

Investigating the effect of hydroalcoholic extract of Germanders (*Teucrium polium* L.) and green tea leaves (*Camellia sinensis* L.) on the chemical and microbial parameters of carp fish fillet during storage at refrigerator temperature

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Extended Abstract

Introduction: Fish and seafood are highly nutritious but highly perishable due to their susceptibility to oxidative and microbial spoilage. The shelf life of fish products is a major concern in food preservation. Conventional synthetic antioxidants and preservatives raise concerns regarding potential health risks. Thus, natural antioxidants and antimicrobials are being explored for improving food preservation. *Teucrium polium* (mountain germander) and *Camellia sinensis* (green tea) are known for their antioxidant and antimicrobial properties due to their high polyphenolic content. This study aims to investigate the effects of hydroalcoholic extracts of these plants on the chemical and microbial properties of common carp (*Cyprinus carpio*) fillets during 20 days of refrigerated storage at 4°C.

Methods: Hydroalcoholic extracts were obtained from dried leaves of *T. polium* and *C. sinensis* using ultrasound-assisted extraction. Extracts were tested at 1%, 1.5%, and 2% concentrations for their total phenolic content (TPC) and antioxidant activity using the DPPH radical scavenging assay. Their antimicrobial properties were evaluated against common spoilage bacteria. Common carp fillets were treated with 0% (control), 1%, 1.5%, and 2% extract solutions and stored at 4°C for 20 days. Samples were analyzed every five days for pH, peroxide value (PV), thiobarbituric acid reactive substances (TBARS), total volatile basic nitrogen (TVB-N), and total viable count (TVC) of bacteria.

Results and Discussion: The antioxidant assays confirmed that the 2% extract concentration exhibited the highest antioxidant activity. Similarly, antimicrobial evaluations showed a significant inhibitory effect, particularly against Gram-positive bacteria. During refrigerated storage, all treated samples exhibited lower oxidative and microbial spoilage rates compared to the control. The pH of the treated fillets remained stable, whereas the control samples showed an increasing trend due to microbial metabolic activities. Peroxide values and TBARS levels increased in all samples over time but were significantly lower in extract-treated samples, indicating reduced lipid oxidation. TVB-N values, a measure of protein degradation, were significantly lower in treated samples, confirming the role of extracts in delaying spoilage. TVC results showed a significant reduction in bacterial growth, with the 2% extract-treated samples exhibiting the best microbial stability.

Conclusion: The results suggest that hydroalcoholic extracts of *T. polium* and *C. sinensis* are effective in enhancing the shelf life of common carp fillets by inhibiting lipid oxidation and microbial growth. The 2% extract concentration demonstrated the most pronounced effect. These natural plant extracts can serve as safe and effective alternatives to synthetic preservatives in fish preservation. Future research should explore their application in other seafood products and potential synergistic effects with other natural preservatives.

Keywords: *Teucrium polium*, *Camellia sinensis*, Common Carp, Shelf Life, Food Preservation