

THE EFFECTS OF ASCORBIC ACID, ROSEMARY EXTRACT AND α -TOCOPHEROL/ASCORBIC ACID ON THE SOME QUALITY CHARACTERISTICS OF CHICKEN PATTIES

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BACKGROUND

Use of antioxidants can very efficiently prevent oxidation of fat. Various antioxidants (natural and synthetic ones) can be used (CAVOSKI et al,1991). Also concern about safety and renewed interest in natural products resulted in increased research on natural antioxidants. Natural antioxidants could be added directly (in vitro addition) to the meat or the meat products during processing. (Mielche and Bertelsen, 1994).

Vitamin E (α -tocopherol) and C (ascorbate) have antioxidative properties. Vitamin C acts as an antioxidant or as a prooxidant may depend on the concentration, the presence of metal ions and the meat tocopherol content (Harbers et. Al.,1981; Schaefer et al.,1995; Leonhardt et al.,1996).

A great number of authors found rosemary to have a very favourable effect on slowing down the process of oxidation of fat in various meat products (Cavoski et al., 1991).

OBJECTIVES

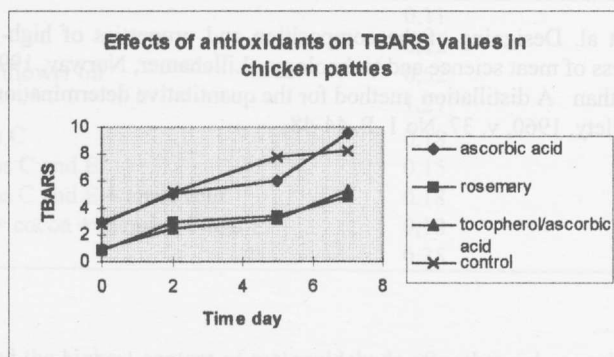
The objective of this study was to make a comparative examination of effects of ascorbic acid, α -tocopherol/ ascorbic acid and rosemary extract on oxidation, sensory properties and some physical properties of chicken patties during 7 days storage.

METHODS

Chickens were obtained from a meat processing plant, after one day of slaughter. Chicken patties were prepared with this formula; %40 breast, %30 thigh, %15 skin, %14 trimmings and %1 salt. Skins were cooked in boiling water by 10 minutes and then ground once through a 1 cm plate. Breast, leg and trimmings also ground once through a 1 cm. plate and mixed with skins. Four different formulations including 300 ppm rosemary extract, 500 ppm ascorbic acid, 200 ppm α -tocopherol/ 500 ppm ascorbic acid and control (no antioxidant) were prepared. All of the antioxidants were mixed with salt and then added to the mixtures. The patties were precooked in electric oven to an internal temperature of 78°C. The precooked patties were stored in polypropilene boxes for 7 days at 4°C. TBA numbers (Tarladgis et al., 1964), nonheme iron content (Schricker et al.,1982), colour measurement (Hunter DC 3881) analysis and sensory evaluation (Kramer and Twigg,1970) were done on the 0., 2., 5. and 7. days of the storage period. A trained 8 member sensory panel was used to characterize oxidize flavour and colour of patties. Patties were reheated in the grill, 10 min.at each side before the analysis. The entire experiment was replicated twice. Data were analyzed using analysis of variance (Açıkgöz,1993).

RESULTS AND DISCUSSION

The effects of rosemary extract, ascorbic acid and α -tocopherol/ascorbic acid mixture on the oxidative stability of chicken patties that stored at 4°C are shown in fig. 1. Concentrations of TBARS were low in all groups at day 0 and increased over a 7 day period. TBARS values ranged from 0.800 to 9.500 mg/kg. At day 0 and 2 no significant differences ($p < 0.05$) were found between the patties. But at day 5, there were significant differences between the rosemary extract added patties and α -tocopherol/ ascorbic acid added patties with control patties. At day 7, ascorbic acid patties had the highest TBA numbers and they did not show a significant difference with control samples. As shown in fig. 1, rosemary extract and α -tocopherol/ascorbic acid treatments yielded lower TBARS values than did the control patties. The addition of ascorbic acid was completely ineffective in preventing oxidation and appeared to exert a prooxidation effect. These results agreed with those of Benedict et al.,1975; Angelo et al.,1990; Cavoski et al.,1991; Yin et al.,1993).



Non-heme iron concentration indicated no differences during storage and among formulations ($p > 0.05$). But in general, non-heme iron values, for all patties increased over storage. Control patties and patties with ascorbic acid had higher non-heme iron content than the patties with



rosemary extract and α -tocopherol/ ascorbic acid. Non-heme iron values ranged from 12.863 ppm to 15.878 ppm. Results demonstrate that, non-heme iron is the prooxidant of lipid oxidation in cooked chicken patties. These results confirm the reports of Hegarty (1971), Love and Pearson (1974); Igene et al. (1979). Cooking increases non-heme iron in meats and hypothesized that the increase was due to oxidative cleavage of the porphyrin ring, allowing release of heme iron (Schricker and Miller, 1983; Miller et al., 1994).

Results of the colour determination; no significant changes on L values were noticed during the storage period of the patties. However, patties with rosemary extract had the lowest L value on days 2, 5 and 7. 0, 2nd and 5th days of storage period, a value didn't show an important difference. But at the day of 7, patties with ascorbic acid had the highest a value and were significantly different from patties with rosemary extract. No differences were found in b value and c value during storage. H value didn't change at 0, 2 and 5 days, but at day 7, there was a significant difference between samples with rosemary extract and ascorbic acid.

A significant differences were found in oxidative flavour among the antioxidants and the storage period. In the beginning of the storage period, samples had the highest scores, but at day 7, lowest scores were observed. On days 0, 2 and 5 the flavour difference was not significant but at day 7, panelists detected more off-flavour in sample with ascorbic acid and less off-flavour in sample with rosemary extract. In sample with rosemary extract, flavour difference was not observed during storage. But in control patties and patties with α -tocopherol/ascorbic acid, flavour scores decreased during storage period. These results are in correlation with TBA numbers.

There wasn't a significant colour difference between samples in sensory evaluation on days 0 and 2 of storage period. But at the fifth day, samples with ascorbic acid were detected as the most light and samples with rosemary extract as the most dark samples. On day 7, significant difference couldn't be found between samples.

CONCLUSION

Rosemary extract and α -tocopherol/ ascorbic acid slow down oxidation of chicken patties. However, ascorbic acid was ineffective in preventing oxidation and appeared to exert a prooxidation effect.

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