Proceedings of the National Aquatic Resources Research and Development Agency (NARA), Scientific Sessions 2015

Antibacterial efficacy of spices and seasoning used in household fish processing and preservation

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Abstract

Seasoning fish with spices is a common household preservation method. However, scientific studies on the antibacterial activity of spices in fish-seasoning are scarce. The objectives of this study were1) to investigate and to enumerate the antibacterial action of gamboges (Garcinia cambogia) paste, common salt, chilli (Capsicum spp.) powder, black pepper (Piper nigrum) powder and turmeric (Curcuma domestica) powder and 2) to detect microbial contamination in some commercial spice products. Tuna flesh was collected for 5 days and commercial and home-made spices were used for seasoning. All samples were homogenized at the end of seasoning. Ten-fold serial dilutions were then prepared from the homogenates and 100µl from each dilution was cultured using spread plate method. Colonies were enumerated using the colony count (Rocker, Taiwan).Gamboge (72.0±15.9%) and salt (73.4±7.70%) demonstrateda significant reduction ($p<0.05$, $n=3$) of counts compared to the control (100%). Dense colonial growth was observed on plates after the treatment of chilli and pepper powders which was most probably due to a microbial contamination of those spice products. Turmeric powder treatment showed variable results with regard to the antibacterial effect, compared to the control. In conclusion, gamboge and salt showed better anti-bacterial efficacy. Certain products evidenced prior contamination, possibly during preparation and storage.

Keywords: antibacterial efficacy, fish processing, preservation, seasoning, spices

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Introduction

Fish is a nutritious but highly perishable food. Various food processing methods are used to prevent the deterioration of fish. Seasoning of fish with spices is one of the common household preservation method practiced in South Asian countries. However, scientific reports on antibacterial activity of spices in fish-seasoning are scarce. The objectives of this study were:1) to investigate and to enumerate the antibacterial action of gamboges paste, common salt,chilipowder,black pepper powder and turmeric powder and 2) to detect microbial contamination in some commercial spice products.

Materials and Methods

Tuna samples were purchased from a supermarket on 5 consecutive days.On each day, tuna flesh was sliced and weighed (13 g) aseptically and each piece was mixed with 5ml of sterile brine solution (100 g/l).One gram of each spice was added separately for one piece of flesh. Controls were also maintained without spices and without brine. All samples were then kept for 30minat room temperature, after mixing with the brine and the spice added. Each piece of flesh was then homogenized with 50ml distilled water for 5minutes,using Bag Mixer (Interscience, France).One milliliter from eachhomogenatewascollectedinto separate, steriletest tubescontaining9ml distilled water.Ten-fold serial dilutions were then prepared and 100µl from each dilution was cultured on nutrient agar, using spread plate method. All cultures were incubated at 37^0C overnight. Colonies were enumerated using the colony count (Rocker, Taiwan).Total bacterial counts (CFU/ml)before and after application of spices/seasoning were statistically compared using Generalized Linear Models (GENLIN) of SPSS version 20.

Results and Discussion

Gamboge (72.0±15.9%) and salt (73.4±7.70%) demonstrated a significant reduction ($p<0.05$)of total bacterial counts(CFU/ml)compared to the control (100%). Previous studies have also demonstrated antimicrobial effects of *Garcinia* spp.. in food (Kapadia and Rao, 2011). However, the effect of gamboge on fish, to our knowledge, has not been studied before. Dense colonial growth was observed on plates after treatment withchiliandpepper powderswhich was most probably due to a microbial contamination of those products. Previous studies in India, have demonstrated *Clostridium perfingens*, *Staphlyococcus aureus*, coliforms including fecal coliforms and other enteric bacteria, in commercial spices (Banerjee and Sarkar, 2003). We could isolate white, irregular colonies carrying Gram-negative rods, from this study. However, further identification could not be made. Turmeric powder treatment showed variable results with regard to the antibacterial effect, compared to the control.

