USE OF MESQUITE PROPOLIS EXTRACT AS A NATURAL ADDITIVE FOR PRESERVING MINCED PORK MEAT

Gastón R. Torrescano-Urrutia^{1*}, Rey David Vargas-Sánchez¹, Brisa del Mar Torres-Martínez¹, Rogerio R. Sotelo-Mundo¹, Nelson Huerta-Leidenz², Armida Sánchez-

Escalante¹

¹ Centro de Investigación en Alimentación y Desarrollo, A.C. (CIAD, A.C.), Hermosillo, México.
² Texas Tech University, Lubbock TX, USA.
*Corresponding author email: <u>gtorrescano@ciad.mx</u>

I. INTRODUCTION

Lipid oxidation and microbial growth are risk factors associated with the deterioration of pork quality and negatively impact consumer purchase intentions. Therefore, the use of additives of synthetic origin is one of the alternatives that the meat industry follows to reduce both problems [1]. However, the uncontrolled use of synthetic additives poses health risks, a reason for concern among consumers that are increasingly reluctant to the consumption of meat products formulated with such food preservatives [1,2]. In this context, honeybee products are considered an important source of chemical compounds with bioactive properties, including polyphenols, which could be considered as novel food additives [3]. The aim of this study was to investigate the potential use of mesquite propolis extract (MPE) as a natural antioxidant and antimicrobial additive for preserving minced pork meat.

II. MATERIALS AND METHODS

Polyphenols from propolis, collected from two apiaries from Pueblo de Álamos (México), were extracted with water (1:10) by maceration-assisted extraction (150 rpm/25 °C/24 h). The solution was filtered (Whatman No 4-filter paper), dried using a freeze drier, and the obtained mesquite propolis extracts (MPE) were subjected to evaluation for total polyphenols contents (phenolic, TPC; flavonoids, TFC) and free-radical scavenging and reducing power activities (DPPH and FRAP, respectively). Also, the antimicrobial activity against *Staphylococcus aureus* and *Escherichia coli* were evaluated. Butylhydroxytoluene and gentamicin were used as positive controls. Minced pork meat (*M. semimembranosus*, 24 h *postmortem*; 1.5% salt; 10% fat) was assigned to four treatments (Control, without antioxidant; MPE #1 and #2, extracts from apiaries #1 and #2, both at 500 ppm; T3, butylhydroxytoluene toluene-BHT at 500 ppm), cooked in a water bath (65 °C for 60 min), and subjected to pH, thiobarbituric acid reactive substances (TBARS), and total bacteria counts (TBC) tests [4,5]. Obtained data (n=6) were subjected to ANOVA and Tukey-Kramer's multiple comparison tests at P<0.05 (NCSS v11).

III. RESULTS AND DISCUSSION

The results depicted in Table 1 showed that MPE #2 showed the highest TPC and TFC values (P<0.05). With respect to antioxidant activity, no significant differences were found between natural and synthetic antioxidants for DPPH values (P>0.05), while MPE #2 and BHT showed the highest FRAP values (P<0.05). Concerning antimicrobial activity, the gentamicin exerted the highest antimicrobial activity, and the main antibacterial effect observed for all treatments was against *S. aureus* compared to *E. coli* (P<0.05). As shown in Figure 1, MPE #1 and MPE #2 reached higher pH values respect to control (P<0.05). The lowest TBARS values (P>0.05) were obtained in MPE #2 samples, while both MPE #1 and MPE #2 samples showed lower TBC values as compared to other treatments (P<0.05).

Traits	Polyphenols		Antioxidant activity		Antimicrobial activity	
	TPC	TFC	DPPH	FRAP	S. aureus	E. coli
MPE #1	174.86±0.66 ^a	30.69 ± 3.48^{a}	89.60±0.02 ^a	1.02±0.04 ^a	0.21±0.01 ^b	0.33±0.01 ^b
MPE #2	286.81±2.16 ^b	70.99±1.86 ^b	89.07 ± 0.05^{a}	1.39±0.06 ^b	0.19±0.01 ^b	0.33±0.01 ^b
Std.	-	-	91.04 ± 0.06^{a}	1.41±0.01 ^b	0.10±0.01 ^a	0.12±0.01 ^a
6.50		0.60		6.00]	
6.30	d	(B) 0.50	b	c (6)	b a	a b
a a	c b	ରୁ 0.40 - ଅ 0.30 -	a	E 4.00 O S 3.00		
도 5.90 5.70		SX 0.20 -		2.00		

Table 1 – Polyphenols content and bioactivity of MPE.

Figure 1. Effect of treatment and cooking period on pH, TBARS and TBC values of pork meat.

MPE #1

MPE #2

внт

0.10

0.00

Control

внт

MPE #2

1.00

0.00

Control

MPE #1

BHT

MPE #2

Propolis is a resinous material that bees process using the plant material surrounding the apiary. This honey coproduct has antioxidant and antimicrobial properties associated to its polyphenols composition. Therefore, it has been proposed as a natural food additive [1,5]. In agreement with our results, the inclusion of propolis extracts (1.5, 2.0, and 5.0%) in raw ground beef has enhanced the oxidative status of minced beef by stabilizing pH and TBARS values during storage (7 °C/9 days), with a concomitant reduction in TBC values [6].

IV. CONCLUSION

MPE #1

5.50

Control

MPE is an alternative source of antioxidant and antimicrobial compounds that can be used as a natural additive in the meat industry.

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