

ฤทธิ์ต้านเชื้อซาลโมเนลลาของสารสกัดเอธานอลจากผลสุกพิลังกาสโนในไก่

Anti-Salmonella Activity of an Ethanol Extract of *Ardisia elliptica* Fruits in Chicken

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บทคัดย่อ

งานวิจัยนี้เป็นการศึกษาฤทธิ์ต้านเชื้อ *Salmonella Enteritidis* ของสารสกัดด้วยเอธานอลของผลพิลังกาสโนในไก่ โดยได้แบ่งไก่ที่ใช้ทดลองเป็น 5 กลุ่ม (กลุ่ม 1-5) ป้อนไก่ทุกตัวด้วยเชื้อ *S. Enteritidis* (ยกเว้นกลุ่มที่ 5) ไก่กลุ่มที่ 1 และ 2 ได้รับสารสกัดที่ผสมลงในอาหารในความเข้มข้น 16 และ 8 กิโลกรัมของอาหารตามลำดับ กลุ่มที่ 3 กลุ่มที่ 4 และกลุ่มที่ 5 ใช้เป็นกลุ่มควบคุมเชิงลบ กลุ่มควบคุมเชิงบวก และกลุ่มที่เลี้ยงดูตามปกติตามลำดับ เมื่อครบกำหนดเวลาได้เก็บตัวอย่างอวัยวะในทางเดินอาหารของไก่ไปตรวจนับจำนวนโคโลนีของเชื้อ *Salmonella* พบว่า ไก่ในกลุ่มที่ 1 ตรวจพบจำนวนโคโลนีน้อยที่สุดเมื่อเปรียบเทียบกับกลุ่มที่ 2 และกลุ่มที่ 3 ซึ่งเป็นกลุ่มควบคุมเชิงลบ ($P < 0.05$)

คำสำคัญ : พลังกาสโน, ฤทธิ์ต้านเชื้อซาลโมเนลลา, ไก่เนื้อ

Abstract

This experiment was devoted to testing the antimicrobial activity against *Salmonella enteritidis* using *Ardisia elliptica* Thunb. fruit extracts in broiler chicken. The chicken were divided into five groups (group I - V). Each bird was challenged with *S. enteritidis* (except group V animals). Group I and II were fed with diet containing the herbal extract at the concentration of 16 and 8 g/kg of diet, respectively. Group III, IV and V served as the negative, positive and the normal control groups, respectively. After the treatment, the alimentary organs were collected and were subjected to a count of the number of *Samonella* colonies. The result showed that the number of *Salmonella* from Group I were the lowest numbers in comparison with the numbers isolated from Group II and the negative control group (Group III) at $P < 0.05$.

Keywords : *Ardisia elliptica*, anti-*Salmonella* activity, broiler chicken

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Introduction

Salmonellae are etiologic agents of food-borne salmonellosis and also the agents that cause typhoid and paratyphoid fevers in both humans and animals (Baudart, 2000). Poultry products are widely known to be a significant reservoir for *Salmonella* which can be transmitted to humans by consuming the un- or insufficiently cooked products (Jorgensen et al, 2002). The aim of this study was to test the activity against *Salmonella enteritidis* of the herbal fruit extract of *Ardisia elliptica* Thunb. (Myrsinaceae family) in broiler chicken. The positive findings indicate that it is worth while to develop the use of the plant extract in poultry production in order to decrease the incidence of *Salmonella* infection in these animals.

Materials and Methods

The protocol was approved by The Ethics Committee of the Faculty of Pharmacy, Mahidol University, Thailand.

Ripe *A. elliptica* fruit was collected in Nakornphathom province, Thailand in October 2003. The powdered fruit was exhaustively extracted with petroleum ether, chloroform and 95 % ethanol respectively in a soxhlet extraction apparatus. The ethanol extract was used for testing.

The 28 day-old broiler chicken were fed with food and water ad libitum and were divided into five groups (groups I to V) on a random basis. Each group consisted of 3 replicates of 3 birds. Each bird (except group V animals) was challenged with 1×10^8 colony forming unit (cfu) of *S. enteritidis*. Group I and II animals were fed with diet containing the herbal extract at the concentration of 4 and 2 times

the minimal inhibitory concentration (MIC) which corresponded to 16 and 8 g/kg of diet, respectively (Phadungkit, 2004). Group III animals (infected group) received no treatment and served as the negative control. Group IV animals were administered 50 ppm enrofloxacin in drinking water as a positive control. Group V animals (non-infected group) received no treatment and served as the normal control.

After seven days of treatment, all chickens were sacrificed. The crops and caeca were harvested. Each crop and caecum with its contents was subjected to a count of the number of *Samonella* colonies. The method was as follows: One ml of the suspension from each sample obtained from mixing with buffered peptone water, 1:10 w/v, was transferred to 9 ml of buffered peptone water; this mixture was serially diluted to 10^{-3} . A 0.1 ml sample of the diluted solution was transferred to xylose lysine tergitol 4 agar (Merck) and incubated for 18-20 h at 37 °C. Then the black colonies of *Salmonella* were counted (Xiong,1998). The results were expressed as mean \pm SD of the number of *Salmonella* colonies per g of crop and caecum and were statistically analyzed using one-way analysis of variance (ANOVA).

Results

The number of *Salmonella* colonies from the harvested crops and caeca were less than 1 colony/g of sample chickens fed an amount of *A. elliptica* extract of 16 g/kg. These were the lowest numbers in comparison with the numbers isolated from chickens fed 8 g/kg (Group II) and the negative control group (Group III) at $P < 0.05$. No *Salmonella* bacteria were isolated from the chickens with enrofloxacin (Group IV) and regular non-infected feed (Group V) (See Table 1).

Table 1 The numbers of *Salmonella* colonies observed on XLT4 agar plate per g of crop and caecum after the treatment of chicken.

Group	Treatment	Colonies per g of samples ¹ (\pm SD)	
		Crop	Caecum
I	Infected group, fed with the herbal extract at the concentration of 4 x MIC value (16 g/kg)	0.31 \pm 0.53 ^a	0.59 \pm 0.56 ^d
II	Infected group, fed with the herbal extract at the concentration of 2 x MIC value (8 g/kg)	3.51 \pm 1.69 ^b	9.13 \pm 2.38 ^c
III	Infected group, normal feed	13.16 \pm 3.47 ^c	39.82 \pm 4.69 ^f
IV	Infected group, administered 50 ppm enrofloxacin in water	0	0
V	The non-infected control group	0	0

¹ Means in the same vertical row with different superscripts were significantly different ($P < 0.05$).

Conclusion

The results of this study showed that the ethanol extract of the ripe fruit of *A. elliptica* inhibited *Salmonella* growth in alimentary organs of broiler chickens. The mechanism involved could be attributed to the presence of flavonoid compounds e.g. quercetin and isorhamnetin as reported in previous work (Phadungkit, 2004). The mode of action was suggested in previous work to be binding of these compounds to bacterial DNA (Ahmed et al, 1994). It is suggested from the current study that at least four times the

minimum inhibitory concentration (4 x MICs) should be incorporated in the food to reduce effectively the numbers of *Salmonella* in the alimentary organs of broiler chickens.

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