

Obesity and its influence on cancer: a recent literature review

Obesidade e sua influência sobre o câncer: uma recente revisão da literatura

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Resumo

Introdução: As taxas de obesidade têm aumentado em todo o mundo, sendo atualmente essa condição reconhecida como a principal causa evitável de vários tipos de câncer. **Objetivo:** Portanto, procurou-se realizar um levantamento das características clínicas que relacionam a obesidade e os diferentes tipos de câncer, entre os anos de 2017 e 2020. **Materiais e Métodos:** Revisão integrativa da literatura, com buscas de evidências nas bases de dados PubMed, Scielo e LILACS, cuja questão norteadora foi: "Qual a sobre a influência da obesidade em relação aos diferentes tipos de câncer?". **Resultados e Conclusões:** Foram identificados 32 artigos, dos quais 8 foram selecionados. A gordura corporal foi enfatizada como um fator de grande impacto no desenvolvimento de neoplasias. Os dados sugerem que quatro em 10 tipos de câncer são evitáveis por meio de mudanças no comportamento e padrão alimentar do indivíduo. Estudos epidemiológicos têm mostrado uma forte ligação entre o fator dietético e a incidência e prognóstico do câncer. Considerando que a dieta e o exercício físico são fatores modificáveis, os projetos e as intervenções nos cuidados primários são essenciais para a prevenção da doença. O entendimento dos mecanismos biológicos explica como um comportamento saudável promove melhorias, destacando-se a importância da disseminação da informação às populações de risco e na implementação de estratégias que ajudem os pacientes a fazer escolhas melhores e mais saudáveis.

Palavras-chave: obesidade; neoplasias; alimentação; atividade física

Abstract

Introduction: Obesity rates have increased worldwide, and this condition is currently recognized as the main preventable cause of various types of cancer. **Objective:** Therefore, an attempt was made to survey of clinical characteristics that relates obesity and different types of cancer, between the years 2017 and 2020. **Materials and Methods:** Integrative literature review, with searches for analysis in the PubMed, Scielo and LILACS databases, specific guiding question was: "What is the influence of obesity in relation to different types of cancer?". **Results and Conclusions:** 32 articles were indentified, and then 8 were selected. Body fat was emphasized as a factor of important impact in the development of neoplasia. The data suggest that four of 10 types of cancer are preventable through changes in the individual's behavior and eating pattern. Epidemiological studies have shown a strong link between the dietary factor and the incidence and prognosis of cancer. Considering that diet and exercise are

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modifiable factors, primary care projects and interventions are essential for disease prevention. Understanding the biological mechanisms explains how healthy behavior promotes improvements, highlighting the importance of disseminating information to risk populations and implementing strategies that help patients make better and healthier choices.

Keywords: obesity; neoplasia; feed; physical activity

Introduction

Obesity rates have increased worldwide, and this condition is recognized as one of the main preventable causes of various types of cancer^{1,2}. Several diseases are directly related to obesity, including diabetes, hypertension, atherosclerosis, strokes, musculoskeletal diseases and cancer, so that obesity is a prevalent public health problem³. The link between high adiposity and an increased risk of cancer is biologically plausible considering that obesity is related to a vast metabolic alteration and physiological dysfunctions. Abnormalities in insulin resistance and insulin growth factor (IGF-1) and insulin pathway, can trigger tumor development⁴. According to Pearson-Stuttard et al.⁵ diabetes and the high body mass index (BMI) have been associated with the increase of several types of cancer, suggesting that 3.9% of global cancer cases in 2012 were assigned to high BMI values.

Recently, the literature shows that the risk and mortality from thyroid, esophagus, liver, gallbladder, colon and kidney cancers, as well as non-Hodgkin's lymphoma and multiple myeloma, are particularly associated with obesity in both sexes. This relation is also strong for endometrial and post-menopausal breast cancer in women and for prostate cancer in men⁶. It is estimated that more than 14 million people worldwide develop cancer every year and this number can increase to more than 21 million by 2030⁷. In addition, 19.3 million new cases (18.1 million excluding non-melanoma skin cancer) and almost 10.0 million deaths occurred in 2020 worldwide⁸. In Brazil, considered one of the countries with the highest mortality rates in the world and occupying the second place in cases of death from the disease⁹, in 2018, there were 559,371 new cases, with 243,588 deaths. According to

the incidence, the five main types of cancer are breast, prostate, lung, colon and thyroid, with lung, breast, prostate, stomach and colon cancer responsible for the majority of deaths¹⁰.

