



Ketogenic diet applied in the treatment of cancer and epilepsy

Dieta cetogênica aplicada no tratamento de câncer e epilepsia

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ABSTRACT

The ketogenic diet is a diet that is based on a high level of lipids and low levels of protein and carbohydrates in meals (FERREIRA, 2022). This diet was first reported in 377 BC by the physician Hippocrates in Ancient Greece, this type of meal was used to treat cases of epilepsy (FERREIRA, 2022). Then there was a long period of disuse and later this diet began to be used again around 1900 for the treatment of cancer and various other diseases (GONÇALVES, 2019).

Keywords: Cancer, Epilepsy, Ketogenic Diet, Treatment.

RESUMO

A dieta cetogênica trata-se de uma alimentação que se baseia em um elevado nível de lipídeos e baixos níveis de proteína e carboidratos nas refeições (FERREIRA, 2022). Essa dieta foi relatada pela primeira vez em 377 a.C. pelo médico Hipócrates na Grécia Antiga, esse tipo de refeição era utilizado para tratar casos de epilepsia (FERREIRA, 2022). Em seguida houve um longo período de desuso e posteriormente esse regime alimentar passou a ser utilizado novamente por volta de 1900 para o tratamento de câncer e várias outras doenças (GONÇALVES, 2019).

Palavras-chave: Câncer, Epilepsia, Dieta Cetogênica, Tratamento.

1 INTRODUCTION

The ketogenic diet is a diet that is based on a high level of lipids and low levels of protein and carbohydrates in meals (FERREIRA, 2022). This diet was first reported in 377 BC by the physician Hippocrates in Ancient Greece, this type of meal was used to treat cases of epilepsy (FERREIRA, 2022). Then there was a long period of disuse and later this diet began to be used again around 1900 for the treatment of cancer and various other diseases (GONÇALVES, 2019).

The classic ketogenic diet is in the middle of ketogenic dietary therapies in which are also the diets of medium chain triglycerides (MCT) in which it is a type of fat that is easier to digest when consumed. Thus, they end up becoming a source of energy for immediate use, there is also the treatment of low glycemic index (LGIT) which are whole and natural foods with restriction of refined foods; And finally, the modified Atkins diet (MAD) is about foods that have no carbohydrates, it is a regimen focused on protein and fatty acids. (GONCALVES, 2019). Of all these variations, the LGIT and MAD diets are mainly used



in adolescent and adult patients with epilepsy, and the classic one that consists of a regimen of high lipid content, low protein and zero carbohydrate, in general is used for patients up to 2 years in the most varied diseases, in general all of them have recognized benefits and the choice of which diet to use is evaluated according to the clinical picture of each patient (GONCALVES, 2019).

The dietary restriction of carbohydrates and the high level of fatty acids causes metabolic changes in the body and consequently the increase of lipolysis because with the decrease in glucose intake, the source of energy becomes the ingested lipids and with this the breakdown of them for the formation of ATP, and beta-oxidation (transformation of fatty acids into energy), with this comes the formation of ketone bodies, a condition in which the body begins to use fats to obtain ATP in place of glucose (FERREIRA, 2022), concomitantly the distribution of glucose is decreased which modifies the entire energy pathway. All these changes become essential for the treatment of epilepsy in which such a difference in metabolism results in synaptic consolidation and reduction of cortical activity thus decreasing seizure rates (FERREIRA, 2022).

As well as it also helps in the treatment for cancer whose tumor cells do not have the ability to make ketosis (production of ATP from lipids when there is not enough glucose in the body)). and with this restriction causes the reduction of activity in cellular processes (FERREIRA, 2022).

2 GOAL

To perform a literature search through a narrative literature review on the use of the ketogenic diet in the treatment of epilepsy and cancer.

3 METHODOLOGY

The present work is a literature review, developed through articles published in the period from 2013 to 2023 in the electronic databases: *Scientific Electronic Library Online (SCieLO)* and *National Library of Medicine Portal (PubMed)*. The following Health Sciences Descriptors (DeCS/MeSH) were used: "ketogenic diet", "cancer" and "epilepsy", and their respective synonyms, in Portuguese and English. As inclusion criteria, articles published on the use of the ketogenic diet in the treatment of patients affected by cancer or epilepsy and that were available online were considered to compose this review. Articles on the use of the ketogenic diet in the treatment of other diseases, preclinical studies, literature reviews and other studies published outside the proposed period, which did not deal with the subject, were not available online and repeated articles found in different databases were excluded.

4 DEVELOPMENT

At 5 years of age, two children were hospitalized after presenting worsening in their clinical picture of Rett Syndrome, symptoms of epilepsy, with regression in psychomotor development, progressive loss of



gait, use of the hands and difficulties in swallowing. The failure in the therapeutic measures previously applied in the treatment of the patient allowed the application of the 4:1 ketogenic diet by means of a nasogastric tube. Reconciled with the pharmacotherapeutic treatment of Topiramate, Sodium Valproate and Lamotrigine. (GONCALVES(2019)

Because of the change in treatment, it was possible to obtain an improvement in the patients' condition, with a decrease in the frequency of crises. The ketogenic diet is often used in the treatment of metabolic disorders. In this context, the ketogenic diet can be considered for early treatment, since its results resemble the antiepileptic effects. Its applicability also proves to be effective in the treatment of refractory diseases. The ketogenic diet is contraindicated in patients who have Pyruvate Carboxylase Deficiency, Porphyrrias, Primary Carnitin Deficiency and β -oxidation defects. They should also be disregarded in case of epilepsy that requires surgical procedures, and patients who have poor adherence to diet. (GONCALVES, 2019)

A 48-year-old patient diagnosed with an adenocarcinoma of the pancreas. The ketogenic diet, the modified ketogenic diet was started, since he was 10 pounds overweight, but did not have malnutrition. In the following visits, it was possible to observe improvement in the clinical picture of the patient, who presented a decrease in body fat and an increase in muscle mass. The patient was able to return to his ideal weight. There was no metastasis in lymph node tissues, and after surgery to remove the tumor, he had a complete reaction to the treatment. (CASADEMUNT, 2019)

The ketogenic diet can be a great ally in the treatment of cancer, due to the low capacity of neoplastic cells to perform ketosis, while healthy ones can easily replace the process of glycolysis in order to generate ATP. With the ketogenic diet, which is low in carbohydrates and proteins, avoiding glycogenesis, but rich in fatty acids, it is possible to decrease the efficiency of tumor cell maturation. (PAIM, 2017). However, some collateral damage makes it difficult to run the ketogenic diet. It is recommended, that the diet, be applied for 3 months at most, due to the risk in the development of hyperlipidemia, nephrolithiasis, and other diseases. (Schoeler & Cross, 2016).

5 FINAL CONSIDERATIONS

Finally, this literature review showed the benefits and the importance of the ketogenic diet for the treatment of cancer and epilepsy, when they are treated correctly and specifically for each patient. It acts as an integrative and complementary therapy with respect to conventional treatments and methods, the summary shows that with the use of this regimen occurs the improvement in survival, secondary symptoms are decreased, and the quality of life is improved.



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