



The Effect Intermittent Fasting On Clinical Markers Among Patients With Type 2 Diabetes Mellitus: Systematic Review

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INFORMASI

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ABSTRACT

Objective: To evaluation of evidences of the effect of intermittent fasting on clinical marker among type 2 Diabetes.

Methods: Systematic review analysis has performed to identify relevant papers that addressed the research question and a clearly articulated question that defines, selects and critically reviews all relevant research using systematic and reproducible methods.

Results: A total of eight articles had six review studies that consisted report of HbA1c level was significantly affect reduce by of intermittent fasting in type 2 diabetes, intermittent fasting had negatively affected body mass index, and had positively average effect on cholesterol among patients with diabetes type 2

Conclusion: Based on the data presented in this report, intermittent fasting is recommended to be used as an alternative to regular calorie restriction for individuals involved in improving body structure and overall well-being who have type 2 diabetes.

Introduction

One of the most prevalent chronic metabolic disorders worldwide is diabetes. The diabetes mellitus epidemic and its consequences pose a significant global challenge to health. The Federation of Diabetes International (IDF) estimated that 1 in 11 persons aged 20-79 years (415 million adults) worldwide have diabetes mellitus, usually diabetes mellitus type 2, a growing health problem worldwide. 552 million patients with diabetes and 300 million people with glucose tolerance are expected to be impaired by 2030. (Zheng et al., 2018).

The worldwide growth in obesity, Physical inactivity and dense meals for energy has contributed to an exponential surge in the number of type 2 diabetes patients. In 2015, It has been estimated that 415 million individuals had diabetes, more than 90% of which had type 2 diabetes, with a predicted rise to 642 million by 2040. (Chatterjee et al., 2017). Type 2 diabetes is an extreme and widespread chronic condition arising from a dynamic association between ancestry and climate in addition to other risk factors, such as obesity and sedentary behaviors. Type 2 diabetes is a major public health issue worldwide and its risks, Impacting almost all communities with elevated levels of diabetes-related morbidity and mortality in both developed and developing countries (Wu et al., 2014).

In order to minimize the burden of microvascular and cardiovascular diseases and enhance the outcomes of type 2 diabetes patients, high-quality medical treatment and multifactorial risk reduction strategies are required, self-management will help type 2 diabetes patients improve self-management awareness, skills and capacity in a cost-effective way (He et al., 2017). For diabetic patients, hypoglycemia or hyperglycemia and metabolic markers are an important concern and are considered a contributing factor in the treatment of glycemia and diabetes. (Tourkmani et al., 2018).

For type 2 diabetes, everyday self-management regimes vary from rigorous (frequent control of glucose, intensive eating activity and drug regimes) to comparatively less complicated regimens (primarily diet and exercise). One of recommendation for primary diet is intermittent fasting, also referred to as alternate day fasting (ADF), irregular fasting or intermittent energy restriction (IER), is a comparatively new dietary technique for weight maintenance that involves interspersing daily regular food intake with intense calorie restriction/fasting for a limited period of time. Some evidence, primarily from animal studies, indicate ben-

eficial effects on weight loss and cardio-metabolic risk factors with regard to the possible biological underlying benefits of intermittent fasting. Whilst the underpinning mechanistic evidence is limited (Jane et al., 2015). This dietary adjustment is a struggle for both patients and their families and can negatively affect glycaemic function, leading to significant complications such as hypoglycaemia, hyperglycaemia and diabetic ketoacidosis (DKA) (Alabboud et al., 2017) many people with diabetes wish to fast. Physicians are asked frequently by their patients about their ability to fast and the possible impact of fasting on their glycaemic control. Studies about the effect of Ramadan on people with insulin-treated diabetes are scarce. This review aims to provide clinicians with the best recommendations for their patients with insulin-treated diabetes who wish to fast. \nMethods: Four databases (Medline, EMBASE, Scopus and PubMed).

While preventive initiatives rely on organized behavioral improvement interventions for higher-risk persons (i.e. those with prediabetes) to make and maintain these improvements in lifestyle behavior, efforts to minimize the prevalence of type 2 diabetes will be optimized if population-wide changes in major dietary risk factors and levels of physical activity are also accomplished. As illustrated in the Quality of Treatment for the American Diabetes Association (ADA) 2017 (American Diabetes Association, 2017), for diabetes type 2 risk reduction, general safe low-calorie eating habits should be promoted and some research also suggests that specific dietary components can either lower the risk of diabetes type 2 (Entire grains, almonds, fruit, yogurt, tea, and coffee) or increase the risk of diabetes type 2 (Sugar-sweetened drinks and red meat) (Siegel et al., 2018) 679 nonpregnant, nonlactating individuals aged ≥ 20 years without diabetes (self-reported diagnosis or glycated hemoglobin $\geq 6.5\%$ [8 mmol/mol] or fasting plasma glucose ≥ 126 mg/dL.