Elevated BMI is associated with an increase of 14 types of cancer. A study calculated the incidence of cancer attributed to high BMI in Brazil in 2012, and its projections for 2025. It was found that 3.8% of all cancers diagnosed in 2012 were attributed to high BMI, with a higher incidence in women (5.2%) than in men (2.6%). The populations that had the highest incidence for all types of cancer were in the richest states in the country, located in the south and southeast. It is projected that in 2025, cancer cases attributed to a high BMI in Brazil may reach 4.6% (6.2% in women and 3.2% in men)¹¹.

According to the World Cancer Research Fund International and the American Institute for Cancer Research, approximately one third of the most common cancers could be prevented by changing lifestyle and eating habits in developed countries¹². Recently, studies suggest that local and systemic inflammation caused by adiposity plays a central role in breast cancer, thus, greater attention is needed for risk populations, such as patients with hyperinsulinemia and / or inflammation of adipose tissue⁵.

Obesity is associated with an increase in postmenopausal estrogen positive receptors, adding to the risk of breast cancer and the relation to the breast tumor subtypes. Several mechanisms have contributed to the link between obesity and this type of cancer, including high levels of local and circulating estrogen, elevation of adipokines (leptin and adiponectin), disruption of insulin / IGF signaling, changes in the microbiome, and local and systemic inflammatory effects⁵. Data confirm that the increase in information

about the concept of BMI and obesity, and the increase of the risk of gynecological cancers are related to a elevate adiposity, could promote a greater awareness of these risks among women¹³.

The increase in westernization is associated to the risk factors for the increase in cancer. According to the Food and Agriculture Organization (FAO), industrialized foods have influenced the food culture that was previously based on fresh and minimally processed foods¹⁰. Over the past few decades, many countries have dramatically increased their consumption of ultra-processed foods. After undergoing several physical, biological and / or chemical processes, these foods are processed to be microbiologically safe, highly palatable and affordable.

Ultra-processed foods can contain high levels of total fat, saturated fat, and added sugars and salt, along with low fiber and vitamins. In addition to the nutritional composition, these foods may contain carcinogenic properties (due to the presence of acrylamides, heterocyclic amines, and polycyclic aromatic hydrocarbons), and may be present during the heating process as a result of the Maillard reaction¹². In a European study, was evaluated the association of anthropometric indicators of obesity, the risk factor established for various types of cancer, distribution of body fat, which reflects on the metabolic complications of obesity, and the relationship between total and local obesity, with the incidence cancer. Hip circumference and waist-to-hip ratio showed a positive association with the relationship between obesity and cancer, especially colorectal cancer in the elderly⁴.

According to Fiolet et al.¹² a study conducted in 2009 in France, showed that the consumption of ultra-processed foods is associated with an increased risk of cancer in general and of breast cancer. These results remained statistically significant after adjusting several nutritional markers. An increase of 10% in the consumption of ultra-processed foods is associated with an increase

of 12% in the risk of cancer in general and 11% in the risk of breast cancer.

The study by Tabung et al.¹⁴ analyzed the relationship between pro-inflammatory diets and the increased risk of colorectal cancer, based on the levels of circulating inflammatory biomarkers. The results suggested that this inflammation is a potential mechanism linked to dietary patterns and the development of this type of cancer. Interventions to reduce the adverse effect of pro-inflammatory diets may be more effective among men with obesity or overweight or women, or thin men who do not consume alcohol.

In addition to food, it is known that physical exercise has a protective factor against colorectal cancer, even in individuals with different BMI. Mortality rates for colorectal cancer in Brazil between 1990 and 2015 were higher than in the rest of the world (68.47% and 24.56%, respectively). Physical inactivity was responsible for 1,302 deaths in 1990 and 4,143 in 2015 due to colorectal cancer. Brazilian states with better socioeconomic conditions indicated higher mortality and morbidity rates due to colorectal cancer due to physical inactivity¹⁵. Obesity, diabetes and cancer are metabolic diseases. Both types of diabetes 1 and 2 share hormonal changes (changes in insulin IGF-1 and the leptin / adiponectin axes), metabolic changes, and immunity (increasing the circulation of inflammatory cytokines)¹⁶.

