



Research articles

Ketosis management in a Type 2 Diabetes mellitus patient: a nutritional Approach

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ABSTRACT

Ketosis-inclined type 2 diabetes, an insulin deficiency tends to occur in response to constant hyperglycemia auxiliary to insulin resistance. Hyperglycemia will additionally restrict the secretion of insulin, and a few examinations have even shown a decrease of insulin production at the genetic level by restraining transcription of insulin-producing proteins. Here in this study, we detailed a patient having ketosis in Type 2 Diabetes mellitus and observed all require parameter in dietary management. The patient was found ketone positive in initial days. Due to high level of blood sugar and constipation, he was suggested a diabetic fluid diet and high fiber content meal. Initially Glucose level was 187mg/dl and Hb level- 12.5, after the observation with maintain diet the Hb level- 14.5 and Glucose level was >150mg/dl. Serum proteins and albumin were also found in normal range and the patients found ketone negative in later stage. To date, clinical trials have provided evidence of benefits of Keto diets in terms of clinical outcomes. However, the molecular events responsible for these improvements still remain unclear in spite of the high amount of knowledge on the primary mechanisms of both the diabetes and the metabolic state of ketosis.

Keywords: Ketosis, Type 2 Diabetes mellitus, management, nutrition.

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INTRODUCTION

The inability of current proposals to control the scourge of diabetes, the particular failure of the predominant low-fat eating regimens to improve obesity, cardiovascular danger, or general wellbeing and the steady reports of some genuine symptoms of usually endorsed diabetic prescriptions, in blend with the proceeded with accomplishment of low-sugar eats less in the treatment of diabetes and metabolic condition without critical results, underline the requirement for a modification of current dietary rules. The advantages of sugar limitation in diabetes are immediate and well documented. Simultaneously, concerns about the efficacy and safety are conjectural rather than based on proof. Dietary carbohydrate restriction reliably reduces high blood glucose, does not require weight loss (although is still best for weight loss), and prompts the decrease or disposal of medication. It was never appeared to bring about results equivalent to those seen with most medications. Somewhere in the range of 2003 and 2005, 4 examinations have reevaluated the impact of sugar limitation on type II diabetes. The first examination enlisted 54 diabetic patients (out of 132 all out members) and found that hemoglobin A1c improved undeniably more than one year with a low-starch diet contrasted and a low-fat, calorie-limited eating regimen.^[1,2] The second investigation selected

8 men with type II diabetes in a 5-week hybrid taking care of study that tried comparative eating regimens. Members showed higher improvement in glycohemoglobin while on the low-carb diet than when on an eucaloric low-fat eating regimen.^[3] The third investigation was an inpatient taking care of study in 10 members with type II diabetes. After just 14 days, hemoglobin A1c improved from 7.3% to 6.8%^[4]. In the fourth examination, 16 members with type II diabetes who followed a 20% starch diet had improvement of hemoglobin A1c from 8.0% to 6.6% more than 24 weeks^[5]. This data is basic for patients taking drugs for diabetes who start a low-sugar diet on account of the potential for unfavorable impacts coming about because of hypoglycemia. Later on, Feinman and partners introduced a steady proof supporting the utilization of low-sugar counts calories as the main way to deal with treating type II diabetes and as the best assistant to pharmacology in type I.^[6] The predominance of type II diabetes is expanding around the world, representing 85-95% of all analyzed instances of diabetes. Until this point, clinical preliminaries have given proof of advantages of KDs as far as clinical results. In any case, the atomic occasions answerable for these upgrades actually stay hazy disregarding the high measure of information on the essential systems of both the diabetes and the

metabolic condition of ketosis. Sub-atomic organization investigation of conditions, sicknesses and therapies may give new experiences and help construct a superior comprehension of clinical, metabolic and sub-atomic connections among physiological conditions.

Dietary treatment is significant in management of type II diabetes or pre-diabetes, yet vulnerability exists about the ideal eating regimen. Aslow and partners led an examination in which they randomized grown-ups with glycated hemoglobin > 6.0% and raised body (weight file > 25) to a VLCK diet or a moderate-carbohydrate, calorie-limited, low-fat (MCCR) diet. All members were encouraged to be genuinely dynamic, get adequate rest, and practice conduct adherence methodologies dependent on certain effect and careful eating. In a year trial, grown-ups with raised glycated hemoglobin and body weight appointed to a VLCK diet had more prominent decreases in glycated hemoglobin; lost more weight, and diminished a larger number of drugs than those educated to follow a MCCR diet.^[7] Our aim here is to maintain the Type 2 Diabetes mellitus patient taking ketosis in to account with all other medical parameter, like diet what to be kept away from, and food varieties to be incorporated in the nutrition.

MATERIAL AND METHOD

This is an observational analysis carried out at Institute of Medical Sciences and Sum hospital, Bhubaneswar. The patient history was given below

- Age : 47 yrs.
- Sex : Male
- Height : 173 cm
- Weight : 54 kg
- BMI : 20.3
- Diagnosis : ketosis, Type 2 Diabetes mellitus.
- Chief complaints : Abdominal pain, Nausea and vomiting, Shortness of breath
- The patient was admitted on 26/01/21 and discharge on 03/02/2021.

