Polyphenolic compounds content and antioxidant activity of agroindustrial residue from açaí infusion processing

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ABSTRACT

This study investigated the potential utilization of agroindustrial residue from Açaí infusion production ('Açaí Coffee') as a source of bioactive compounds. Extracts were obtained by maceration technique using different concentrations of aqueous ethanol solutions (40%-80%) and analysed for total polyphenolic content and antioxidant activity. The 70% ethanol extract showed higher total phenolic (87.86 mg GAE/100g) and total flavonoid (19.31 mg QCT/100g). However higher antioxidant activity was obtained by 60% ethanol extract. These findings suggest promising potential for the sustainable utilization of 'Açaí Coffee' residue in the food industry, contributing to reduction and valori zation of agroindustrial by-products.

Keywords: Bioactive compounds. Extraction. Açaí. Residue.

1 INTRODUCTION

The açaí fruit is known for being rich in proteins, monounsaturated fats, vitamins A, B1 and E, as well as antioxidant substances such as anthocyanins. These compounds confer beneficial health properties to açaí such as reduction of bad cholesterol and improved bowel function[1]. Some Brazilian industries have commercialized the infusion of açaí seeds, also called "açaí coffee", as a tasty, caffeine-free drink.

The reuse of coffee waste is a practice that promotes sustainability, bringing both environmental and economic benefits. The study by Furtado et al.[2] have highlighted the potential of coffee husks for producing bioactive compounds, organic fertilizers, and biofuels, thereby fostering a circular economy. However, there are no reports about use of "açaí coffee" waste.

From the açaí infusion production process, a large amount of waste is generated and discarded. Considering the concept of circular economy, this work aimed to evaluate the potential of this agroindustrial waste as a source of bioactive compounds.

2 MATERIALS AND METHODS

The residue (peel, rest of açaí seed and roasting residue) was acquired from açaí infusion production industry located in the Chapada Diamantina, Bahia. For extraction of compounds, different concentrations of aqueous ethanol solutions ranging from 40% to 80% were prepared and mixed with residue using a ratio of 1:5 (solid:solvent). The samples were macerated and agitated in the shaker at 200 rpm, 30°C for 1 h. After that, the samples were filtered through filter paper[3].

The extracts were analysed for total phenolics by Folin-Ciocalteu method[4], using gallic acid as a standard. Results were expressed in milligrams of gallic acid equivalents (GAE)/100 g of residue. Total flavonoid was determined by aluminum chloride method[5]. Results were expressed in milligrams of quercetin (QCT)/100 g of dry residue. The extracts were evaluated for antioxidant activity using the capture of the DPPH radical (2,2-diphenyl-1-picrylhydrazyl) method[6].

The extracts were also evaluated for antimicrobial activity using the disk diffusion test[7] against the bacteria Bacillus cereus (CBAM 0353), Bacillus subtilis (INCQS 00002), Staphylococcus aureus (INCQS 00014), Serratia marcescens (CBAM 0519), Escherichia coli (CBAM 0002), Salmonella typhimurium (CBAM 0018), Salmonella Enteritidis (INCQS 00258) and Enterococcus faecalis (INCQS 00531) were provided by the microorganism collection of the Oswaldo Cruz Foundation (Manguinhos, Rio de Janeiro). The bacterial strains were seeded in petri plates contained Mueller-Hinton agar and discs of 6 mm contained the extracts were placed on agar and incubated at 35°C for 24 h. The inhibition zones formed were determined in milimeters.

3 RESULTS AND DISCUSSION

The total phenolic and total flavonoid content were higher in the 70% ethanol extract, being 87.86 mg GAE/100g and 19.31 mg QCT/100 g, respectively (Figures 1 and 2). These results indicate the influence of ethanol concentration on the extraction of these bioactive compounds, meaning the presence of compounds with hydrophobic characteristics, i.e. higher affinity by ethanol. On

the other hand, higher antioxidant activity was obtained in the 60% ethanol extract (5.76 g Trolox/g of residue). This result can be due the presence of polar compounds with higher affinity by water than those obtained in the 70% ethanol extract. No study reports were found with this type of residue. Researchers as Fernandes et al.[8] analysed the drink prepared with açaí seed,that showed 16.89 mg GAE/L. In comparison, the residue (this study) showed a superior value of phenolic compounds (120 mg GAE/L of extract) than the obtained in the drink. In relation to antimicrobial activity, the bacteria were not sensitive to extracts (diameters of inhibition zone of 6 mm).