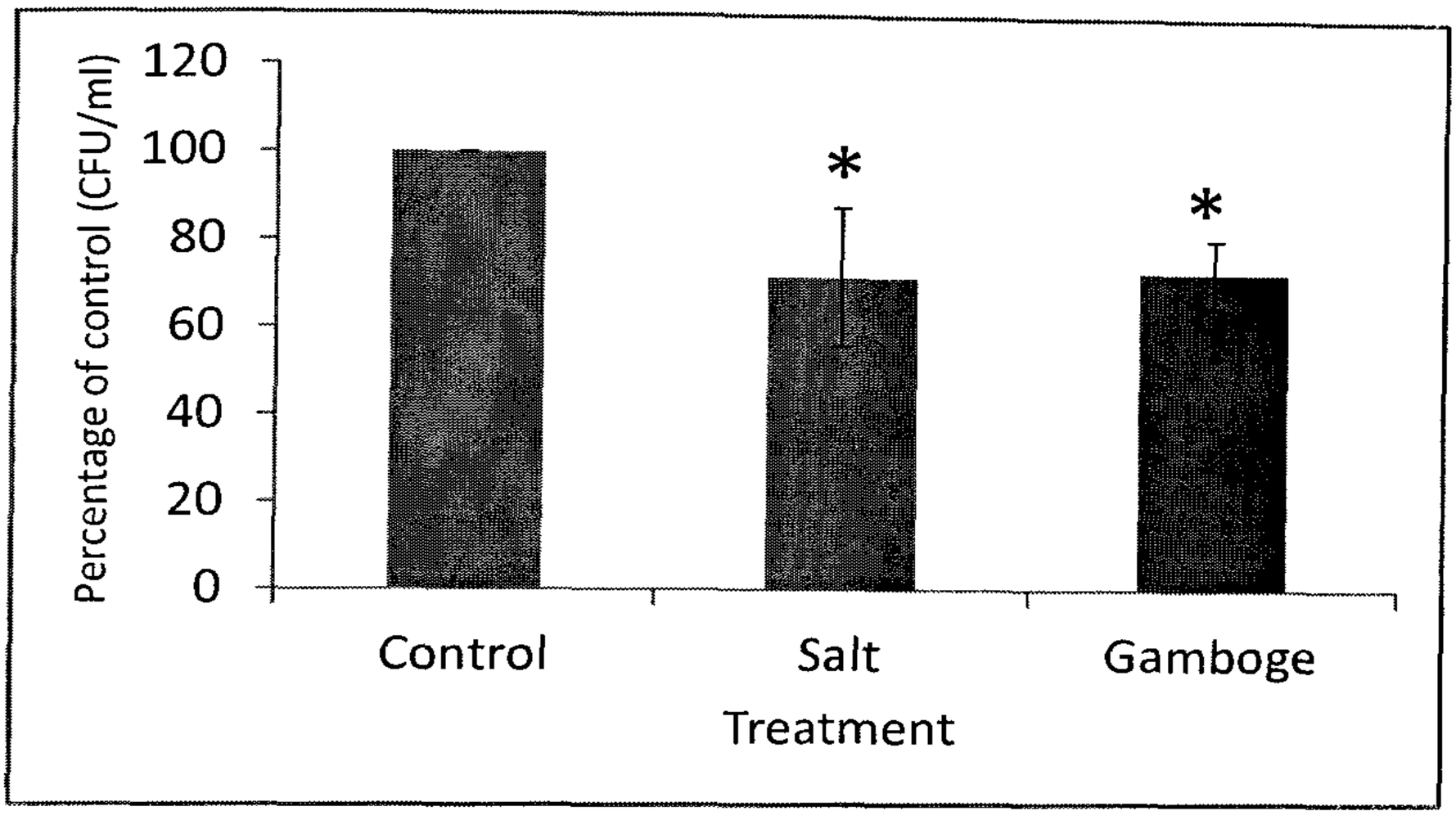

*Figure 1.Anti-bacterial effect of salt and gamboge as a spice/seasoning on tuna flesh. Values (Mean±SEM; CFU/ml) are expressed as a percentage of control.*p<0.05 compared with the control.*

Conclusion

In the present study, gamboge and salt showed significantanti-bacterial efficacy. However,chili and pepper powder products showed evidence of prior contamination, possibly during preparation and storage.

References

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