Obesity has an influence of 20 to 35% of all the cancers. The main candidates related to obesity are those cytokines that cause insulin resistance: leptin, tumor necrosis factor α (TNF- α), adiponectin and free fatty acids. Insulin resistance and hyperinsulinemia promote the production of growth of insulin-like factor 1 (IGF-1). Several cancer cell lines, including colon and prostate, have IGF-1 receptors. Visceral adipocytes, lipolysis pathway, increase the circulation of free fatty acids that can develop a cancerous potential, through cell proliferation, stimulation of IGF-1, and indirectly, through insulin resistance¹⁷.

There are other mechanisms by which glucose favors tumor growth regardless of insulin: inducing an increase in the growth of factors such as IGF in cancer cells; invasive and migratory cell increasing; increase of reactive oxygen species and glycosylated products. Tumor cells obtain energy through oxidative phosphorylation and with the high availability of glucose, thus the production of reactive oxygen species is increased, favoring the development of mutations¹⁷.

According to that have been discussed above, it is suggested that hyperglycemia is a risk factor independent of tumor and inflammatory factors for the development of cancer in diabetic patients. Recently, the results of cancer research have emphasized the importance of immunity, metabolism and oncometabolites. The emerging concept is that certain metabolites modulate signaling in tumor cells, inducing the adaptations required to support all tumor characteristics¹⁶.

Avoiding weight gain through calorie restriction can improve inflammation in white adipose tissue in rats. Weight loss is associated with a reduction in interleukin 5 (IL-5), recombinant human granulocyte colony-stimulating factor (GM-CSF), and circulating neutrophils, resulting in the reversal of the pro-metastatic effects of obesity in pre-clinical breast cancer models. Lifestyle interventions such as physical activity have shown improvements in the immune system. Physical exercises and epinephrine lead to the activation of immunovigilance T-killer cells, and suppress the tumor incidence and the growth of various types of cancer¹⁸.

Within this context, the aim of this study was to conduct a survey of the clinical characteristics that relate obesity and different types of cancer, between the years 2017 and 2020.

Materials and Methods

This study consists of an integrative literature review, whose guiding question

was: "What is the influence of obesity in relation to different types of cancer?"

For the selection criteria of the scientific articles, the following health descriptors (DeCS) were used: "obesity", "excess body weight", "cancer" and "processed foods", in the US National Library of Medicine National Institutes of Health (PubMed) Scientific Electronic Library Online (SciELO), Latin American and Caribbean Literature on Health Sciences (LILACS) databases, in the month of April 2020. Scientific articles in Portuguese, English and Spanish were selected.

As an inclusion criterion, articles published between the years 2017 and 2020, due to the relevance of the theme in the present time. Studies published in other formats than articles (for example: dissertations, theses, books, book chapters, editorials, among others), those published in other language than the one previously mentioned, as well as those that were not in accordance with the theme were excluded. These exclusion criteria were considered in the analysis of the titles and abstracts of the studies, and later in the reading of the full texts retrieved.

