SUNTEXT REVIEWS

SunText Review of Endocrine Care

ISSN: 2771-5469

Open Access
Commentary Article
Volume 4:1

Adherence to Medical and Dietary Therapy in Type 2 Diabetes Patients

Wood M[1,2], Ebe K[1,2] and Bando H[1,3,*]

[1]*Japan Low Carbohydrate Diet Promotion Association (JLCDPA), Kyoto, Japan*
[2]*Takao Hospital, Kyoto, Japan*
[3]*Tokushima University/Medical Research, Tokushima, Japan*

[*]**Corresponding author:** Bando H, Tokushima University /Medical Research, Nakashowa 1-61, Tokushima 770-0943 Japan; E-mail: pianomed@bronze.ocn.ne.jp

Received date: 02 March 2024; **Accepted date:** 11 March 2024; **Published date:** 16 March 2024

Citation: Wood M, Ebe K, Bando H (2024). Adherence to Medical and Dietary Therapy in Type 2 Diabetes Patients. SunText Rev Endocrine Care 4(1): 119.

DOI: https://doi.org/10.51737/2771-5469.2024.019

Abstract

Non-adherence to medical and dietary therapy can hinder effective therapy and lead to poor outcomes in diabetic patients. Adherence is multi-factorial and related to socioeconomic, healthcare system, medical condition, co-morbidities, therapy polypharmacy, complexity, and patient. Explanations for adherence can be broadly divided into intentional and non-intentional. Unfortunately, data about adherence to diabetes medications are limited and mostly observational. Focusing on social aspects of common reasons for non-adherence may contribute to improved adherence in diabetes patients. The Japan LCD Promotion Association (JLCDPA) has been promoting comprehensive diabetes education since 2013. Organizations affiliated with the JLCDPA provide instruction on nutrition, low-carbohydrate diets (LCDs), food, cooking, well-being, medical devices, and more.

Keywords: Japan LCD Promotion Association (JLCDPA); Non-Adherence; Healthcare System; Polypharmacy; Nutrition; Low-carbohydrate diet (LCD)

Introduction

Type 2 diabetes (T2D) is a growing problem worldwide. Sequelae from diabetes cause great societal and individual burdens. Adherence to therapeutic regimens can lessen these burdens. Reasons for non-adherence are variable and multifactorial and can be divided into intentional and non-intentional factors. As a result, data studying adherence are limited to mainly observations that are muddied by a platitude of factors that can be seen in Figure 1. For example, depression appears to be bi-directional with diabetes sequelae, while patients with pre-existing depression appear to experience more sequelae [1]. One of the most cited reasons for non-adherence is the complexity of therapy. Only one-third of T2D patients were compliant with their OHAs in a retrospective cohort study where an inverse association between the number of tablets and adherence was found [2]. Another study claims that adverse effects (AEs) and perceived drug efficacy better explain non-adherence than polypharmacy alone [3]. The authors of a 483-participant cross-sectional study found adherence to diabetes medications to be 63.1% and largely determined by self-efficacy and social support intertwined with patient neuroticism [4]. A systematic review concluded that drug toleration, dosing frequency, depression, and doubts about drug efficacy all contribute negatively to adherence [5].

Sequelae of diabetes usually occur years after the initial diagnosis. As a result, patients may be relatively asymptomatic and can hold false beliefs about their disease status. Understanding the pathophysiology of the disease, mechanisms of therapy, and role of therapy could help patients ease doubts about drug efficacy. Socioeconomic issues are very complex, are associated with education status, and are likely to be improved with education as well.

Rational for LCD Education and Measuring Dietary Adherence

Patient education is the number one method to combat non-adherence. Dietary adherence in T2D patients was compared between a low-carbohydrate, ketogenic diet (LCKD) and a low-

glycemic index diet (LGID) in a 24-week-long randomized clinical trial [6].