A limit of 600 calories per day, which may prove to be too extreme for many patients with type 2 diabetes, but an intermittent fasting approach could be more appropriate and also boost metabolic parameters, insulin and insulin sensitivity and avoid diabetic problems from forming (Horne et al., 2020).

Via calorie restriction, the effectiveness of IF in maintaining overall wellbeing, and the prevention and treatment of major disorders, such as blood glucose regulation, blood pressure, and other targets, intermittent fasting can have an effect on metabolic status for many patients. This was largely due to the lack of knowledge

and health promotion needed for the management of diabetes. It is important to test intermittent fasting as an intervention for patients with diabetes mellitus type 2 from multiple trials to demonstrate the need.

Purpose

The study purpose is a evaluation of evidences of the effect of intermittent fasting on clinical marker among diabetes mellitus type 2.

Method

Search strategy

Strategy-searching literature use in this article was an electronic database including Pubmed, The Cumulative Index to Nursing and Allied Health Literature (CINAHL), and Web of Science (WoS) with no limitation of time published. The keywords used in the searching strategy were Intermittent fasting, type 2 diabetes mellitus, NIDDM, and clinical marker. MeSH terms were used in the PUBMED strategy-searching literature. The example of the search terms in PUBMED was ("Diabetes Mellitus, Type 2"[Mesh] AND "Intermittent fasting") AND ("metabolic" OR "Clinical marker" OR "HbA1c" OR "cholesterol" OR "weight" OR "body mass index").

Eligibility criteria

The inclusion criteria are observational studies of intermittent fasting or Time-Restricted Feeding among the population of T2DM, which tests parameters of interest outcomes at the clinical markers, and metabolic process. Studies which were written in Indonesia and English. The exclusion criteria are grey literature such as reviews, conference report, letter and unpublished paper. The search retrieved 828 articles, which 237 of it selected by endnote for double articles. The articles then selected based on relevancy in intermittent fasting or eating restricted on diabetes type 2 patients. Then, the articles were screen based on intervention. The 19 articles were read and screened based on criteria inclusion and exclusion. Finally, after read the whole articles, 8 articles were included in this study as shown on figure 1.

Statistic analysis

The statistical analysis of this review used the NCSS 2020 to interpret the mean difference between intermittent fasting with HbA1c, BMI (*Body mass index*), and cholesterol.

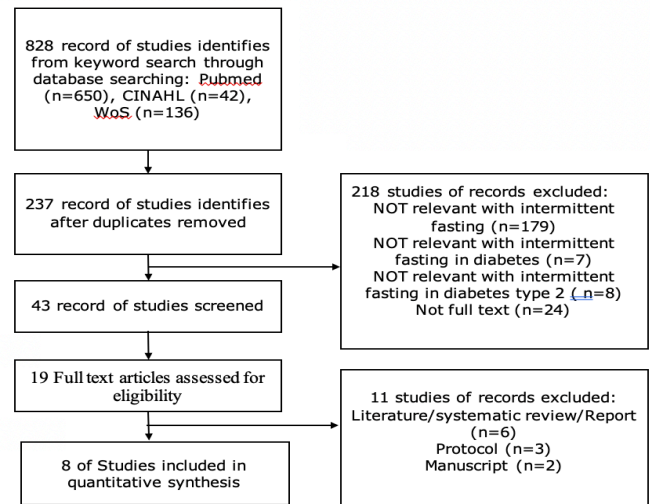


Figure 1: Prisma scheme for study selection

Result and Discussion

The final articles were appraisal using Jaddad and the appraisal quality for all the article was more than 4 that consider as high quality. Result in this review found that intermittent fasting has significant impact on metabolic proses on Type 2 diabetes. Based on synthesis article of the eight articles there are two articles which reveal that intermittent fasting affects the health of type 2 diabetes patients. one article revealed that intermittent fasting not effects of quality of life for type 2 patients with diabetes, another article revealed that intermittent fasting affects the activities of type 2 diabetes patients.

Related from (Mattson et al., 2017) that impact of intermittent fasting on health and diseases proses, it's Elevated alertness/arousal and enhanced mental acuity involve behavioral improvements that arise during the fasting phase of IF diets.

