

Impact of Dietary Counseling Based Interventions for Improvement in Glycaemic Control in Diabetes Mellitus Patients: A Systematic Review

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Abstract

Counseling efforts to improve self management are dominant components of any effective treatment plan. For people with diabetes mellitus to achieve optimal glycaemic control, motivation to perform self management like dietary and lifestyle related aspects is important. The researcher has determined whether or not counseling based interventions are clinically effective for improving glycaemic control of type 2 Diabetes Mellitus. The studies have been included research papers were based on dietary counseling based intervention. The current study has included 23 Randomized Control Trials (RCTs), while 16 were group based approaches while 7 were individual based approaches. All trials were effective in improving glycaemic control and reported statistically significant improvements in glycated hemoglobin test (HbA1c) levels through diet counseling based intervention. Regarding the counseling method, individualized counseling was more effective. Combining diet, exercise, and psychosocial intervention is more effective than dietary counseling alone. Studies have shown that a repetitive and long term dietary counseling intervention that offers follow up management was more effective than a short term counseling intervention.

Keywords: Counseling; Self-management; Glycemic; Diabetes mellitus; Diabetes; Glycated hemoglobin.

INTRODUCTION

Systematic reviews continue to gain prevalence in health care primarily because they summarize and appraise vast amounts of evidence for busy healthcare providers.¹ Thus, awareness of diabetes Mellitus (DM) and its complication has become

an integral and essential part of DM care for the patients themselves, especially awareness of dietary management.² Consequently, dietary counseling efforts to improve self management of any effective treatment plan. There is an increasing amount of evidence that patient counseling is the most effective way to lessen the complications of diabetes and its management.³

The incidence of diabetes mellitus is increasing world wide. According to the International Diabetes Association, diabetes patients world wide account for 8.3% of the total population, and it is expected that this number will reach 592 million by 2035.⁴ Diabetes is a chronic metabolic disease that causes complications such as cardiovascular disease, arteriosclerosis, hypertension, neuropathy, nephropathy, and diabetic retinopathy.⁵ Type 2 diabetes usually occurs after the age of 40 and

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accounts for about 90% of all diabetes patients. Unlike type 1 diabetes, there are often no clear clinical symptoms in the early stages.⁶ The onset of type 2 diabetes is preceded by a decrease in insulin secretion, followed by a metabolic disorder due to an increase in insulin resistance. In many cases, type 2 diabetes mellitus can be improved if weight is reduced through diet and exercise at an early stage.⁷

Patient counseling and counseling is a process that improves patients' ability to cope with their disease and make informed decisions regarding management, diet, and medication. It helps motivate patients to change any harmful dietary and life style habits.⁸ The main objective of this study is to review the impact of diet counseling on patients with DM.⁹ Despite several approaches to DM management being already available, healthcare professionals in India still struggle to achieve health targets without the adjunct therapy of diet coaching or counseling.¹⁰

METHODOLOGY

2.1. Search strategy

A review of randomized controlled trials (RCTs) to evaluate the effectiveness of dietary counseling based interventions for people with T2DM was conducted from February to March 2022. The article was searched using Springer-link, NCBI, PubMed, and Scopus databases. Studies published from 2012 to 2022 in the English language were included. The authors independently extracted data on participant and intervention characteristics. The main outcomes included glycaemic control (reduction in HbA1c level).

2.2. Inclusion criteria

This systematic review included RCTs and ensured all studies in adults aged 18 and over with T2DM in different healthcare settings were included. Studies, where participants were diagnosed with type 1 diabetes mellitus, gestational diabetes, and a mixture of T2DM with T1DM or other chronic conditions, were excluded. Furthermore, web-based or peer support, or telephone counseling were excluded to reduce confounding bias. Only studies that covered diet and dietary based counseling in groups or individual levels.

2.3. Data extraction and validity

Abstracts were independently screened by the authors to determine eligibility for inclusion in the

review. After the author's retrieved eligible articles, each author was responsible for extracting half of the articles. A data extraction form was adapted from the literature for this purpose. Following data extraction, the two authors exchanged articles, read them, and reviewed the corresponding data extraction sheet performed by the other person to ensure data extraction accuracy.

Quality assessment was conducted by the authors to review the clarity of the study aims, the adequacy of details about the sample, the rating of the study design, the clarity of the methodology, and the reliability and validity of the measures and tools.

