

# Antioxidant properties of onion and onion peel extracts in cooked pork patties during storage period

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**Abstract-** The effect of adding onion and onion peel on the antioxidant properties of cooked pork patties were investigated during storage. Pork loins were ground, added with none (control), added 0.3 % onion extract (T1), 0.3 % onion peel extract (T2), 0.6 % onion peel extract (T3), packaged in oxygen permeable bags, and cooked to an internal temperature of 75 °C. The TBARS values of all treatment increased with increasing the storage time. The addition of onion peel extract had lower TBARS values at 7 d. The DPPH· radical scavenging activity was not significantly change during storage time. T2 (from 9.07 to about 26.4 %) and T3 (from 3.7 to about 10.78 %) was increased, but control (from 13.6 to about 9.09 %) and T1 (from 14.6 to about 5.8 %) was decreased during storage. The amount of total phenol contents of T3 expressed higher (388.01 ug/ml) than the other treatments at 1 d. The amount of total flavonoid contents was significantly decreased during storage time. The addition of onion extract had higher total flavonoid contents values compared to the T2 and T3. Especially, 0.3 or 0.6 % onion peel was more effective in delaying lipid oxidation and increasing radical scavenging activity compared to the added onion sample and control.

**Keywords** – Antioxidant; onion peel; pork patty

## I. INTRODUCTION

A recently trend towards production of precooked, refrigerated ready to eat has made the control of lipid oxidation increasingly important [1,2]. Lipid oxidation was a major cause of deterioration meat quality and can be accelerated

of off-flavor and discoloration in meat. Also, it can decreases nutritional quality and safety by the formation of secondary products after cooking and processing [3,4]. To avoid or delay these problems, antioxidants use to the oxidation of various undesirable compounds were added to prevent the formation. The most common antioxidants used in the food industry were butylated hydroxyanisole (BHA) and butylated hydroxytoluene (BHT). The two antioxidants, BHA and BHT were free radical scavengers, which terminate the oxidation cycle and give stability to the system. However, the use of antioxidant such as BHA or BHT in food has potential chemical cause disease, used different criteria depending on the country. Therefore, many studies reported to the use of natural substances to get the antioxidant effects. Onions (*Allium cepa L.*) is one of the property of various functions; antioxidant, antimicrobial, anticancer and antihypertensive activities [5]. The dry outer layers of onion, which are wasted before food processing, contain large amounts of quercetin, quercetin glycoside and their oxidative products [6]. The skin extracts of onion contained highest quercetin values more than edible part [7]. No research has been conducted on the utilization on onion peel on the production of meat products, especially of patty. The objective of this study was to evaluate the potential of onion and onion peel extracts as an inhibitory agent to lipid peroxidation of pork patties.

## II. MATERIALS AND METHODS

Ingredient composition of cooked pork patties were presented in Table 1. Trimmed off connective tissue and excess fat was combined in grinder twice a 7 mm plate. Added to this batch were of a spice preblend, ice and blended the appropriate antioxidant. The patties (approximately 80 g each) packaged in oxygen permeable bags and cooked to an internal temperature of 75 °C, stored at 4 °C. Cooked pork patties were divided into four treatments: Control, added with none; T1, added with 0.3 % onion extract; T2, added with 0.3 % onion peel extract; T3, added with 0.6 % onion peel extract. Onion and onion peel washed with distilled water and dried incubated for 24 h at 80 °C. Then put into 100 ml ethanol (99.6 %) per 5 g and reflux extracts for 1 hr at 60 °C. Filtered and concentrated in the rotary vacuum evaporator (AC230V, EYELA, JAPAN) at 40 °C. Evaluation of oxidative stability was performed using the 2-Thiobarbituric acid test [8]. TBA reactive substances (TBARS) were expressed as mg malonaldehyde/kg sample. Antioxidant activity was determined by the measurement of the DPPH· radical scavenging [9]. The amount of total phenol content and total flavonoid content was determined using Folin-Ciocalteu reagent [10] and colorimetric assay of Aluminum chloride [11]. The data were subjected to analysis of variance (ANOVA) and Duncan's test to compare the sample means. The significance level was 0.05.

### III. RESULTS AND DISCUSSION

Fig 1 shows the change of TBARS values in pork patties treated onion and onion peel extract. The TBARS values in all treatments were quite increased during storage time. Addition of onion peel extract had significantly ( $P < 0.05$ ) lower TBARS values when compared to the control and T1. Extracts from onion have potent antioxidant properties and phenolic compounds, including quercetin, kaempferol and rutin, may contribute to this activity [7]. The DPPH· radical scavenging activity of T2 (from 9.07 to about 26.40 %) and T3 (from 3.70 to about 10.70 %) was increased, but control (from 13.60 to about 9.09 %) and T1 (from 14.60 to about 5.80 %) was decreased

during storage. Free radicals were considered to play a major role in the process of lipid autoxidation, and the DPPH· radical has been widely used to evaluate the ability of various plants to scavenge free radicals. Skin extracts of onion possessed the highest activities more than 240 times higher than those of onion [7]. The amount of total phenol contents of T3 were higher values than the other treatments at 1 d. However, the amount of total flavonoid of T3 and T4 was lower than T1. Published data total flavonoid levels in onions indicate a very high degree of variation. Patil et al [12] found a flavonoid (comprising 80-90 % quercetin) range of 0.21-286 mg/kg across 75 cultivars. Yang et al [13] found that total flavonoid ranged from 58-692 mg/kg in 10 varieties grown. Price and Rhodes [14] reported total quercetin levels of 1778, 1516 and 1369 mg/kg in three types of onion. Addition of onion peel extract sample produce small amounts of total phenol and flavonoid was higher than the other treatment. In particular, 0.3 or 0.6% onion peel was more effective in delaying lipid oxidation and increasing radical scavenging activity compared to the added onion sample and control.