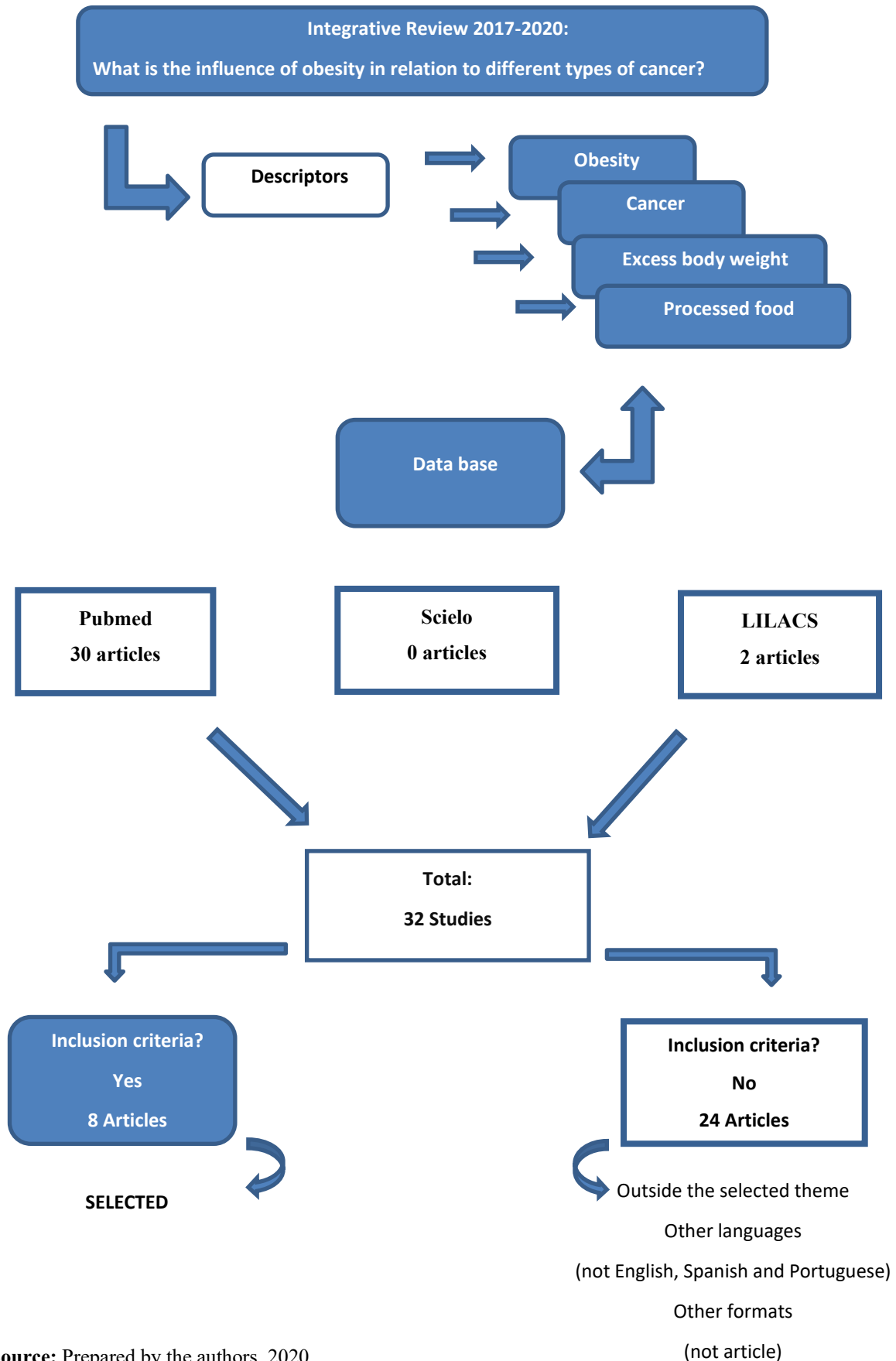
As limitations of the study, few articles were found within the proposed period that directly addressed the subject, and it was noticed that recent literature is scarce in studies that relate obesity to specific types of cancers, especially with regard to publications in Portuguese.

Results

After consulting the aforementioned databases, 32 articles were identified, being: PubMed (n=30), LILACS (n=2). When the exclusion criteria were applied only 8 articles were selected, which matched the methodological criteria.

Figure 1 shows the flowchart of the selection process of the researched articles. The most relevant information about the articles is shown in **Chart 1**.

Figure 1: Flowchart of the selection process of the researched articles. Brazil, 2020.



Source: Prepared by the authors, 2020.

Table 1. Results of the analysis of the articles. Brazil, 2020.

