CRAFT BEER AND HUMAN HEALTH: EVALUATION OF THE ANTIOXIDANT PROPERTIES AND THEIR BENEFITS

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ABSTRACT

Craft beer is linked to the search for more natural, differentiated and high-quality products. In this study, he investigated, through a literature review, the antioxidant properties of craft beer and the benefits associated with its moderate consumption, especially in cardiovascular health. The antioxidants present in craft beers, such as polyphenols, flavonoids, and malt, contribute to the neutralization of free radicals and the reduction of oxidative stress. The results of the review point out that moderate consumption of craft beers can help prevent cardiovascular diseases, such as atherosclerosis, hypertension and heart attacks, due to the bioactive properties provided by their ingredients and differentiated production processes. systematic approach to identify and select articles related to the antioxidant properties of craft beer and its potential health benefits. The searches were carried out in the Virtual Health Library (VHL), exploring databases such as MEDLINE, VERTIDEX, LILACS and WPRIM, the keywords used were Beer, Antioxidants, Malt and Polyphenols. Inclusion criteria were established for articles published between 2018 and 2024, After the screening process, which involved analysis of titles, abstracts, and full reading, 10 articles were selected to compose the final portfolio. The analysis highlighted topics such as the chemical composition of craft beer, the impact of ingredients such as malt and hops, and the relationship of these compounds to cardiovascular health. The choice of articles sought a representativeness that covered biochemical, therapeutic and production aspects.

Keywords: Antioxidants. Beer. Polyphenols. Malt.

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INTRODUCTION

The production and consumption of craft beer have grown significantly in recent years, reflecting a growing search for more authentic and differentiated products (Bicalho Pimenta et. al 2020). Craft beer differs from commercial beer not only because of its manufacturing process, which is less automated and more focused on the quality of the ingredients, but also because of the diversity of flavors and styles it offers. The popularity of craft beer is due, in part, to the perception that it is a more natural and less processed product (Bicalho Pimenta et. al 2020).

Cardiovascular diseases are the leading cause of global mortality, with ischemic events, such as heart attacks and strokes, being the most common (Vieira de mello et. al 2023). These events are linked to atherosclerosis, a chronic inflammatory condition that begins in childhood and can progress throughout life, alternating periods of accelerated growth and relative stability. Atherosclerosis is also associated with other chronic non-communicable diseases, such as hypertension, obesity, diabetes, and dyslipidemia, which are often caused by poor lifestyle habits, including poor diet, sedentary lifestyle, smoking, and excessive alcohol consumption (Vieira de mello et. al 2023.)

Craft beer is rich in antioxidant bioactive compounds, such as polyphenols, melanoidins, flavonoids and vitamins, which vary according to the ingredients and production methods used. These compounds are influenced by the type of ingredients used (malt, hops, yeast) and the production methods. Recent studies have shown that moderate beer consumption may be associated with health benefits, such as improved endothelial function, reduced inflammation, and protection against oxidative stress (Marin et. al, 2023). A study compares the concentration of antioxidants between craft and commercial beers, providing a comprehensive overview of the impact of the production process on the antioxidant composition of beer (Rodrigues et. al, 2022).

Antioxidants are substances that can prevent or slow cell damage caused by free radicals, bringing health benefits such as reducing the risk of heart disease, cancer, and neurodegenerative diseases. The antioxidants present in craft beer are essential due to the potential of these compounds to offer additional beneficial properties compared to industrial beers, resulting from natural ingredients and differentiated production processes (Silva et. al, 2021).

Craft beer is relevant as it covers areas such as pharmacognosy, pharmaceutical chemistry, and toxicology, allowing for a deeper understanding of bioactive compounds and their therapeutic applications, as well as promoting education about responsible alcohol consumption and public health.

The purpose of this study is to investigate the antioxidant properties of craft beer and the potential health benefits associated with its moderate consumption.

METHODOLOGY

This is a qualitative, descriptive research and an integrative literature review. The bibliographic research was carried out through the textual search for the following descriptors: Beer and Polyphenols. The Virtual Health Library was consulted in the IBCS databases: Medline, Lilacs, Wprim, Vertidex

The selected articles comprise the topic in question in the period from 2018 to 2024. Studies available in full in Portuguese were included. Dissertations and theses were excluded. A total of 29 articles were found.