### IV. CONCLUSION

The purpose of this study was to effect of adding onion and onion peel on the properties of cooked pork patties during storage. Lipid oxidation was deterioration meat quality and degraded storability. In this study, onion peel from wasted before food processing could be concluded that there is a real possibility of using for developing natural food ingredients with functional properties.

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Table 1. The basic formulation of patties

Ingredient (%)	Treatments <sup>1)</sup>			
	Control	T1	T2	T3
Pork lean	61.0	61.0	61.0	61.0
Pork fat	24.0	24.0	24.0	24.0
Salt	1.50	1.50	1.50	1.50
Water (ice)	13.50	13.50	13.50	13.50
Onion extract	-	0.30	-	-
Onion peel extract	-	-	0.30	0.60
<b>Total</b>	<b>100.00</b>	<b>100.30</b>	<b>100.30</b>	<b>100.60</b>

<sup>1)</sup> Control: added with none; T1: added 0.3% onion extract; T2: added 0.3% onion peel extract; T3: added 0.6% onion peel extract.

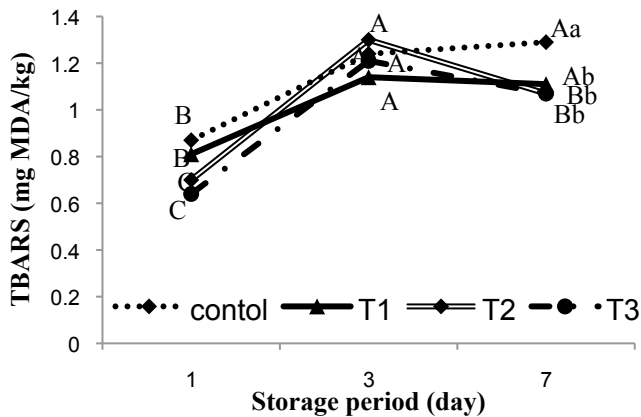


Fig 1. Changes of TBARS values in pork patties treated with onion and onion peel extracts during storage at 4°C

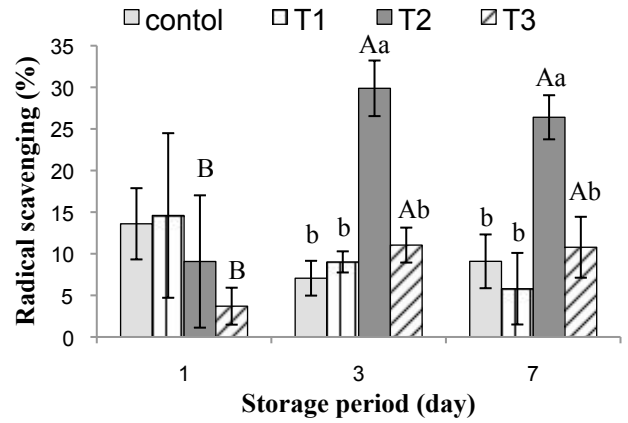


Fig 2. Changes of DPPH· radical scavenging values in pork patties treated with onion and onion peel extracts during storage at 4°C

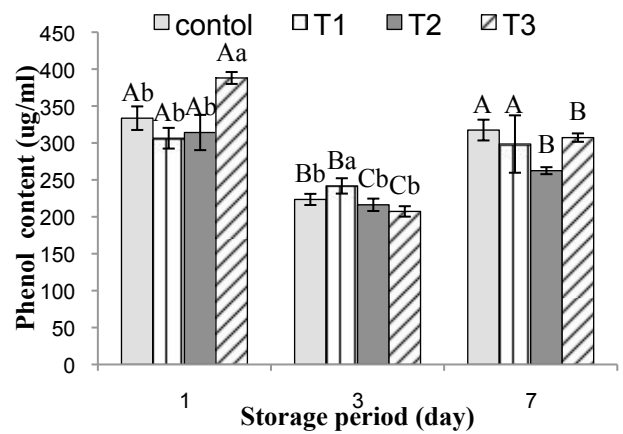


Fig 3. Changes of Total phenolic content in pork patties treated with onion and onion peel extracts during storage at 4°C

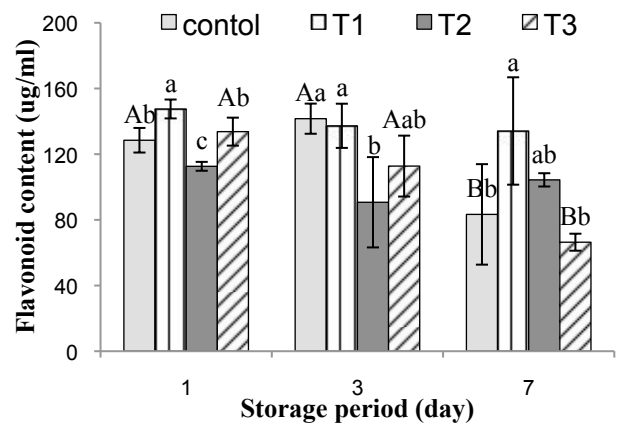


Fig 4. Changes of Total flavonoid content in pork

patties treated with onion and onion peel extracts  
during storage at 4°C