| ARTICLE | DATA DESCRIPTION |
|--|--|
| <p>Author / Year</p> <p>Title</p> <p>Objective</p> <p>Conclusion</p> | <p>Stern et al.²⁷</p> <p>Diet, physical activity, obesity and cancer-related risks: strategies for reducing cancer burden in the Americas.</p> <p>Discuss the relationships between diet, obesity, physical activity, and cancer, emphasizing strategies directed to children to decrease the risk of obesity, control obesity-related risk factors, and reduce sedentary lifestyles.</p> <p>The links between diet, obesity, physical activity and cancer, emphasizing strategies directed at children to decrease the risk of obesity, control obesity-related risk factors and reduce sedentary lifestyles, considering that these factors may have a high impact on cancer risk in adults.</p> |
| <p>Author / Year</p> <p>Title</p> <p>Objective</p> <p>Conclusion</p> | <p>Aguirre-Portolés & Molina¹⁹</p> <p>Precision nutrition for targeting lipid metabolism in colorectal cancer .</p> <p>Deepen the study of co-occurring events, which orchestrate CRC tumorigenesis and that are essential for evolving precision nutrition paradigms. Discuss the application of precision nutrition approaches to target lipid metabolism in CRC.</p> <p>Compelling evidence from epidemiological and experimental studies supports the crucial role of obesity, dietary patterns, gene-diet interactions, and lipid metabolism in CRC prevention and prognosis. The design of clinical trials combining classical chemotherapeutic agents with bioactive products targeting lipid metabolism constitutes an unquestionable line of research in CRC treatment.</p> |
| <p>Author / Year</p> <p>Title</p> <p>Objective</p> <p>Conclusion</p> | <p>Yang et al.²⁸</p> <p>Young Adult Risk Factors for Cancer: Obesity, Inflammation, and Sociobehavioral Mechanisms</p> <p>The article evaluates social disparities on metabolic and inflammatory cancer risk in the U.S. young adult population, and examines the psychosocial and behavioral mechanisms in these disparities.</p> <p>This study provides new insights into the social distribution of early life exposures to physiological precedents for cancer development later in life, with implications for prevention and early intervention of modifiable risk behaviors in adolescents and young adults.</p> |
| <p>Author / Year</p> <p>Title</p> <p>Objective</p> <p>Conclusion</p> | <p>López-Suárez²⁵</p> <p>Burden of cancer attributable to obesity, type 2 diabetes and associated risk factors. Metabolism.</p> <p>Discuss how obesity plays a central role in the morbidity and mortality of multiple organ and system diseases and is a major contributor to the growing incidence of cancer.</p> <p>Approximately 30 to 40 percent of the most common cancers are preventable by avoiding smoking, being overweight and adopting a healthy lifestyle. Leading a healthy lifestyle means engaging in regular physical activity; choosing a predominantly plant-based diet that limits consumption of red meat, alcohol, and ultra-processed foods, particularly processed red meat; and selecting vegetables, nuts, dried fruits, and fish as the primary source of protein. However, public health interventions in food delivery are also called for to reduce the burden of obesity-related cancers and to alleviate the growing unsustainable expenses for health care systems.</p> |

Continuation

| ARTIGO | DATA DESCRIPTION |
|--|--|
| <p>Author / Year</p> <p>Title</p> <p>Objective</p> <p>Conclusion</p> | <p>Milliron et al.²³</p> <p>Diet assessment among men undergoing genetic counseling and genetic testing for inherited prostate cancer: Exploring a teachable moment to support diet intervention.</p> <p>Conduct a targeted dietary analysis of men undergoing GC / GT for PCA for adherence to the United States Department of Agriculture (USDA) Food Standard recommendations aligned with cancer prevention and recurrence in the Genetic Evaluation of Men (GEM) study at two academic centers to inform future strategies for dietary intervention.</p> <p>A high proportion of men who received GC/GT for PCA were overweight and/or obese and lacked adherence to national dietary recommendations for cancer risk and recurrence, providing a learning moment and supporting the systematic focus of introducing nutritional intervention during GC to promote survival.</p> |
| <p>Author / Year</p> <p>Title</p> <p>Objective</p> <p>Conclusion</p> | <p>Queiroz et al.²²</p> <p>Nutritional and environmental risk factors for breast cancer: a case-control study.</p> <p>To investigate associations between breast cancer diagnosis and nutritional and environmental factors in women from Northeast Brazil.</p> <p>Higher consumption of ultra-processed foods, presence of overweight or obesity, waist circumference ≥ 88 cm, poor sanitation, and family history of cancer were risk factors for breast cancer in this sample of women living in the state of Rio Grande do Norte.</p> |
| <p>Author / Year</p> <p>Title</p> <p>Objective</p> <p>Conclusion</p> | <p>Almeida et al.²⁴</p> <p>Diet as a risk factor for bowel cancer in university students.</p> <p>Analyze the quality of university students' diet as a risk factor for bowel cancer.</p> <p>It was observed a high consumption of processed and/or industrialized foods with high fat and sugar content, along with a low intake of grains. This dietary conjuncture associated with a sedentary lifestyle is risk factors for the installation of a neoplasm condition.</p> |
| <p>Author / Year</p> <p>Title</p> <p>Objective</p> <p>Conclusion</p> | <p>Ludwig Cancer Research Nutrition and Cancer Prevention Collaborative Group²⁹</p> <p>Current opportunities to catalyze research in nutrition and cancer prevention - an interdisciplinary perspective.</p> <p>Discuss the need for systematic and interdisciplinary approaches to better understand the relationships between nutrition, exercise, obesity, and metabolic dysfunction with cancer development.</p> <p>A robust dialogue has identified obesity as a major cancer risk and the food environment, especially high-energy, low-nutrient processed foods, as strong and prevalent risk factors for obesity.</p> |

According to the articles found, all emphasize body fat as a factor of significant impact on the development of neoplasms. The data suggest that four out of 10 types of cancer are preventable through changes in

individual behavior, especially regarding eating patterns, as well as avoiding sedentary behavior, highlighting nutrition and physical activity as the main factors of cancer prevention.