After reading the title, there were 10 articles with the descriptor craft beer, cardiovascular, 4 articles with the descriptor craft beer, malt and antioxidant activity, 6 articles polyphenols craft beer. Only articles were selected, whose titles had the same subject as this review. Duplicate articles whose search focused on the descriptors used were excluded (Chart 1).

Chart 1 – Data collection methodology.

	MEDLINE	VERTIDEX	LILACS	WPRIM
Search result	5	10	13	01
Title reading	03	03	03	01
Reading the summary	03	03	03	01
Deleted	19			
Full reading	10			
Portfolio composition	10			

RESULTS

In this integrative review, the presence and relevance of antioxidant compounds in craft beer was highlighted. The studies address the influence of ingredients (malt, hops and yeast) and production methods on the concentration of bioactive compounds. The potential benefit to cardiovascular health is also highlighted, especially in the prevention of diseases related to oxidative stress. The results are presented below by author and year, with emphasis on the main findings (Chart 2):

Chart 2 – Presentation of the articles selected for the formation of the portfolio.

AUTHOR/ YEAR OF PUBLICATION	ARTICLE TITLE	ARTICLE SUMMARY
1.Karina Medina, 2022	Commercial craft beers produced in Uruguay: Volatile	This article addresses the analysis and chemical and volatile compounds of Uruguayan Blond Ale and IPA beers,

	profile and physicochemical composition.	differentiating them based on physicochemical parameters. The results showed diversity among the samples and highlighted the quality of local craft beers.
2. Fernandes, 2020	Antiglycation effect and inhibition properties of α-amylase, lipase and α-glucosidase of a polyphenolic fraction derived from citrus residues.	The article addresses the potential of a polyphenolic fraction of citrus residues, rich in hesperidin, in inhibiting the formation of AGEs and digestive enzymes, showing its value in high value-added products.
3. Ana Luiza Arruda, 2023	Analysis of the relationship between the chemical characterization of beers and the alpha acid content present in two hop cultivars / Analysis to study the relationship between the chemical characterization of beers and the alpha acid content present in two hop cultivars	The article aborts the impact of the Comet and Fuggle cultivars, produced in Brazil and the USA, on the chemical properties of a standard IPA beer. The beer made with Brazilian Fuggle showed a higher content of phenolic compounds and antioxidant activity, indicating a positive influence on quality and conservation.
4. Mariana Vieira de Mello Barros, 2023	Could a lipid oxidative biomarker be applied to improve risk stratification in the prevention of cardiovascular disease?	The article discusses the main risk factors and biomarkers involved in the development and progression of atherosclerosis and cardiovascular disease (CVD), addressing the need for new biomarkers, such as those of oxidative stress, to improve the prediction of cardiovascular disease risk. It is noteworthy that, although oxidative stress is relevant.
5. Bicalho Pimenta et. al Year 2020.	The history and process of beer production: A review	The article points out the main characteristics of the inputs used in the production of craft beer.
6. Pina; Cruz and Martelli, Year 2022.	Evaluation of the influence of aromas generated by unconventional yeasts used in beer production: a review	The article talks about the main yeasts used in craft beer manufacturing processes, as well as how their varieties can interfere with the characteristics of the final product.
7. Marin et. al, Year 2023.	Evaluation of physicochemical parameters and phenolic compounds of craft beer subjected to forced aging	The article addresses the phenolic compounds present in craft beer.
8. Li Lingling, et. al, Year 2021.	Microbial synthesis of plant polyphenols	The paper aborts the synthesis of polyphenols in microorganisms, including strategies such as precursor engineering, dynamic regulation, and cultivation, and suggests future avenues in polyphenol pathway engineering.
9. Ignasi Sacanella Anglés, Rosa Casas Rodríguez, Esther Viñas Esmel, Sara Castro Barquero, Emilio Sacanella Meseguer, Year 2019.	Prevention of cardiovascular diseases and fermented alcoholic beverages. Reality or fiction?	The article discusses how they associate moderate alcohol consumption with reduced cardiovascular morbidity and mortality
10. Ixchel Osório-Paz, Regina Brunauer and Silvestre Alávez, Year 2019.	Beer and its non-alcoholic compounds in health and disease.	Non-alcoholic compounds are responsible for many of beer's beneficial

		effects, suggesting its potential for therapies against chronic diseases.