2.4. Data analysis

Due to the heterogeneity of populations, interventions, and measured outcomes, we could not conduct a meta-analysis. We, therefore, used a recently described method to identify specific intervention features likely to be associated successfully or unsuccessfully with the outcome of interest. Interventions were analyzed based on their success in producing a significant change (p -value ≤ 0.05) in outcomes, in the hypothesized direction. Outcome measures of interest were HbA1c levels, and diet outcomes. Diet was assessed with a desirable change in any of the following: total kilocalorie intake, dietary risk score, mean vegetable consumption, fruit consumption, consumption of five fruits and vegetables per day, fried food consumption, healthy eating plan adherence, fat-related dietary habits, dietary fat intake, dietary cholesterol intake, kilocalories from saturated fat, and percent kilocalories from fat. When a study used several instruments to measure an outcome (e.g., diet), at least 60% (an arbitrary cut-off) of the measures must have reported significant positive results to be considered a success for that outcome.

RESULTS AND DISCUSSION

A total of 738 non-duplicated publications were screened, 101 abstracts were assessed for eligibility, and 40 publications required full-text review before a decision could be made. 23 studies fulfilled the inclusion criteria, and the search processes are illustrated. The interventions varied considerably according to the number and duration of sessions; however, the content was mostly similar focusing on diabetes self-management.

We found that HbA1c levels were lower in the experimental group after dietary counseling based interventions compared with those in the control



Fig. 1: Process of review of the research article

group.¹¹ Dietary counseling-based interventions are emphasized as important in diabetes guidelines and are effective in controlling blood sugar levels. Subgroup analysis was performed to analyze HbA1c levels according to the duration of dietary counseling. HbA1c levels assessed after 4–6, 7–9, and 10–12 months of dietary counseling interventions were lower in the experimental group than in the control group.¹² In contrast, HbA1c assessed after 3 months of a dietary counseling based intervention did not show a significant difference between the two groups.¹³ In addition, HbA1C levels according to the duration of dietary counseling intervention, including the follow-up period, were lower in the experimental group at 4–6, 7–9, and 10–12 months. Studies have shown that a repetitive and long-term dietary counseling intervention that offers follow-up management was more effective than a short-term counseling intervention.¹⁴ Moreover, considering that HbA1c reflects the blood sugar level at 3 months, it is thought that dietary counseling interventions for 4 months or longer are necessary. In particular, there is a need for continuous control of blood glucose levels in diabetes to prevent complications.¹⁵ Maintaining HbA1c levels < 6.5% for 6 years is known to help prevent complications, including microvascular complications. Therefore, continuous follow-up interventions would be necessary for addition to dietary counseling interventions for 4 months or longer.¹⁶ In particular, individual counseling interventions showed low heterogeneity between studies and large effect sizes.¹⁷

Experimental studies reported that HbA1c decreased by 1.0%–2.0% after individual nutritional counseling.¹⁸ Considering these findings, individual counseling seems to be effective and should be given to diabetes patients. Different dietary counseling intervention contents were also analyzed.¹⁹ Sub group analysis of a dietary centered counseling intervention, dietary and athletic counseling intervention, and dietary exercise and psychosocial intervention showed that the effect size of HbA1c was significantly reduced in the two intervention groups, except for the dietary centered counseling intervention.²¹ This finding is consistent with the results of a 10-year follow-up study, which showed

significantly decreased HbA1C after a dietary and athletic counseling intervention.²² Similar findings were reported by another study where HbA1c significantly decreased after a dietary counseling and moderate exercise strategy that included a decrease of 500–750 kcal and 175 min of moderate-intensity exercise per week.²³ Therefore, combining diet, exercise, and psychosocial intervention is considered more effective than diet counseling alone.²⁴

There are significant changes in blood sugar levels after diet counseling.²⁵ Intake of the high amounts of fiber, low glycemic foods, and functional foods helps to reduce the blood sugar levels randomly.²⁶ The contents and methods of interventions were diverse between studies, and it was difficult to divide them into different groups.²⁷ The studies included in this systematic analysis have included complex dietary counseling interventions, so there may be high heterogeneity.²⁸ Therefore, it is necessary to carefully interpret the research results.

The results of the investigation showed that intervention group participants were generally likely to follow dietary principles more carefully, and were more involved in their interactions with the counselor.²⁹ Many study results also indicated that subjects who received periodic, intensive diet counseling did not show symptoms of progression to diabetic complications, and also did not progress to insulin therapy for the management of their disease.³⁰

CONCLUSION

As the incidence and prevalence of diabetes increase, intervention through dietary counseling is becoming more important for diabetes control. This systematic review examines the evidence for the efficacy of dietary counseling interventions on diabetes control. The study subjects were patients with T2DM, and the main outcome variable was HbA1c. All trials were effective in improving glycaemic control and reported statistically significant improvements in HbA1c levels. Regarding the counseling method, individualized counseling was more effective.

Moreover, considering that HbA1c reflects the blood sugar level at 3 months, it is thought that dietary counseling interventions for 4 months or longer are necessary. Combining diets, exercise, and psychosocial intervention is more effective than dietary counseling alone.

Conflicts of Interest

The authors declare no conflict of interest.

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