

Comparison of Antimicrobial Properties of Kombucha Fermented from Green Tea, Black Tea and Yerba Mate

Kombucha tea is a popular health beverage that is brewed from the fermentation of tea and sugar using a culture of yeast and bacteria. Traditional kombucha brews utilize black and green teas derived from the *Camelia sinensis* plant. However recent reports in Brazil have described the use of *Ilex paraguariensis*, the main ingredient in yerba mate tea for kombucha preparations. As a result of fermentation, kombucha contains ethanol, carbon dioxide, glycolic acids and metabolites believed to have health promoting activities. Traditional kombucha preparations were reported to have antimicrobial activities against a broad spectrum of gram positive and gram negative bacteria attributed to the glycolic acid content of the beverage. Given the health implications of traditional teas, yerba mate and the fermented probiotic brew kombucha, this study was conducted to compare the antimicrobial properties of kombucha prepared using black tea, green tea or yerba mate. Kombucha was prepared using a commercial kombucha mother culture that contains *Bacillus coagulans* (née *Lactobacillus spirogenes*) and *Saccharomyces boulardii*. The antimicrobial activity was determined by agar-well diffusion method against the common pathogens *Escherichia coli*, *Salmonella typhimurium*, *Staphylococcus aureus*, and *Candida albicans*. Preliminary results show that the antimicrobial properties of kombucha fermented with yerba mate were less effective than that of kombucha prepared from black or green tea. These antimicrobial results correlate with the glycolic acid concentrations of these preparations as suggested by the lower pH of green tea kombucha (pH 3.5) and black tea kombucha (pH 3.7) compared to yerba mate kombucha (pH 4.0). While less effective against pathogens, the growth of the yerba mate kombucha SCOBY (symbiotic colony of bacteria and yeast) was measurably greater than that of the SCOBY of black tea kombucha but smaller than the green tea kombucha SCOBY. Further investigation in the study will include palatability of different kombucha brews in the general population; identification of kombucha SCOBY microorganisms by DNA sequencing; and the identification glycolic acids and metabolites present in the three different kombucha preparations.

Keywords: kombucha, antimicrobial properties, green tea, black tea, yerba mate, probiotics, SCOBY