Review

Food components and diet habits: chief factors of cancer development

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Abstract

Food is a vital need for everyone. Today, there is food for all, but the world still suffers from under- and over-nutrition and risk of cancer development and chronic diseases can follow both cases. Worldwide, cancer is a leading cause of mortality after cardiovascular disease; it is considered the second reason for death globally. Role of nutritional habits, the quality of food, the consumption of canned foods, genetically modified fruits and vegetables and exposed food to certain pesticides and carcinogens agents, and unhealthy lifestyle behaviours such as smoking, alcohol, obesity, and fast-foods consumption may be at risk to the development of some cancers. In recent decades, researchers have carried out attention in this field to improve the quality of life and to limit nutrition problems. Thus, this study aims to summarize current evidence on the relationship between nutritional factors and cancer expansion, how nutrition can be a heal and a source of fatal illness leading to death. In detail, this review will highlight the influence of specific foodstuffs on the threat of cancer incidence and recurrence by providing some examples of most carcinogenic compounds.

Key words: cancer; carcinogens; food; nutritional habits.

Introduction

Cancer is a worldwide leading cause of mortality after cardiovascular disease. It is a genetic disease caused by mutations leading to a hierarchical and uncontrolled expansion of the body’s cells with the capacity to propagate and destroy the body’s normal tissue. Those mutations are acquired accidentally during replication or elicit by carcinogens (Pitot and Loeb, 2002). Carcinogens are substances or agents that damage the genome and can induce cancer; some of them interrelate directly with the DNA, though others act on some molecules that can unite by covalent adduct with DNA after their stimulation. This induces disorder in some biological processes because of mutations gained in genes critical to these processes (Soliman, 2018). Carcinogens can have a synthetic chemical origin or can occur from natural substances. It can split the variation of agents that induce cancer into exogenous and endogenous sources. Exogenous which are chemical, physical, and biological carcinogens have a mutagenic action after their introduction into the cell either by passive diffusion or through membrane receptors by causing the alteration of the DNA (Figure 1). Physical carcinogens as UV radiation, ionizing radiations, X radiation, radioactivity, etc., and chemical one’s damage the DNA such as tobacco smoke or stimulate cell proliferation such as oestrogens, prolactin, and biological carcinogens such as DNA, RNA, and other viruses (Figure 1) (McKeague, 2017).

Endogenous causes induce alteration provoked by molecules issued from our metabolism such as reactive oxygen species (ROS). Badger showed that spontaneous DNA replication errors can express significant damage to the cell’s genetic code caused by ROS (Badger, 1956). Besides, these ROS leads to oxidative stress, which affects the mechanisms of tumour growth and carcinogenesis (Miyata et al., 2017).

Nowadays, belonging to the family of exogenous carcinogens, food that we are consuming is being one of the important and dangerous causes causing cancer. Heat treatment, cooking habits, and consumption of genetically modified foods gives mount to...
a plethora of substances with toxic effects. Those components affect the DNA and its replication leading to cancer. For the carcinogenic risk assessment and estimation, the International Agency for Research on Cancer’s (IARC) has tested over 1000 chemical agents and mixtures marked by raising the risk of cancer in humans. Thought, it is important to mention that diet habits also play a significant part in cancer (Anttila et al., 2002; Abnet, 2007). Studies showing a significant percentage represented in terms of consumption of products such as hormone foods (27%), burned foods (14%), alcohol (16%), and cola drinks (7%) (Figure 2), which are a leading cause of cancer (Kaplan et al., 2018). In particular, the existence of chemical compounds in foods considered as potentially carcinogenic to humans has attracted public attention and sparked a debate on the safety of heated foods and beverages (Wenzl et al., 2007).

For this study, collected data that hold some types of potentially carcinogenic compounds funded in food, diet habits, it presents some suggestions for maintaining a healthy bad lifestyle.

Effect of carcinogens in foods and diet habits on cancer growth

Nutrition reported in 70% of all cancers 40% of cancer-related deaths (Stewart and Wild, 2014). Studies have been broadly conducted about the harmful properties of different foods and their components and contaminants. Researches on increased cancer risk have revealed that a poor diet and a sedentary lifestyle are main factors on the recurrence of the level of breast cancer and mortality in Mediterranean basis countries (Toklu and Nogay, 2018). Michels et al. explained that this rising results from life anticipation and adoption of western lifestyle and were characterized by several risk factors, those which are non-modifiable such as age, genetic disposition, and modifiable one such as dietary choices (Michels et al., 2007). Taking as an example of the bad diet habit, the elevated intake of caloric foods containing sugar and saturated fat, and low intake of healthy foods leads to obesity; thing that raises adipose tissue inflammation leading to breast cancer growth and progression (WCRF, 2018). We consider red meat to be one of the most recognized cancer risk factors (Figure 3). Cooking processes, use of high temperature and the role of iron funded in meat, which is known to be a mutagens agent; increase the risk of formation of pro-carcinogenic compounds (Inoue-Choi et al., 2016). Sevim (2019) has proved that elevated temperature of cooking can guide to deterioration in the final’s quality product by protein denaturation, variation in the solubility of carbohydrates, the degradation of vitamins, and the oxidation fat acids (Sevim, 2019). Regarding dairy products, they also had a chief function in raising the incidence of cancer growth (Figure 3) because of saturated fatty acids founded, also the promoter of breast cancer growth endogenous Insulin-like Growth (IGF-1) according to Turner, 2011. Salted fish contain several potential carcinogens such as N-nitrosodimethylamine, due to the unsafe process of their production (Zou et al., 1994). Fermented and distilled alcoholic beverages can cause cancer in humans and promote tumour growth (Poschl and Seitz, 2004; Roswall and Weiderpass, 2015).
and Linsell, 1973; Hayes to human and having liver as a target. However, tumours in the provides infected animal food products that will be transferred and cereals. The consumption of infected elements by animals have as source Aspergillus flavus higher, moderate, and low level of carcinogenicity. The most hazardous. Investigators divided them into agents with a which are the primary route of human exposure, they are considered an entrance for the digestive system and since it is the first exposed barriers, so that, the existence of multiple circumstances and risk factors associated with carcinogenesis will be elevated (Yen et al., 2002).

