to long-term caloric-restriction dietary plans is often suboptimal (4, 6).

Pharmacological interventions

When lifestyle changes alone are insufficient to achieve diabetic control and treatment targets, a range of pharmacological agents is available to augment treatment (1, 7).

Glucose-lowering agents include oral preparations and injectables (1, 7). Oral agents target different steps of the glycaemic control pathway, from decreasing glucose production to increasing insulin secretion (1, 7). Insulin has been traditionally used as the only injectable form of glucose-lowering agent and a last-resort treatment for advanced or treatment-resistant diabetes (1, 7). Insulin is cheap and very effective in reducing blood glucose levels. However, insulin has serious side effects, including acute life-threatening hypoglycaemia. Insulin precipitates hunger and causes weight gain, which worsens glycaemic control (1, 7).

Recently, the market has witnessed the revolutionary introduction of new diabetes injectables; Glucagon-like peptide-1 receptor agonists (GLP1 agonists) work on stimulating insulin and inhibiting glucagon (1, 7). Unlike insulin, these agents cause significant weight loss and are increasingly used as weight loss agents in non-diabetics (1, 7).

Despite the expansive range of hypoglycaemic agents available, oral Metformin remains the first line pharmacological treatment for type II diabetes and is considered both safe and effective (7).

Conclusion

The research highlights that poor glycaemic control can lead to insulin resistance, metabolic syndrome and potentially Type 2 Diabetes. Intermittent fasting appears to positively impact glycaemic control in Type II Diabetic patients. It has also been utilised by patients in addition to pharmacological therapy, and this can potentially cause hypoglycaemia. Therefore, dietary patterns, such as a Mediterranean diet with less calorie restriction, may be more beneficial in patients at risk of hypoglycaemia. The introduction of GLP1 agonists is a significant addition to tackling weight and metabolic syndrome; although we are yet to see the data for long-term side effects and impact on sustained weight, intermittent fasting may be an appropriate tool for some patients, with alternative options, including dietary and pharmacological for others.

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