EFFECT OF MEDICINAL HERB MIX EXTRACT ON THE ANTIOXIDANT POTENTIAL AND MICROBIAL QUALITY OF GROUND PORK PATTY DURING COLD STORAGE

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Introduction

Medicinal herb extracts have shown an antimicrobial and anti-oxidative effect *in vitro*. Especially polyphenols of the extracts of plant origin were readily react with single electron oxidants due to their multiple polar functionality, resulting in powerful free-radical scavenging activity and complex with metal ion prooxidant to curtail anti-oxidant reactions (Hassan and Fan, 2005; Decker and Xu, 1998). Herb and their extracts with antioxidative property can be used to improve food quality and extension of shelf – life of meat (Vichi et al.2001). Recently, several oriental herb mixes have been studied for their antimicrobial activity as an alternative of antibiotics in Korea. The aim of this study was to evaluate the effect of the medicinal herb mix, developed as an alternative of antibiotics, on anti-oxidative activity and microbial quality of ground pork patty during cold storage.

Materials and Methods

Medicinal herbs (*Morus alba* L , *Coptis chinensis*, and *Lonicera japonica* Thunberg) were chopped, ground to pass mesh (2 mm) and extracted overnight with 75% methanol. The solvent was evaporated using an evaporator, lyophilized, and powdered. Each medicinal herb extract powder was mixed with the ratio of 48.5:48.5:3.0 for *Morus alba* L , *Coptis chinensis*, and *Lonicera japonica* Thunberg, respectively, and used as medicinal herb mix. Ham portion of pork was purchased from a local store, ground through a 9 mm plate, and divided into four groups with different ration of the addition of the medicinal herb mix; C (0%), T1 (0.5%), T2 (1.0%), and T3 (2.0%). The ground pork with medicinal herb mix was mixed thoroughly. The pork patties (approximately 90 g each) of each treatment group were prepared using a petridish. Totally 96 patties (4 treatment x 3 replications x 4 storage day) were prepared and kept at 4 °C.

Analyses were performed every five days. pH was measured by a pH meter. Total phenol content and ABTS+ radical scavenging activity of patty was measured using the methods of Katalinic et al (2006) and Erel (2004). Microbial quality was assessed using 3M Petrifilm plate techniques were used to enumerate microbial populations as recommended by the manufacturer (Nero et al., 2006). An 1.0 g pork patty sample and 9 ml distilled water were vortexed for 3min, and then serially diluted. The total plate count was obtained after incubation the Petrifilm at 37 °C for 48 h.

Results and Discussion

The pH of pork patties with different amount of medicinal herb mix is shown in Table 1. The pH values were shown a decreasing trend during cold storage at 4°C in all treatments but the decrease rate of the pH was rapid when the medicinal herb mix was included. Therefore, although the initial pH value was the highest in T3 but the pH of 10 day analysis was the lowest. One of the antioxidant mechanisms is to provide hydrogen atoms to free radicals and to stop the chain reaction (Nanjo et al., 1996) and polyphenols are the most potent components of herbs for antioxidative activity (Lee et al., 2003). The total phenol contents in the pork patty with 2% medicinal herb mix was the highest and the control was the lowest (Fig. 1), which are also supported by the results of ABTS+ radical scavenging activity (Fig. 2). The effect of the addition of medicinal herb mix was more significant as storage period was increased. Addition of the medicinal herb mix decreased the total aerobic bacterial number (Table 2). The pork patties showed approximately 1 decimal reduction in total plate count when 1 and 2% of the medicinal herb mix was added. The original microbial load for the medicinal herb mix was 1.5×10^3 CFU/g. Therefore, the addition of medicinal herb mix directly into ground pork patty enhanced antioxidative activity with microbial quality during storage.

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Table 1. Change of pH of pork patties mixed with medicinal herb during cold storage

Treatment (herb mix %)	Storage days		
	0	5	10
C (0)	5.80c	5.57a	5.66a
T1 (0.5)	5.82b	5.34b	5.52a
T2 (1)	5.83b	5.31c	5.23b
T3 (2)	5.89a	5.30c	5.21b
SEM	0.010	0.100	0.052

[a-c]Different letters within the same column differ significantly (P<0.05).

Table 2. Number of total plate counts of the pork patties containing medicinal herb mix during cold storage (CFU/g)

Treatment (herb mix %)	Storage days		
	0	5	10
C (0)	4.5×10^3	6.5×10^5a	4.9×10^7a
T1 (0.5)	5.9×10^3	2.3×10^5b	3.7×10^7b
T2 (1)	5.5×10^3	8.7×10^4c	7.7×10^6c
T3 (2)	4.6×10^3	7.2×10^4c	6.2×10^6c

[a,b] Different letters within the same column differ significantly (P<0.05).

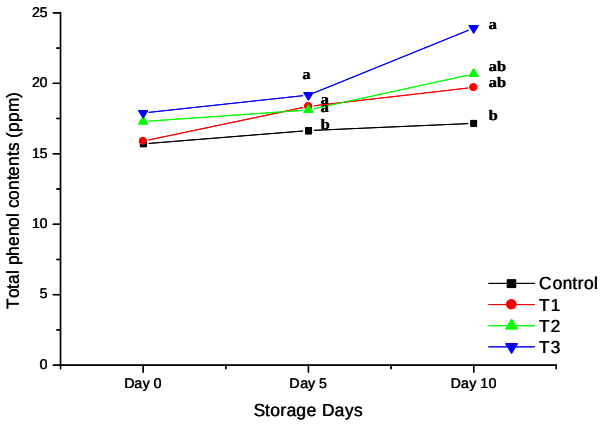

Fig. 1. Total phenol content of ground pork patties containing medicinal herb mix during cold storage

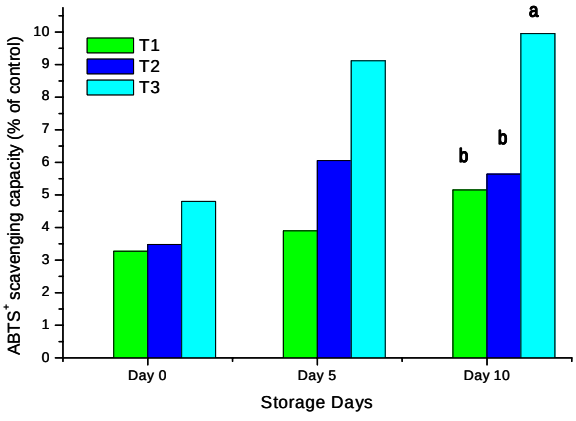

Fig. 2. Relative $ABTS^+$ scavenging activity of ground pork patties containing medicinal herb mix compared with control during cold storage