

## The Role of Ketogenic Diet in the Treatment of Cancer: A Review Paper

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### Abstract

Cancer is recognized as one of main community health problems. The Ketogenic diets (KDs) have recently gained increased interest for the treatment of cancer. This review intends to present a summary of the recent knowledge of the role of KD in treatment of cancer. The electronic searching was carried out in Pub Med, Cochrane, Google scholar Cumulative Index for Nursing and Allied Health (CINAHL), EBSCO, CINHALL, and GLOBAL ETD SEARCH. Most of studies suggest the use of the KD in combination with other standard treatment depend on its ability to increase the antitumor effects. KD is safe, tolerable by patients with cancer and improves quality of life. Future studies are required to find out which types of cancers and course of therapy the KD may be most suitable.

**Keywords:** Ketogenic Diets; Cancer Patient; Cancer Therapy

### Introduction

Cancer is recognized as one of main community health problems [1-4]. There are many factors that contribute in the development of cancers [5-8]. Many evidences point to that both genetic and environment factors (lifestyle, economic and behavioral factors, tobacco, diet, obesity, infection, radiation, stress and lack of physical activity) play a role in a variety of phases of different malignancies [9,10].

There are two methods that help to manage cancer. First method, through medication such as non-steroidal anti-inflammatory drugs (NSIADS), chemotherapy, radiation therapy, hormonal therapy, aspirin and vitamin supplementation specific vitamin D, and vaccination such as human papillomavirus vaccine (HPV) which is good for prevent the infection and hepatitis B vaccine [11]. The other method is through diet and nutrition [12].

The appropriate diet regimen has significant effects on individual health [13]. A variety of studies specified that appropriate nutrition and nutritional patterns can have a role in prevention and treatment of cancer [14]. The Ketogenic diets (KD) have recently gained in-

creased interest for the treatment of cancer [15]. The KDs are diets that mimic and imitate the metabolic state of fasting through inducing a physiological increase in the two main circulating acetoacetate, ketone bodies and beta-hydroxybutyrate, above the suggestion range [15]. The KD limits carbohydrate intake to less than 25 to 50 grams per day to push the body tissues to utilize fat and ketones as energy for the period of caloric restriction, and it is usually suggested that 20% of calories from protein and 75% from fat, with just 5% from carbohydrates [16].

### Objective of the Study

This review intends to present a summary of the recent knowledge of the role of KD in treatment of cancer patient based on literature.

### Method

#### Search methods

The searching was conducted in different Electronic databases: Pub Med, Cochrane, Google scholar Cumulative Index for Nursing and Allied Health (CINAHL), EBSCO, CINHALL and GLOBAL ETD SEARCH. The key search terms were: 'Ketogenic Diet', 'cancer therapy' and 'cancer patient'.

Inclusion criteria were studies (a) discuss the management of cancer patient diet (b) published between 2014 and 2020, (c) published in English language. While, studies published before 2014 were excluded.

#### Search outcome

Exploring of literature yield 100 studies for review, 30 excluded when reviewed the title, 60 when reading the abstract and 10 studies met the inclusion criteria.

### Results and Discussion

Recently, there is a significant discussion about the appropriateness of the KD for cancer treatment. This review evaluated the recent knowledge of the role of KD in treatment of cancer. The KD has become popular in both human studies and preclinical animal studies for their potential to reverse or even prevent growth of tumor. Generally, most clinical human studies carried out so far have revealed a positive anticancer effect of KD [17-20]. In Turkey, a recent retrospective study found that KD together with metabolically supported chemotherapy (MSCT), hyperbaric oxygen therapy (HBOT) and hyperthermia may improve the patients outcomes diagnosed with stage IV non-small cell lung cancer (NSCLC) [17]. And, it appears effective in treating Triple-negative breast cancer (TNBC) when it is combined with other metabolic approach [18]. Also, the Postpancreatectomy cancer patients when consumed KD show a high energy intake and body cell Mass (BCM), which propose the possible use of KD as an adjuvant anti-cancer treatment [19]. In agreement with other studies, Italian study confirms that an approach depends on diet that includes oleic acid and vitamin D3 within the KD may be useful in the complementary treatment for patients with breast cancer [20].

The majority of clinical studies indicated that the use of KD may increase in quality of life for patients with cancer. According to recent a randomized controlled trial, the KD influence quality of life through raising energy, improving physical function, and reducing specific food desires among women with ovarian and endometrial cancer [21]. And, it may influence quality of life among patients with metastatic cancer [22].

A number of animal studies reveal that KD has significant anti-tumor effect. The KD can suppress the cancer progression and the associated systemic inflammation with no adverse effects on muscle mass and weight gain [23]. Further studies showed that KD decrease

tumor growth in animal models of neuroblastoma [24]. Especially, in combination with other metabolic therapies [25]. But, with minimal effect on the progression of liver tumors growth [26].

### Conclusion

Most of human studies and preclinical animal studies suggest the use of the KD in combination with other standard treatment depend on its ability to increase the anti- cancer effects of typical chemo- and radiotherapy. Generally, it's safe, tolerable by patients with cancer and improves their quality of life. Since, the impact of KD as anti-cancer is cancer type dependent, future studies is required to find out which types of cancers and course of therapy the KD may be most suitable.

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