Concerning carcinogenic compounds found in some foods, which are the primary route of human exposure, they are considered the most hazardous. Investigators divided them into agents with a higher, moderate, and low level of carcinogenicity. Aflatoxin is by far the most hazardous carcinogens which have as source Aspergillus flavus that can infect peanuts, nuts, and cereals. The consumption of infected elements by animals provides infected animal food products that will be transferred to human and having liver as a target. However, tumours in the colon and kidney also are affected by this carcinogen (Peers and Linsell, 1973; Hayes et al., 1984; Abnet, 2007). Nitrites, which occur naturally in fruit and vegetables, are transformed in the stomach to nitrous acid and after its reaction with amines in foods; it can produce other carcinogenic agents, which are known as nitrosamines (Oliver et al., 1993). The polycyclic aromatic hydrocarbon (PAHs), produced by cigarette smoke, is also a hazardous carcinogen to humans. It causes irreversible damage to the genome after its interaction directly to DNA. This approves the harmful role of cigarette smoke, which according to researches contains 60 carcinogens and they consider 15 of them as carcinogenic to humans (DeVita et al., 2015). Nevertheless, it is unfettered into the environment after the combustion of carbon-containing and from materials affected by high temperatures such as cooking and domestic heating (World Health Organisation, 2000). Another compound that was identified and considered as the result of high-temperature cooking processes is Acrylamide but had a low carcinogenic effect than PAHs (Report on Carcinogens, 2002). Studies conducted with the herbal infusion of the plant Maté have established an association between the hot substance and the cancer of mouth, oropharynx, head and neck, and oesophagus (Goldenberg, 2002; De Stefani et al., 2003).

So, in these cases, food is one of the major causes of cancer, making changes which guide to the loss of the taste because of damage of the taste receptor cells (TRCs) inducing the feeling of satiety, anorexia, nausea, vomiting, and diarrhoea. Noticed changes in metabolism were explained by the increase of protein of catabolism and energy expenditure leading to cachexia and weight loss (Davidson et al., 2004). Besides, smoking, alcohol, and food consumption attack directly the oral cavity which is an entrance for the digestive system and since it is the first exposed barriers, so that, the existence of multiple circumstances and risk factors associated with carcinogenesis will be elevated (Yen et al., 2002).

Food and diet habit: key for a better lifestyle

According to the recommendations of the World Cancer Research Foundation and the American Institute for Cancer Research, following a fibre and soy-rich diet and limiting intake of fats decrease the risk of cancer rising. Healthy dietary is known as the increase of intake of unrefined cereals, vegetables, fruits, and moderate consumption of saturated fatty acids and red meat (WCRF, 2018). So, the aim nowadays is to secure food’s quality for all than improving its distribution and this can be achieved by adjusting our habits of diet.

Known to be an effective anti-cancer, polyphenols and fibre have a preventive carcinogenesis role (Braakhuis et al., 2016). Polyphenols found in some fruits such as dates, bananas, apples, besides in green tea that play an important chemopreventive role and had a part in the prevention of carcinogenesis, including prostate cancer (Miyata et al., 2019) and possesses antioxidant agents that counteract oxidative stress and inflammation, the thing that reduces cancer risk (Yoon and Baek, 2005). Polyphenols extracted from cacao reduces platelet activation and aggregation (Ludovici et al., 2018). The identification of Blueberry powder contains reveals that it possesses a high quality of polyphenols, which regulate interleukin (IL)-6 that modulates breast cancer proliferation (Kanaya et al., 2013). Furthermore, polyphenols inhibit the enzymatic activity of LOX and COX which are over-expressed in tumour cells (Figure 4) beside transcription factor NF-kB and regulate the expression of inflammatory cytokines factors of tumour necrosis (Wadsworth and Koop, 1999; Gerhauser et al., 2003; Biswas et al., 2005).

Likewise, dairy products besides their carcinogenic role have anti-carcinogenic proprieties, thanks to the presence of vitamin D, lactoferrin, etc. (De Ciccio et al., 2019). So, each food item could have good and bad effects, it is still a matter of improving production and quality control, and given the poor quality of food, it is important to secure processes of their production and to give attention to changing habits and spreading the feeling of improving life quality.
Conflict of interest statement

None declared.

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