Ketogenic diet: situational analysis of current nutrition guidelines
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Abstract
Ketogenic diet is gaining popularity as a non-pharmacological intervention for weight loss and glycaemic control. There is abundant literature on this topic, which serves to confuse the reader. No scientific recommendations have been formulated to guide evidence-based or rational use of ketogenic diet in obesity and diabetes management. This article is a situational analysis of leading professional guidelines on diabetes care, with regards to their coverage of ketogenic diet. It underscores the need for leading experts to pay attention to this upcoming field of metabolic medicine.

Keywords: AACE/ACE guidelines, ADA guidelines, Atkin’s diet, diabetes, Diabetes Canada guidelines, ketogenic diet, NICE guidelines, obesity, RSSDI guidelines, weight loss.

Introduction
Ketogenic diet, which has been used for nearly a century in the management of childhood epilepsy, is now increasingly being utilized in the care of obesity and diabetes. While good quality randomized controlled trials are available to support its use in these conditions, there is uncertainty regarding their appropriate place in therapy. Through this communication, we hope to underscore the need for professional endocrine and diabetology associations to release expert, and if possible, evidence-based guidance regarding rational use of ketogenic diet in the prevention and management of diabetes. Such publications will not only promote scientific discussion and usage of ketogenic diet, but also facilitate awareness of the various myths and hearsay surrounding its use. Both these strategies will help avoid unwarranted and inappropriate prescription of the diet in clinical situations where it is contraindicated. Thus, this communication should stimulate a movement for promotion of health, and prevention of ill-health, through ketogenic diet.

Lack Of Guidance
Nutrition is an integral part of metabolic management, and is recognized as such. The need for patient centred choices in diabetes care is also well known. One nutritional management choice, which may be of help to many persons with diabetes and/or obesity, is the ketogenic diet. However, no professional organization in endocrinology or diabetology has focused on the rational use of ketogenic diet in these conditions. This may be due to many factors. These include lack of interprofessional communication with ketogenic diet experts, a misplaced fear of the pathological effects of ketosis, and poor awareness regarding the difference between nutritional (physiological) ketosis and insulin deficiency induced (pathological) ketosis. This situational analysis describes the place of ketogenic diet in various current guidelines that relate to nutritional management of diabetes. The aim of this analysis is to highlight the lack of attention given to this important, yet underutilized metabolic therapeutic intervention. It also proposes a framework to help identify the indications and contraindications of ketogenic diet.

American Association Of Clinical Endocrinologists And American College Of Endocrinology (AACE/ACE)
A guiding principle of the AACE/ACE recommendation is that weight loss should be considered in all patients with prediabetes and T2D who also have overweight or obesity. The weight loss therapy should include lifestyle prescription that includes a reduced-calorie healthy meal-plan, physical activity, and behavioural interventions. Nutrition aims to maintain normal weight using a primarily plant-based diet high in polyunsaturated and monounsaturated fatty acids, with limited intake of saturated fatty acids and avoidance of trans fats. Consistency in carbohydrate intake, and limitation of sucrose-containing or high-glycaemic index

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foods is recommended. However, there is no mention of the benefits of ketogenic diet in this otherwise comprehensive document

**American Diabetes Association (ADA)**

The ADA, in its 2018 standards of care, does not mention ketogenic diet by name. It supports the call for individualized meal planning or medical nutritional therapy, preferably provided by a skilled registered dietician. It calls for weight loss >5% in overweight or obese persons with Type 2 diabetes mellitus, but refrains from suggesting a mandatory or fixed macronutrient balance. High protein diet is noted to increase insulin response without increasing plasma glucose concentrations. Thus, if the aim is to treat or prevent hypoglycaemia, high protein foodstuffs should be avoided. An acceptable proportion of 20-35% fats, and of 15-20% protein in relation to total caloric intake, is suggested, but not specified.

The 2014 ADA Position Statement on Nutrition clearly mentions that there is no ideal percentage of calories from carbohydrate, fat and protein for persons with diabetes. It therefore proposes a person-specific distribution, based on personal eating patterns, preferences and metabolic goals. This decision should be taken in a “collaborative” manner, and should include monitoring of carbohydrate intake, whether by carbohydrate counting or experience based estimation. The statement does review the benefits or neutral results noted with low carbohydrate and/or high protein diets, but avoids using the term ‘ketogenic’ in relation to diet.

**Research Society For Study Of Diabetes In India (RSSDI)**

RSSDI suggests an individualized eating plan, based on individual health needs, personal and cultural preferences, access to healthful choices, health literacy and numeracy. This is in concordance with ADA recommendations. The ideal diabetic diet aims not only to maintain euglycaemia, but to ensure normal growth, development and lipid levels. RSSDI notes that the exact diet appropriate for T2DM is still debatable. It feels that low carbohydrate high protein diets are associated with poor metabolic profile. The weight loss linked with this is associated with duration of dietary restriction and overall reduction in energy intake. However, RSSDI does reference randomized controlled trials which report the benefit of low carbohydrate ketogenic diet and very low carbohydrate ketogenic diet. In its ‘recommended care’ section, RSSDI clearly states that ‘low carbohydrate ketogenic diet is preferred than low caloric diet in patients with T2DM. However, it recommends protein intake of 15% of total daily calories and avoidance of high fat diet as well. RSSDI thus seems to be the first expert professional body to discuss the utility of ketogenic diet in diabetes care.

**Diabetes Canada**

The Canadian guidelines are extremely patient centred and respectful of patient preferences and diversity. They call for nutrition therapy from qualified professionals and allow flexibility [within recommended ranges] in macronutrient distribution. The Canadian recommendations underscore the importance of weight loss of >5% in overweight and obese individuals with diabetes. They also highlight the importance of low glycaemic carbohydrates in mixed meals, and the need to maintain consistency in consumption. However, they too, do not recommend ketogenic diet in diabetes management.

**National Institute For Health And Care Excellence (NICE) (UNITED KINGDOM)**

NICE guidelines encourage tailor-made dietary changes, according to food preferences, and support flexible approaches to calorie restriction. Without mentioning any diet by name, NICE discourages use of unduly restrictive and nutritionally unbalanced diets, doubting their long term efficacy and safety. They discuss the shortcomings of very low calorie diets (VLCD), while clearly mentioning indications and caveats for their use. Unfortunately, a similar discussion for ketogenic diet is missing in the updated document. Ketogenic diet is mentioned only in relation to epilepsy and autism spectrum disorder. NICE supports referral of children and young people with refractory epilepsy to specialists “for consideration of the use of a ketogenic diet”.

**Proposed Suggestion**

There is ample evidence to support the use of low carbohydrate and high protein diets in diabetes and obesity management. We suggest that professional organizations should develop and share pragmatic advice regarding the rational use of this therapeutic modality. This is especially important for carbohydrate-loving South Asia, which shoulders more than its fair
share of diabetes and obesity. We make a beginning (Table) by listing some robust indications and contraindications for ketogenic diet. These simple suggestions should be able to help physicians guide their patients in selecting, or avoiding, ketogenic diet as a part of their short term or long term diabetes management plan.

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