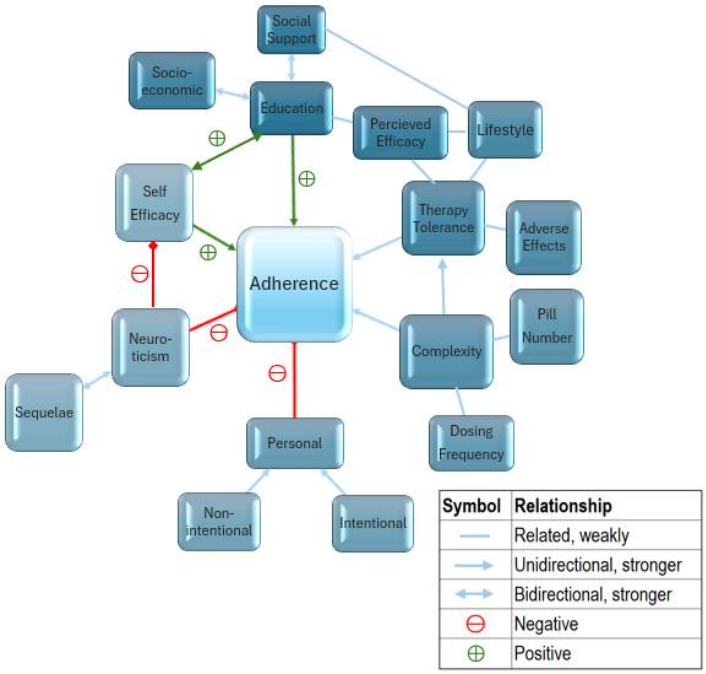

Figure 1: *Factors influencing adherence.*

The LCKD group was told to eat ad libitum while the LGID group was told to eat at a daily 500 kcal deficit. Both groups utilized lay-press diet books, handouts, and dietician guidance. Adherence was comparable between groups as 21 of 38 LCKD participants (55.3%) and 29 of 48 LGID participants (60.4%) completed the trial. The rates of adherence in this study are comparable to studies on diabetes medication adherence [2,4,5]. The primary tool that we use is dietary intervention with the LCD. There are increasing data to support the LCD as a highly effective and safe treatment modality for diabetes [7]. Interestingly, the LCKD had greater improvements over the LGID in HbA1c (-1.5% vs -0.5%, $p = 0.03$), body weight (-11.1 kg vs -6.9 kg, $p = 0.008$), and medication reduction or elimination (95.2% *vs*. 62%, $p < 0.01$) in the study mentioned above [6]. We also observed weight, triglycerides, and glycemic control improvements in 2,699 subjects with diabetes, metabolic syndrome, or both when implementing a strict LCD [8]. Adherence to medications is typically done by patient self-reporting or pharmacy records. Diets can be monitored via self-reported recall, diet journals, recall questionnaires, urine urea to creatinine ratio, and ketone body measurements, among other methods [9]. The variability in reported adherence is because patients can feel social pressure to report a certain way or have difficulty recalling what they ate. Blood ketone levels are increased to about threefold in four to five days [8]. For these and other reasons, we rely on serum acetone, serum 3-hydroxybutyrate, and urine ketone bodies, among other biomarkers, to monitor super LCD adherence (Figure 2).

LCD Education and Implementation

The JLCDPA is a non-profit incorporated association founded in 2013 that aims to provide a wide range of diabetes treatment and treatment services to medical professionals, people with diabetes, people with pre-diabetes, and the families of diabetes patients.

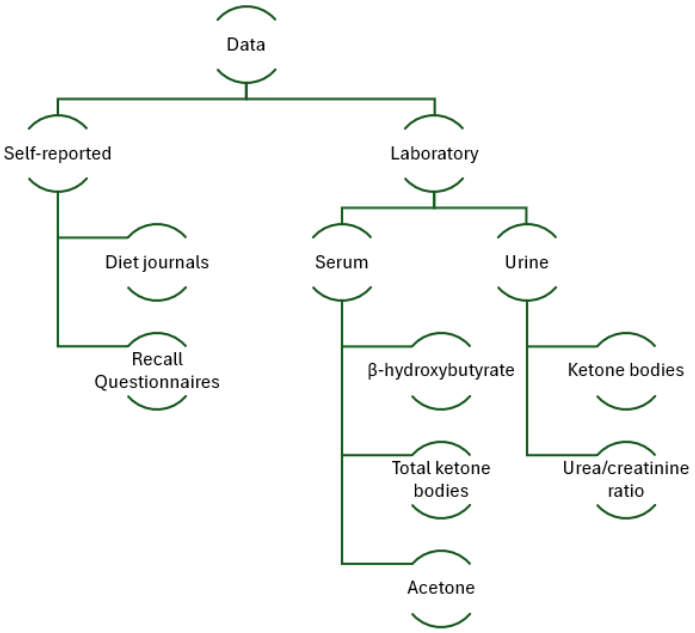

Figure 2: *Methods to measure LCD adherence.*

There are 75 affiliated clinics and hospitals associated with the JLCDPA. Numerous cooperative organizations provide low-carbohydrate-related food, support, or services. Biannual LCD journals and frequent mail magazines are disseminated. Seminars geared toward medical professionals, and cooking workshops are continuously being organized. Social media and online videos are also provided free of charge by the JLCDPA and its affiliated organizations. The JLCDPA has four main goals to achieve through promoting LCDs:

