

ABSTRACT

Title : **Extension of shelf life of chicken meat patties using natural preservatives by application of hurdle technology**

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Chicken patties from broiler meat were prepared by incorporation of essential oils as natural preservatives and application of additional hurdles namely vacuum packaging and in-pack cooking with the objective extending shelf life. The entire study was designed by conducting four experiments. In experiment I, the water activity of the product was adjusted by the incorporation of wheat flour and oat flour. In experiment II, the optimal levels of incorporation of four essential oils in the chicken patties were determined based on the physicochemical, antibacterial and sensory characteristics. In experiment III, combination levels of two essential oils selected from previous experiments were optimized based on physicochemical characteristics and sensory attributes at ambient ($30\pm 2^{\circ}\text{C}$) and refrigeration ($4\pm 2^{\circ}\text{C}$) storage. In experiment IV the effect of essential oils in combination, vacuum packaging and in-pack cook system on the quality characteristics of chicken meat patties were studied. The fresh patties samples were analysed for emulsion pH, emulsion stability, product yield, product pH, water activity (a_w), DPPH assay and sensory evaluation and stored samples for product pH, a_w , free fatty acids (FFA), DPPH scavenging activity, thiobarbituric acid reactive substances (TBARS), tyrosine value (TV), moisture, microbiological parameters (total viable count, streptococcal count, coliform count, staphylococcal count, psychrophilic count, yeast and mould count) and sensory parameters.

In experiment I, wheat flour and oat flour were incorporated in the patties formulation and the a_w was adjusted to 0.943 with the latter. The sensory properties of the patties were not significantly affected by the addition of oat and wheat flour and the emulsion stability was improved. Oat flour was selected for inclusion in the patties formulation for the following experiments.

In experiment II, the four essential oils turmeric, clove, rosemary and nutmeg were added in the patties at various levels and optimum levels were selected based on the physicochemical and sensory properties. Turmeric oleoresin (TOR) was acceptable up to 0.05%, clove bud oil (CBO) up to 0.05%, oleoresin rosemary (ORM) up to 0.1% and nutmeg oil (NO) up to 0.05% based on sensory parameters. CBO formed the maximum inhibitory zone among the four essential oils and ORM had the highest DPPH scavenging activity. Hence, CBO 0.05% and ORM 0.10% were selected to be used as natural preservatives in further experiments.

In experiment III three treatment patties with CBO 0.05%, ORM 0.10% and CBO 0.05% + ORM 0.10% along with control were studied. Except the patties with essential oil combination, the other three samples were spoiled on 3rd day at ambient temperature storage. In refrigeration storage, the TV was significantly lower for ORM either alone or in combination and the combination and the TBARS was lowest in the combination. In refrigerated storage, the sensory score was lowest for CBO 0.05% treatment with no difference between other groups.

In the experiment IV, six treatment groups namely (i) control formulation with aerobic packaging (ii) control formulation with vacuum packaging (iii) Essential oil combination with aerobic packaging (iv) Essential oil combination with vacuum packaging (v) Essential oil combination with aerobic packaging and in-pack cook system and (vi) Essential oil combination with vacuum packaging and in-pack cook system were studied. In ambient storage, samples with control formulations spoiled on 3rd day, samples without in-pack cooking spoiled on 5th day and the in-pack cooked samples had lower pH and FFA on 5th day. In refrigerated storage, up to 45 days, the in-pack cooked samples had lower TV, TBARS and the microbiological count than other samples especially in vacuum packaging compared to aerobic packaging.

Based on the present study, it can be concluded that the essential oil combination of CBO at 0.05% and ORM at 0.10%, vacuum packaging and in-pack cooking system could be used as

hurdles in the preservation of chicken patties to extend the shelf-life of chicken patties up to 5 days at ambient temperature and up to 45 days at refrigeration temperature storage.