Source: The authors, 2025

DISCUSSION

This study was based on an integrative literature review with the aim of understanding the relationship between the antioxidant compounds in craft beer and their potential health benefits, especially in the prevention of cardiovascular diseases. The methodology followed a systematic approach to ensure that the selected articles were directly relevant to the topic, covering the period from 2018 to 2024, and highlighting the most recent scientific contributions.

Cardiovascular diseases, such as atherosclerosis, heart attacks, and strokes, are among the leading causes of mortality in the world (PAHO, 2022). Factors such as inadequate diet, sedentary lifestyle, and oxidative stress play a crucial role in its progression (Ministry of Health, 2022). Compounds such as polyphenols, flavonoids, and melanoidins contribute directly to the neutralization of free radicals, being essential in the prevention of oxidative stress and cardiovascular protection. (Marin et. al, 2023).

The artisanal production process, associated with the choice of ingredients such as malt and hops, results in a higher concentration of antioxidants when compared to commercial beers (Ana Arruda, 2023).

Moderate consumption of craft beers can favor cardiovascular health, by improving endothelial function, reducing inflammatory markers, and protecting against lipid oxidation, contributing to the prevention of atherosclerosis and other associated diseases (Osório-Paz et. al, 2019).

The antioxidant properties of craft beer and its potential health benefits reveal important contributions to science and public health, while emphasizing the relevance of moderate consumption of alcoholic beverages (Osório-Paz et. al, 2019). (Osório-Paz et. al, 2019) highlights how bioactive compounds, such as polyphenols, flavonoids, and melanoidins, present in craft beer, have shown action in fighting free radicals and reducing oxidative stress, crucial factors for the prevention of cardiovascular diseases (Osório-Paz et. al, 2019).

Artisanal production, by prioritizing high-quality ingredients and less automated processes, results in a final product with a higher antioxidant content when compared to commercial beer. This characteristic is particularly relevant, considering that antioxidants not only help prevent chronic non-communicable diseases, but can also play a protective role against conditions such as atherosclerosis, hypertension, and heart attacks (Bicalho Pimenta et. al, 2020).

Craft beer is a beverage rich in bioactive compounds with antioxidant potential. The combination of natural ingredients, differentiated production processes, and responsible consumption are factors that justify its role as a functional alternative, with potential health benefits, especially in combating oxidative stress and cardiovascular protection. However, it is critical to consider the risks associated with excessive alcohol consumption, including liver diseases such as cirrhosis and hepatitis, increased risk of cancer, hypertension, and cardiovascular problems. It can also cause neurological disorders, dependence, in addition to affecting the immune system and causing gastrointestinal and psychiatric problems (Osório-Paz et. al, 2019).

Craft beers have a higher concentration of antioxidants compared to commercial beers, as the addition of preservatives and chemical additives in commercial beers can negatively influence the quality of the bioactive compounds present in the drink, compared to craft beers, which follow more natural production processes and with fresh ingredients (Marin et. al, 2023).

THE RELATIONSHIP BETWEEN ANTIOXIDANT COMPOUNDS AND CARDIOVASCULAR DISEASE

Cardiovascular diseases, such as atherosclerosis, myocardial infarction, and strokes, represent one of the leading causes of death in the world (Ignasi Sacanella et. al, 2019), with oxidative stress being one of the main factors that contribute to their development. Oxidative stress, characterized by the imbalance between the production of free radicals and the body's ability to neutralize them, can damage endothelial cells and promote the formation of atherosclerotic plaques. Several studies suggest that the antioxidant compounds present in craft beers, such as polyphenols and flavonoids, have the potential to reduce this oxidative stress and, consequently, prevent cardiovascular diseases (Osório-Paz et. al, 2019).