Discussion

During the last decade, the decreased physical activity and increased in caloric intake have contributed to the increase of obesity, thus a metabolic change has occurred in the body, giving rise to hypertrophy and hyperplasia of adipose tissue¹⁹. The susceptibility to cancer does not depend only on the patient's genetic background, environmental factors and lifestyle can determine the etiology of colorectal cancer. Despite advances in early diagnosis and specific therapies for this type of cancer, the incidence has increased in people under 40 years. Alcohol consumption, smoking, dysbiosis, and diets rich in red meat are strongly associated with colorectal cancer¹⁴.

In consonance with the previously study found in this review, according to Silva et al.¹⁵ colorectal cancer is considered the third most lethal type of cancer in women and the fourth in men in Brazil, while in the United States it represents the second in this classification. This neoplasm has a multifactorial etiology that includes genetics and modifiable lifestyle factors. Among the modifiable lifestyle factors, physical activity stands out, because it interacts with some genes that are able to influence the onset of the development of this cancer. However, evidence shows that regular physical activity can reduce the development of colorectal cancer by 20-25% in both sexes. These mechanisms are still unclear, but changes in immune functions and the levels of prostaglandins, insulin, bile secretion, cholesterol, and gastrointestinal hormones have been reported.

According to Freitas-Alves et al.²⁰ breast cancer is the most frequent among women, and its increasing incidence is a global challenge. Exposure to estrogen is the main risk factor, but postmenopausal obesity has been shown to be a trigger for

the development and progression of the disease. The link between obesity and breast cancer carcinogenesis involves increased estrogen production and pro-inflammatory stimuli in adipose tissue, with activation of the cyclooxygenase-2 pathway. In this study was evaluated the impact of cyclogenase-2 polymorphisms in combination with obesity on the risk of breast cancer progression in Brazilian patients. It could be concluded that cyclogenase-2 genotyping can be added as a prognostic evaluation in obese patients with breast cancer. According to a study²¹ that evaluated the risk factors for breast cancer in the population in southeastern Brazil, 4,242 women aged 40 to 69 years without a history of breast cancer were evaluated and the risk prediction model indicated that the variables can be evaluated in the following population: age, height, previous breast biopsy, number of pregnancies, use of hormone replacement therapy.

Another Brazilian study²² identified in this review investigated associations of risk factors for breast cancer. Poor household sanitation and family history of cancer were significantly associated. According to anthropometric data overweight and increased waist circumference had a higher prevalence in the group of diagnosed cases, regular consumption of ultra-processed foods was also identified as a risk factor for breast cancer.

Low consumption of fruits, vegetables and seafood, and high consumption of processed meats and foods rich in saturated fats, has been reported among men diagnosed with non-metastatic prostate cancer. Adherence to a Mediterranean diet, rich in vegetables and omega 3, has been associated with lower rates of colorectal cancer-related morbidity.²³ Some similar dietary factors are related to increased risk of colorectal cancer, obesity and high consumption of red

meat, fat, and alcohol. However, a balanced diet, rich in fiber, vitamins, and minerals, may be preventive factors, and may help along with clinical treatment and the regression of the carcinogenic stage²⁴.

In obesity, specifically in type 2 diabetes, there is a state of up-regulation in IGF receptors, hyperinsulinemia, insulin resistance, and dyslipidemia, both conditions are associated with an inflammatory state that increases levels of interleukin 6 (IL-6), TNF- α , and plasminogen activator inhibitor. These changes activate cell receptors leading to complex changes in signaling pathways, and these changes are believed to play a critical role in the risk of oncogenesis through proliferation and migration, angiogenesis, and decreased cell apoptosis²⁵.