Observation and results

The patient was admitted on 26/01/21. He had a raised blood glucose level of 445 mg/dl. Diet: was low CHO, high fat, normal protein. Initial days the patient was given E=1600 kcal, CHO=230 g, Protein=60g, Fat=28g. The patient seemed to be weak and glucose level was 338 mg/dl. On the date 28/01/21, A diet of E=1600 kcal, CHO=230.6g, Protein=60g and fat=28.5g was recommended to him. The patient glucose level was 298mg/dl. Hb level of the patient was 10.4. On the date 29.01.21 & 30.01.21, Blood glucose level was 301 mg/dl. Hb level of patient was 11.5. The patient had consumed a diet of E-1721kcal, CHO- 220gm, protein- 65gm, and fat-28gm. Glucose level is slightly up right.

After 2 days, the patient was ketone negative. Glucose level was 187mg/dl. Hb level- 12.5. The patient was suffering from constipation. He was suggested an oral fluid feeding of Energy 1620 kcal, CHO- 220gm, protein-65gm, Fat-28gm.

On 02/02/21, the patient was ketone negative. Due to high level of blood sugar and constipation he was suggested a diabetic fluid diet and Fiber content of the meal was increased. At the patient was discharged on this day. At that time the patient was feeling weak. The ketone body is negative and the glucose level was <150. A diabetic chart with a mention of which food should be added and which food should be avoided was provided.

Table 1: Biochemical parameter

Parameters	Date of admission (22.01.2021)	Date of discharge (03.02.2021)	Normal level
BP (mm of Hg)	120/76	110/70	100/70
Pulse rate	86/min	102/min	60-100
Hb	10.4	14.5	13-18
Glucose(mg/dl)	>200	>150	120-140
Serum protein(g/dl)	5.86	6.42	6-8.3
Albumin (g/dl)	2.4	3.6	3.3-5.2
Ketone	+ve	-ve	-

Table 2: Sample menu given at discharge

MEAL	MENU
Early morning	Tea (1 glass) + Biscuits (Nutrichoice -2 pcs)
Breakfast (9am)	Oats / Dalia porridge- 1 cup or Oats / Dalia upma- 1 cup / Idli(3pcs) + Sambar-1 cup / Corn flakes-1cup + Milk (1- glass)
Mid-morning (11am)	Apple/ Guava / Orange-(1) without sugar or Tender coconut water-1glass
Lunch (1pm)	Parboiled rice-1/2 cup, Soft Roti-2 pcs, Dal-1 cup, Boiled egg curry-2, Mix bhaja - 1cup / brinjal bharta/ paneer bharta, Salad- or Mix veg. khichdi- ½ cup, Soft roti- 2 pcs, Soybean curry-1 cup / Paneer curry- 1 cup (4-5 pcs), Salad-1 cup, Bitter gourd/ Ridge gourd
Snacks (5pm)	Brown bread sandwich-3 pcs / Non-Veg soup-1 cup
Dinner (8pm)	Soft roti- 2 pcs, + scrambled egg /Santula/ Soyabean curry + skimmed milk (1 glass)

Table 3: Food to be avoided and included by the patient

Food to be avoid	Food to be include
Fried, spicy food, candies, sugary food, Refined wheat flour products, potato, Colocasia, yam, beet root, sweet potato, banana, resins, dates, starchy vegetables, pasta, honey or sugar in any form.	Green leafy vegetables, meat, fish and sea food, egg, butter milk, nuts, berries, apple, guava, salad, juice without sugar

DISCUSSION

Ketosis-inclined type 2 DM ordinarily gives diabetic ketoacidosis in patients who fit neither the classification of type 1 or type 2 diabetes. Further subcategory of diabetes is important to recognize the sort and anticipate result and treatment procedures. Of note, while most examinations have been directed in the kind 2 diabetic populace, there is no contraindication to seeking after nourishing ketosis for the management of type 1 diabetes. It is significant, in any case, due to the distinctive pathophysiology of these two illnesses to leave upon a wholesome ketosis dietary intercession under the direction of a clinical expert. It is very basic

to require diminishing levels on both bolus and basal insulin while in ketosis, so it is judicious to have to have appropriate monitoring to avoid inconveniences of undetected hypoglycemia.^[7] In a 2018 investigation of grown-up type 1 diabetics holding fast to a ketogenic diet (as estimated by plasma B-hydroxybutyrate levels) for a mean of 2.6 years, analysts inferred that a ketogenic diet for type 1 diabetics prompts amazing HbA1c (mean $5.3 \pm 0.4\%$) with insignificant glycemic fluctuation.^[8] In any case, they noted scenes of hypoglycemia as distinguished by constant glucose checking, which features the requirement for sufficient observing.

Most trials looking at both low carbohydrate and ketogenic diets in type 2 note a diminishing in HbA1c that mirrors the lower glycemia values in light of both diminished admission of carb and expanded insulin affectability (demonstrated by decreased excursions in blood sugar and lower glycemic variability)^[9], this would be expected to similarly occur in type 1 diabetics. A systematic review published in March 2018 surveyed the existing literature and demonstrated the need for well-designed intervention studies to evaluate the effects of ketogenic diets in type 1 diabetics. While the existing literature is promising, there are only a few trials that have examined the relationship in this population.^[10, 11]

CONCLUSION

In conclusion, LCD and KD can be successful alternatives in patients with weight as well as type 2 diabetes, despite the fact that they are by all account not the only accessible dietary methodology for such patients. In any eating routine, LCD and KD ought to be tailored to individual necessities and patients ought to be followed for an all-inclusive timeframe. The use of those diets in patients with type 1 diabetes is still controversial and their long-term safety is still not proven.

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