According to the review by (Marin et. al, 2023), the artisanal beer production process, with the use of natural ingredients and the absence of automated industrial processes, favors the concentration of phenolic compounds, such as flavonoids, which play a key role in neutralizing free radicals. Not only do these compounds help protect endothelial cells, but they also have anti-inflammatory effects by reducing the expression of leukocyte adhesion molecules, which are essential for the development of atherosclerosis (Ana Arruda, 2023). Studies also indicate that polyphenols can improve endothelial function, a crucial factor in the prevention of cardiovascular disease (Ignasi Sacanella et. al, 2019).

COMPARISON BETWEEN CRAFT AND COMMERCIAL BEER: QUALITY AND QUANTITY OF ANTIOXIDANTS

Craft beers are produced with greater attention to the quality of inputs, such as malt, hops, and yeasts, and without the addition of preservatives or chemical additives. This results in a higher concentration of bioactive compounds, especially antioxidants, that are preserved during the fermentation process. In contrast, commercial beers often undergo industrial processes that can reduce the quality of the antioxidant compounds present (Bicalho Pimenta et. al, 2020).

The research of (Bicalho Pimenta et. al, 2020) demonstrated that the addition of preservatives and chemical additives in commercial beers can negatively affect the presence of polyphenols, flavonoids and other antioxidant substances. Additionally, the use of large-scale production techniques, which involve rapid fermentation and pasteurization, can compromise the integrity of these compounds. On the other hand, craft beers, by opting for slower production methods and with fresh and natural ingredients, maintain a greater diversity and concentration of these antioxidant compounds.

Beer is a fermented alcoholic beverage widely consumed in the world. In recent years, craft versions, especially those made in microbreweries, have stood out for the diversity and originality of the styles. At the same time, there is an increase in the search for innovations that make the product more competitive in the market (Mapa, 2020).

IMPACT ON GUT MICROBIOTA AND CARDIOVASCULAR HEALTH

Another relevant point is the interaction between the bioactive compounds in craft beer and the intestinal microbiota. Studies suggest that the polyphenols present in fermented beverages, such as craft beer, can have a positive impact on the composition of the gut microbiota, promoting a healthy environment for the growth of beneficial bacteria. The interaction of polyphenols with the microbiota can even enhance the beneficial effects on cardiovascular health, by improving nutrient absorption and reducing systemic inflammation (Lingling et. al, 2021).

The gut microbiota is recognized as an important modulator of the immune system and systemic inflammation. The balance between inflammation and oxidative stress is crucial for cardiovascular health, and the intake of antioxidant compounds from craft beer can help maintain this balance. The presence of flavonoids and melanoidins, bioactive substances present in craft beer, can reduce oxidative stress biomarkers and protect the

vascular endothelium, which is essential for artery health and the prevention of cardiovascular disease (Vieira et. al, 2023).

CLINICAL EVIDENCE ON CARDIOVASCULAR BENEFITS

Clinical research, such as those by (Sacanella et. al, 2019) and (Osório-Paz et. al, 2019), suggests that moderate consumption of fermented beverages, such as craft beer, is associated with reduced cardiovascular risk. These studies underscore that in addition to antioxidant effects, the bioactive compounds in craft beer may also improve lipid profiles, such as HDL cholesterol, and reduce blood pressure. These benefits are most pronounced when beer is consumed in moderation, within a balanced diet and accompanied by a healthy lifestyle.

However, it is essential to note that excessive alcohol consumption, regardless of how it is consumed, can have harmful effects on health. Excessive consumption of beer, as well as other alcoholic beverages, is associated with an increased risk of liver disease, hypertension, and other health problems. Therefore, the potential benefits of craft beer on cardiovascular health should be analyzed within a context of responsible consumption (Pina et. al, 2022).

CONCLUSION

The literature review highlights that craft beers have a higher concentration of antioxidant compounds due to their production methods and differentiated ingredients such as polyphenols, flavonoids and malt, contributing to the neutralization of free radicals and the reduction of oxidative stress. In addition, the choice of natural ingredients and less automated manufacturing methods contribute to a final product with higher functional value compared to industrial beers. Thus, moderate consumption of craft beers can be integrated into healthy lifestyle habits, offering health benefits without neglecting the need to raise awareness about the risks associated with alcohol abuse.