The synthesis article of the eight articles there are six articles which reveal that intermittent fasting affects on clinical marker of diabetes type 2 patients. based on the results of article synthesis intermittent fasting can affect, hypoglicemia, diet composition, Anthropometry and biochemistry, BMI, triglycerides, fasting blood glucose, serum lipid, HbA1c, gastrointestinal hormone.

(Tinsley & La Bounty, 2015) In reducing body weight (3 percent-7 percent), body fat (3-5.5 kg), total cholesterol (10 percent-21 percent) and triglycerides (14 percent - 42 percent) in medium weight, overweight, and people who are obese, intermittent fasting lasting 3 to 12 weeks seems to be successful. Full-day fasting studies of 12 to 24 weeks frequently decrease body weight 3%-9% and body fat and positively boost

blood lipids by a 5%-20% decrease in overall cholesterol and a 17%-50 percent reduction in triglycerides.

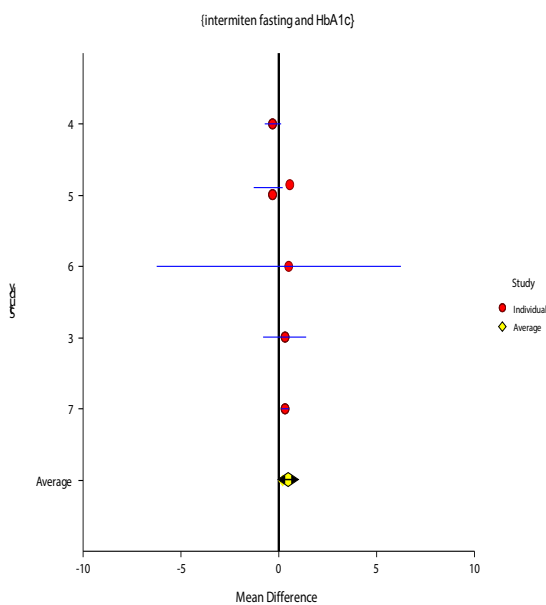
Based on synthesis in review article there are some specific results that have an impact on a clinical marker from trials of type 2 diabetes patients.

1. Study characteristic

The number of samples was 518 in eight research articles. all articles use intermittent fasting compared to usual care or continuous fasting. The sample type is adults with type 2 diabetes. Average calorie restriction is around 500-600 calories / day, 1200-1500 kcal / day.

2. Intermittent fasting and HbA1c

A total of six review studies that consisted report of HbA1c level was significantly effect reduce by of intermittent fasting in type 2 diabetes.

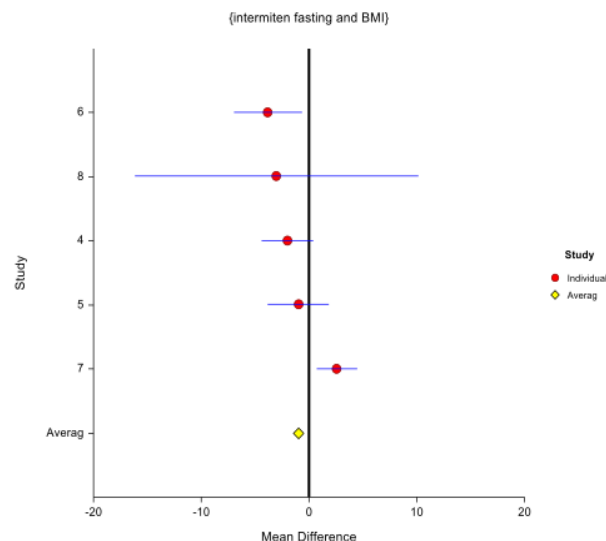


Based on the Figure above, there are six articles that have the effect of intermittent fasting on Hb1ac based on the difference in mean. two articles had negative effects and four articles had positive effects on Hb1ac. and the article mean had a positive effect of intermittent fasting on Hb1ac. Related from (Tay et al., 2020) Mean HbA1c was lowered by 2³mmol/mol from 43.0 ± 2.7 mmol/mol to 41.0 ± 2.3 mmol/mol for the combined groups (n = 26) (p < 0.001). There was no distinction between the classes of probiotics or placebo, nor between males and females. HbA1c decreased to normoglycemia (HbA1c < 40 mmol/mol) in 23 of the 26 participants (88 percent) and 3 participants (12 percent).

Calorie restricted effects on Positive metabolic criteria that can benefit patients that are extremely pre-diabetic and insulin resistant without any pharmacological solution. Study analysis from (Aksungar et al., 2017) nutritional habits, sleeping pattern and meal frequency have profound effects on human health. In Ramadan some Muslims fast during the day-light hours for a month, providing us a unique model of intermittent fasting (IF Metabolic prosis played a part in decreasing the amount of glucose, HbA1c, insulin, Homa-IR and TSH in human intervention.

