

QUALITY CHARACTERISTICS OF CHICKEN SAUSAGE CONTAINING PSYLLIUM HUSK POWDER AND ITS APPLICATION TO *IN VITRO* DIGESTION MODEL

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I. INTRODUCTION

Psyllium, one of the hydrocolloids has a hydrophilic, colourless, and transparent fibrous mucilage that exhibits gelling properties, increases its volume by more than 10 times due to its excellent absorbency [1]. Despite the functionality effect of psyllium husk, studies on its application to meat products have not been well performed [2]. *In vitro* digestion systems are suitable for evaluating the physical and chemical state of food, interactions with nutrients, and the effects of biological, physical or chemical treatments [3]. Therefore, the purpose of this study was to investigate the effect of adding various concentrations of psyllium husk powder (PHP) to chicken breast sausage on quality characteristics and *in vitro* digestibility.

II. MATERIALS AND METHODS

Chicken breast sausages were manufactured with different PHP concentrations (0, 0.5, 1.0 and 1.5%). Cooking loss, Expressible moisture, pH, colour, texture profile, sodium dodecyl sulphate polyacrylamide gel electrophoresis (SDS-PAGE), -SH and S-S group levels, protein digestibility and low-vacuum scanning electron microscopy (LV-SEM) were measured. The experiment design was one-way analysis of variance. Duncan's multiple range test was used as a multiple comparison at a significant level of 0.05.

III. RESULTS AND DISCUSSION

As shown in Fig 1(A) and (B), cooking loss and expressible moisture decreased as PHP level increased ($P < 0.05$). Fig 1(C) showed that the myosin heavy chain band was reduced, and biopolymers were formed with PHP in a concentration-dependent manner.

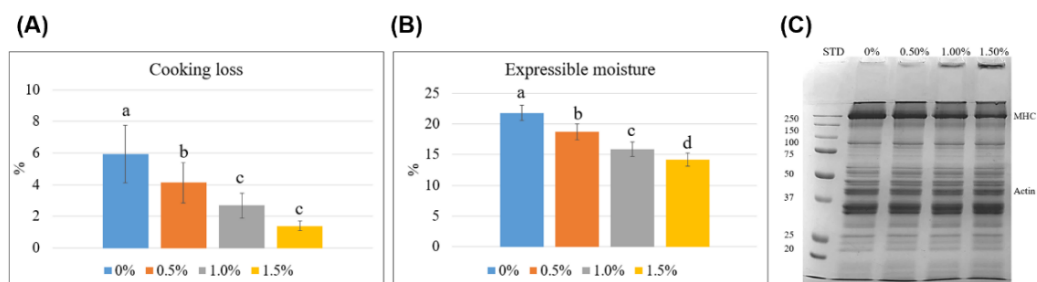


Figure 1. (A) cooking loss (B) expressible moisture and (C) SDS-PAGE of chicken breast sausages containing various levels of psyllium husk powder during *in vitro* digestion. ^{a-c} Means with different superscripts in the same parameter are different ($P < 0.05$).

In Table 1, as the amount of psyllium husk increased, the lightness (CIE L^*) decreased and the yellowness (CIE b^*) increased ($P < 0.05$). However, no differences were observed according to the treatment group in the texture properties ($P > 0.05$).

Table 1. pH, color and texture profile of chicken breast sausages containing various levels of psyllium husk powder

PHP	pH	CIE L*	CIE a*	CIE b*	Hardness	Springiness	Gumminess	Chewiness	Cohesiveness
0%	6.27 ^a	78.5 ^a	3.57 ^a	7.78 ^b	4684 ^a	7.01 ^a	45.2 ^a	318 ^a	9.22 ^a
0.50%	6.28 ^a	76.3 ^b	3.56 ^a	8.32 ^b	4225 ^a	6.67 ^a	38.4 ^a	263 ^a	8.52 ^a
1.00%	6.29 ^a	74.8 ^c	3.48 ^a	8.95 ^a	3396 ^a	5.99 ^a	28.5 ^a	179 ^a	8.22 ^a
1.50%	6.29 ^a	73.2 ^d	3.80 ^a	9.38 ^a	3253 ^a	5.83 ^a	25.3 ^a	166 ^a	7.96 ^a
SEM	0.01	0.43	0.09	0.16	272	0.19	3.57	27.6	0.30
P-value	0.88	<0.01	0.64	<0.01	0.20	0.07	0.18	0.16	0.52

^{a-c} Means with different superscripts in the same parameter are different (P<0.05).

As shown in Fig 2 (A), as the content of psyllium husk increased, the -SH group decreased, but the S-S group increased (P<0.05). S-S group increased as -SH group decreased due to the heat treatment (P<0.05) (Fig 2(A)). Addition of 1.0% and 1.5% PHP increased protein digestibility of chicken sausages during oral-gastrointestinal digestion (P<0.05) (Fig 2(B)). In the LV-SEM results (Fig 2 (C)), prior to digestion, the protein surface structure was formed denser and flatter as the PHP content increased. The protein structure of sausages was more destroyed with increased levels of PHP and digestion process performed.

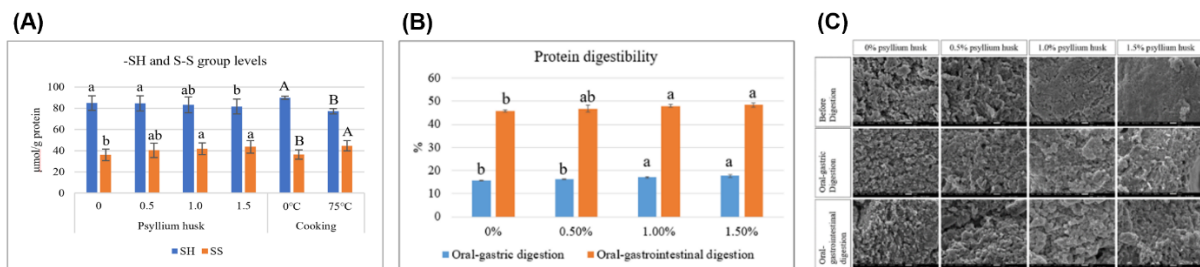


Figure 2. (A) -SH and S-S group levels, (B) protein digestibility and (C) scanning electron microscopy of chicken breast sausages containing various levels of psyllium husk powder (PHP) during *in vitro* digestion.

^{a-b} Means with different superscripts in the same parameter are different (P<0.05); ^{A-B} Means with different superscripts in the same parameter are different (P<0.05)

IV. CONCLUSION

The addition of PHP into chicken breast sausages improved the water holding capacity, and protein digestibility and scanning microscopy were improved when 1% or more amounts of PHP were added to chicken breast sausages, resulting in effective way for protein digestion in an *in vitro* digestion model.

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