The results indicate that moderate consumption of craft beers can help prevent cardiovascular diseases, such as atherosclerosis, hypertension and heart attacks, due to the bioactive properties provided by their ingredients and differentiated production processes. Moderate consumption of craft beers can be considered an ally in the prevention of cardiovascular diseases, as long as it is combined with healthy lifestyle habits and conscious consumption.

REFERENCES

1. Arruda, A. L. (2023). Análise da relação entre a caracterização química de cervejas e o conteúdo de alfa ácidos presente em dois cultivares de lúpulo [Dissertação de mestrado, Universidade não especificada]. Revista AgroVeterinária. https://doi.org/10.22319/rmcp.v14i3.6111

2. Bicalho Pimenta, L., & outros. (2020). A história e o processo da produção da cerveja: Uma revisão. Caderno de Ciência & Tecnologia, 37(3), e26715. https://doi.org/10.35977/0104-1096.cct2020.v37.26715

3. Cunha, L. P., Gomes, D. B., Martins, F. D. G., Costa, E. C., Bissoli, N. S., & Brasil, G. A. (2023). Leveduras não convencionais como opção para produção de cervejas: Uma revisão sistemática. Seven Editora. https://sevenpublicacoes.com.br/editora/article/view/552

4. Fernandes, A. C. F., Santana, Á. L., Martins, I. M., Moreira, D. K. T., Macedo, J. A., & Macedo, G. A. (2020). Anti-glycation effect and the α-amylase, lipase, and α-glycosidase inhibition properties of a polyphenolic fraction derived from citrus wastes. Preparative Biochemistry & Biotechnology, 50(8), 794–802. https://doi.org/10.1080/10826068.2020.1737941

5. Ignasi Sacanella Anglés, Rosa Casas Rodríguez, Esther Viñas Esmel, Sara Castro Barquero, & Emilio Sacanella Meseguer. (2019). Prevenção de doenças cardiovasculares e bebidas alcoólicas fermentadas. Realidade ou ficção? Nutrición Hospitalaria, 36(3), 721–729. https://doi.org/10.20960/nh.02811

6. Ixchel Osório-Paz, Regina Brunauer, & Silvestre Alávez. (2019). Cerveja e seus compostos não alcoólicos na saúde e na doença. Revisões Críticas em Ciência Alimentar e Nutrição, 61(21), 3507–3526. https://doi.org/10.1080/10408398.2019.1696278

7. Lingling, L. (2021). Síntese microbiana de polifenóis vegetais. Journal of Bioengineering. http://cjb.ijournals.cn/cjbcn/article/abstract/gc21062050

8. Marin, A. T., Fronza, E. C. P., Santos, L. dos, Pastre, S., Hey, A., & Pereira, R. A. (2023). Avaliação de parâmetros físico-químicos e compostos fenólicos de cerveja artesanal submetida a envelhecimento forçado. Food Science Today, 2(1). https://doi.org/10.51847/fst/59

9. Medina, K. (2022). Cervejas artesanais comerciais produzidas no Uruguai: Perfil volátil e composição físico-química. Food Chemistry, 382, 132407. https://doi.org/10.1016/j.foodchem.2022.132407

10. Ministério da Saúde (Brasil). (n.d.). Cerca de 400 mil pessoas morreram em 2022 no Brasil por problemas cardiovasculares. https://bvsms.saude.gov.br/cerca-de-400-mil-pessoas-morreram-em-2022-no-brasil-por-problemas-cardiovasculares/

11. Organização Pan-Americana da Saúde. (2022). Doenças cardiovasculares. https://www.paho.org/pt/topicos/doencas-cardiovasculares

12. Pina, R. L., Cruz, D. C. P., & Martelli, M. C. (2022). Avaliação da influência de aromas gerados por leveduras não convencionais utilizadas na produção de cerveja: Uma revisão. Research, Society and Development, 11(17), e43111738868. https://doi.org/10.33448/rsd-v11i17.38868

13. Vieira, M. (2023). Um biomarcador oxidativo lipídico poderia ser aplicado para melhorar a estratificação de risco na prevenção de doenças cardiovasculares. Biomedicine & Pharmacotherapy, 159, 114336. https://doi.org/10.1016/j.biopha.2023.114336