Similar results have demonstrated that the pathophysiological aspect of obesity and diabetes is chronic inflammation characterized by increased production of pro-inflammatory cytokines (IL-6, TNF- α) by adipose tissue, which leads to insulin resistance. High levels of IL-6 and TNF- α have been reported in patients with different types of cancer. The signaling of inflammatory cytokines through protein kinases, such as mitogen-activated protein kinases (MAPK), or the Janus family of tyrosine kinases/transcription factors (JAK/STAT), contributes to cancer biology by increasing proliferation, survival, and accumulation of mutations in cell tumors¹⁶.

Furthermore, Guitierrez-Salmeron et al.¹⁶ state that these factors systematically contribute to the suppression of the body's anti-tumor immunity. High circulating levels of glucose promote tumor growth through direct and indirect mechanisms. Glucose uptake is increased in tumor cells due to the metabolic adaptations they have undergone. Glucose indirectly induces tumor growth by increasing circulating levels of growth factors (insulin/IGF-1), epidermal growth factor (EGF), and inflammatory cytokines.

According to Stern et al.²⁶ the globalization process is highlighted as a major influence of some risk factors, considering that children and adults are exposed to these factors regardless of their country of residence. The Latino population living in the United States is experiencing a dietary transition, once consisting of grains, legumes, fruits, and vegetables, and now filled with processed foods, high calorie density, and highly sweetened beverages. This transition is also characterized by sedentary behaviors, obesity, cardiovascular disease, diabetes, and cancer.

Increased understanding of these metabolic processes may yield effective interventions in order to reduce the overall incidence of obesity and consequently the incidence of cancer. According to the increasing prevalence of these risk cancer factors, global efforts and clinical guidelines should reflect on the importance of cancer as a consequence of diabetes and high BMI, and thus target preventive measures to reduce morbidity in this group of patients³. This combination of dietary pattern, physical activity, body weight, and inflammation may explain the 35% of cancers in adults that are attributable to diet and malnutrition²⁷.

A balanced and diverse diet can be considered one of the most important modifiable factors on preventing the primary cancer risks¹². Rezende et al.¹¹ highlights the importance of public health and policy interventions (fiscal policies and regulation on the labeling, marketing, and sale of ultra-processed products), which are necessary for reducing the levels of overweight and obesity in the population. Concomitantly, food guide policies and market innovations should value and promote fresh and minimally processed foods, thus promoting the development of healthy food systems that are culturally appropriate and economically feasible in Brazil.

Yang et al.²⁸ reported that obesity and excess body fat associated with the

Western diet may represent the largest preventable cause of cancer in nonsmokers. Physical inactivity may further increase the risk of several types of cancer through its effects on adiposity, in addition to inactivation of the immune system and inflammation.

Low body fat is protective against some cancers. However, it is necessary to understand how specific diet and metabolite processes interact with environmental factors. However, dietary and metabolic factors have a role in cancer prevention, supported by a scientific basis that has been elucidated so far²⁹.

Actions to combat physical inactivity, dietary education, and public policy actions to improve cancer classification and treatment are urgent in Brazilian states²⁵. Promoting active lifestyles requires an integration of various health sectors to increase the number of opportunities to encourage individuals to be physically active. Policy and environmental interventions (bike paths, walkable sidewalks, and parks) are essential to support sustainable changes in physical activity in a large part of the population¹⁰.

The World Health Organization and the American Cancer Society recommend that cancer survivors consume a plant-based diet and perform 150 minutes per week of moderate-intensity physical activity. Lifestyle modifications have shown

benefits in preventing cancer, reducing its risks, and factors that favor quality of life³⁰.

Conclusion

According to the recent data presented here, anthropometric indicators linked to obesity, high BMI and body fat accumulation generate metabolic and physiological dysfunctions that may favor a higher incidence of different cancerous types. Therefore, the present study contributes to a better understanding of the biological mechanisms linking obesity and cancer, including inflammatory processes, microbiota and hormonal changes, immune system abnormalities as well as those related to insulin resistance, which are among the clinical modifications currently reported in the literature.

Considering that diet and exercise are modifiable factors in the prevention of several types of cancer, primary care projects and interventions are essential for disease prevention. Healthy behavior promotes improvements, so the importance of disseminating information to risk populations and implementing strategies that help patients make healthy choices that can be sustained according to their lifestyle, requires engaging in a set of intersectoral actions so that mobilization strategies aimed at encouraging and supporting appropriate and healthy eating environments are achieved.

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