1. Decrease in complications and deaths due to diabetes
2. Diabetes prevention and early detection of pre-diabetes
3. Eradicate the health damage caused by the spread of diets with little medical evidence
4. Significant reduction in medical costs

Not every patient will require the same degree of rigidity, so we have separated LCD into three tiers based on a percentage of total dietary carbohydrate intake. Super LCD, standard LCD, and petit LCD are defined as 12%, 26%, and 40% of daily caloric intake from carbohydrates, respectively [10]. Giving flexibility to patients based on disease severity and preference could improve dietary adherence. Simple instructions are helpful to prevent non-intentional causes of non-adherence as well. Super LCD, standard

LCD, and petit LCD can be explained by limiting carbohydrate-rich foods (e.g., rice, bread, and pasta) to 0, 1, or 2 meals a day, respectively (Table 1). There is also an LCD food pyramid to give patients visual context [11]. Takao Hospital provides 2 to 4-week-long comprehensive inpatient education and treatment for diabetes patients. Intervention with the traditional CRDs is given for 2 days, followed by the super LCD for either 12 or 26 days depending on the length of stay. During this time the patient's glucose is monitored by CGM to optimize the diabetes regimen. Registered dieticians extensively discuss dietary goals. Wellness is integrated via counselling, tai chi, and community building. In brief, patients learn the basic pathophysiology of diabetes, how diet and medications affect blood glucose, the benefits of good glycemic control, how to monitor disease status, and how to utilize all available resources. In conclusion, adherence to medication and dietary therapy is essential for positive outcomes in diabetic patients. Data studying adherence in diabetes therapy are limited. Variability in reported adherence can be variable among studies due to differences in how adherence is measured or the population of the study.

Table 1: *Three types of LCD with useful characteristics.*

LCD Type	Breakfast	Lunch	Dinner	Carb kcal/d	Remarks
Petit	●	●	✗	40%	Easy to start, good for light dieting
Standard	✗	●	✗	26%	Makes lunch flexible
Super	✗	✗	✗	12%	Most effective for weight and DM management
✗ = no carbohydrate rich foods per meal ● = 1 carbohydrate rich food per meal					

Strategies to improve adherence are likewise varied and patients are likely to benefit from simpler customized plans. LCDs can lower the number of medications and make adherence easier to achieve. Comprehensive diabetes education from abundant affordable and free easily accessible high-quality sources is important. Addressing social issues and personal well-being is likewise likely beneficial. We hope that this review can bring more attention to unravelling questions regarding adherence and guide progress in understanding and improving diabetes therapy adherence.

References

1. Nouwen A, Adriaanse MC, Van Dam K. Longitudinal associations between depression and diabetes complications: a systematic review and meta-analysis. Diabetic Medicine. 2019; 36: 1562-1572.
2. Donnan PT, Macdonald TM, Morris AD. Adherence to prescribed oral hypoglycemic medication in a population of patients with type 2 diabetes: a retrospective cohort study. Diabet Med. 2002; 19: 279-284.
3. Grant RW, Devita NG, Singer DE, Meigs JB. Polypharmacy and medication adherence in patients with type 2 diabetes. Diabetes Care. 2003; 26: 1408-1412.
4. Huang J, Ding S, Xiong S, Liu Z. Medication adherence and associated factors in patients with type 2 diabetes: a structural equation model. Front Public Health. 2021; 9: 730845.
5. Cramer JA. A systematic review of adherence with medication for diabetes. Diabetes Care. 2004; 27: 1218-1224.
6. Westman EC, Yancy WS, Mavropoulos C. The effect of a low-carbohydrate, ketogenic diet versus a low-glycemic index diet on glycemic control in type 2 diabetes mellitus. Nutr Metab (Lond). 5: 3.
7. Ebe K, Bando H. New era of diet therapy and research including Low Carbohydrate Diet (LCD). Asp Biomed Clin Case Rep. 2018; 2: 1-3.
8. Bando H, Ebe K, Nakamura T, Bando M, Yasuda Y. Low Carbohydrate Diet (LCD): Long and short-term effects and hyperketonemia. Glycative Stress Res. 2016; 3: 204.
9. Kumar NK, Merrill J, Carlson S, German J, Yancy WS. Adherence to low-carbohydrate diets in patients with diabetes: A narrative review. Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy. 2022; 15: 477-498.
10. Bando H, Ebe K. Beneficial and Convenient Method of Low Carbohydrate Diet (LCD) as Petite, Standard and Super LCD. Asp Biomed Clin Case Rep. 2023; 7: 1-4.
11. Bando H. Effective proposal of food pyramid for understanding of low carbohydrate diet (LCD). Case Rep Rev Open Access. 2020; 1: 101.