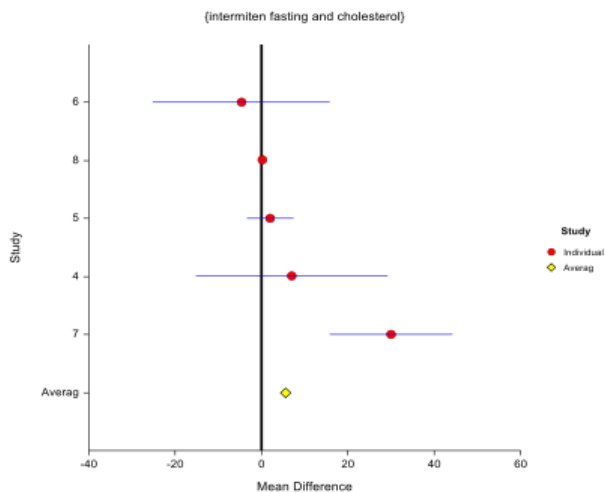
3. fasting and BMI (*Body Mass Index*)

Based in this figure show that intermittent fasting had negatively affect body mass index. In this show 4 article had negative effect, one has positive effect on body mass index. The average of result show that's intermittent fasting has negatively effect on human body mas index. Recent research has disproved the common belief that body mass index is associated with intermittent fasting. In the IFD category, the BMI was slightly lower at 0.75 kg / m² (95% CI, -1.44 to -0.06; p = 0.0333 / m²). (Aksungar et al., 2017)nutritional habits, sleeping pattern and meal frequency have profound effects on human health. In Ramadan some Muslims fast during the day-light hours for a month, providing us a unique model of intermittent fasting (IF. Several article The probability of damage among



4. Intermittent fasting and Cholesterol

The figure of the average results show that intermittent fasting has a positive effect on cholesterol in humans. (Tikoo et al., 2007) observed A substantial rise in BUN in DAL (51 ± 4.99) relative to CAL (20 ± 1.80) in the intermittent fasting category suggests the growth of DNN.



Based on the findings presented in this report, intermittent fasting appears to be a healthy alternative to daily calorie restriction, which has been shown to have long-term results and adverse effects. The pattern of fasting period often differs in time-restricted feeding experiments. In general, fasting is consecutive days, although it was alternating days in two human trials. Insulin tolerance has long been considered to increase with dietary restriction, the most common characteristic of type 2 diabetes. Insulin sensitivity increases after a period of fasting and insulin levels decline. These contribute to increased levels of fasting and postprandial glucose (Grajower & Horne, 2019).

An exploration was undertaken by (Jospe et al., 2020) Study of 250 adults who are overweight following self-selected diets Regimes, in which only 54% of participants continued to adhere At 12 months without an intensive ongoing IF regimen (5:2 diet) Nutritional assistance.

Type 2 DM is largely due to causes and genetics of the lifestyle. It is understood that a variety of lifestyle factors are essential for the production of type 2 DM. There are physical inactivity, sedentary lifestyle, chewing cigarettes, and generous alcohol intake. Obesity has been shown to lead to about 55 percent of type 2 DMD cases. (Olokoba et al., 2012).

From the National Health and Diet Review Surveys (known as NHANES), we found that every 3-hour improvement in night fasting time was associated with substantially reduced chances of elevated HbA1c (OR, 0.81; 95 percent CI, 0.68 to 0.97) (69) and significantly reduced CRP levels in women who consumed less than 30 percent of their daily calories after 5:00 PM ($p = 0.011$). (Patterson & Sears, 2017). From (Li et al., 2017) Intermittent fasting (IF) with a decrease in abdominal fat, inflammation, and blood will

prevent and reverse all forms of metabolic syndrome. Pressure and improvement in sensitivity to insulin.

The literature offers insufficient evidence on the consistency, tolerability, and protection of intermittent fasting among the general public as used as a weight loss intervention. In three patients, minor side symptoms such as moderate headaches and constipation were experienced and only one patient was dropped from the study due to difficulties adhering to the diet.

Conclusion and limitation

It's advised that intermittent fasting be considered, on the basis of the details provided in this study, As an alternative to the daily restriction of calories for persons interested in optimizing the anatomy structure and general healthiness who have type 2 diabetes.

This study has several limitations. There is also little information available on the optimum period of intermittent fasting systems to limit this analysis. Some scholars have claimed that intermittent fasting can prolong lifespan and foster potential tolerance to age-related diseases. There is little research on intermittent fasting in type 2 diabetes patients because of the many negative risks posed by this intervention.

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