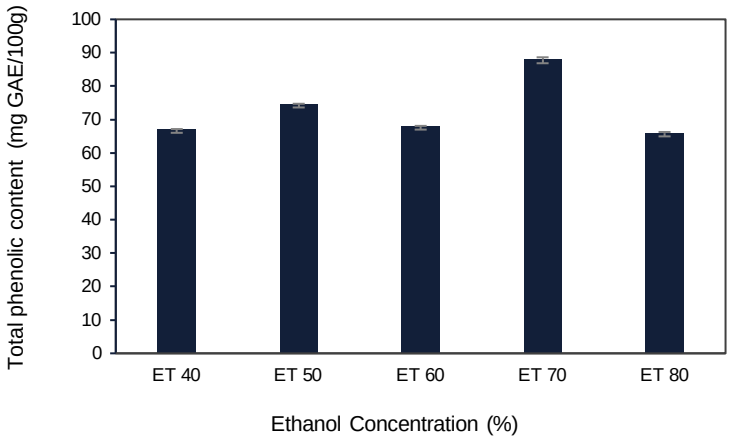

Figure 1. Total phenolic content in the extracts of agroindustrial residue from açaí infusion

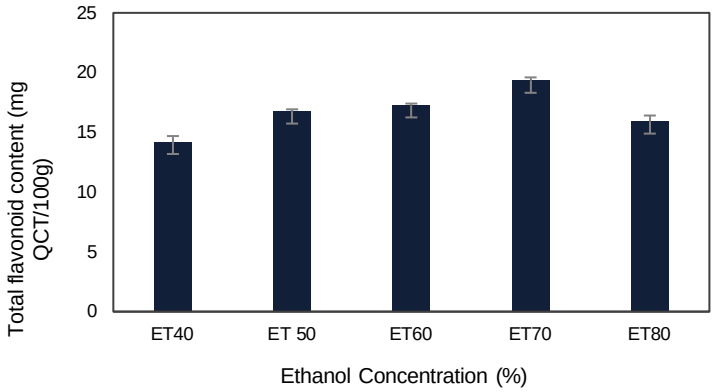

Figure 2. Total flavonoid content in the extracts of agroindustrial residue from açaí infusion

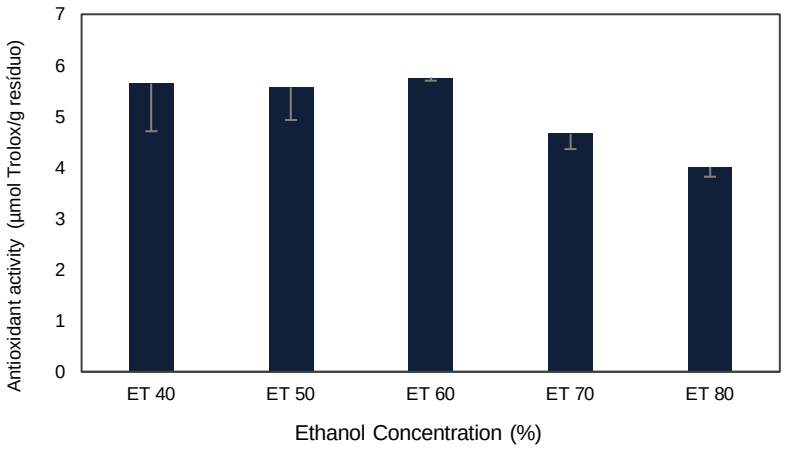

Figure 3. Antioxidant activity by DPPH method of extracts of agroindustrial residue from açaí infusion

4 CONCLUSION

The agroindustrial residue from Açaí infusion showed potential to be used as a source of bioactive compounds. Regarding the antimicrobial activity of the extracts from the residue, no bacterial inhibition was observed using ethanol solutions ranging from 40% to 80%. Future studies are still necessary to optimize the extraction process, as well as to test other extraction techniques.

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