

Experimental study on the effect of Propolis injection Concentration to Anaphylaxis Shock

[Jong-Hui Ri](#), [Gyong-Hua Kang](#), [Sang-Ho Ra](#)

Department of Pharmacology, Pyongyang Medical College, Kim Il Sung University, Taesong District, Democratic People's Republic of Korea

Correspondence Address:

Dr. Jong-Hui Ri

Pyongyang Medical College, Kim Il Sung University, Taesong District

Democratic People's Republic of Korea

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Abstract

Purpose: To find the effect and mechanism of the action that the propolis injection concentration has on the anaphylactic shock, we made an anaphylactic shock model in guinea pig and found that the shock model guinea pig was recovered from the shock by the propolis injection concentration. We also studied the change of normal mast cell counts and the degranulation counts in a white rat mesentery and we found the effect on the change of the rat intestinal smooth muscular contraction by histamine so that we can explain the mechanism of the propolis action.

Materials And Methods: The study methods are as follows: (1) The effect on the anaphylactic shock, (2) the experiment to establish the mechanism of the anaphylactic shock treatment by the propolis injection, (3) the experiment to establish the mechanism of the anaphylactic shock treatment by the propolis injection.

Results: The Propolis Injection Concentration was found to increase the survival rate and decrease the counts of the degranulated cells remarkably in the rat mesentery after the anaphylactic shock.

Conclusion: The propolis injection concentration shows the recovery of anaphylactic shock and its mechanism is to block the histamine receptor and depress degranulation of the mast cell. Thus, it can be also used in the treatment of allergic asthma, conjunctivitis, urticaria.

Keywords: Anaphylactic shock, propolis, propolis injection concentration

Introduction



Propolis is a good natural material of raw drug, and there are many good physiological activators to the human health and treatment.

Many researchers have studied the antibiosis, anti-inflammatory, and antiviral action of propolis, but there has been no research on its anti-anaphylactic shock action.

During the research on the antiallergic action of the propolis, we found that the propolis injection concentration could be used for the recovery of anaphylactic shock and established its mechanism. [\[1\]](#)

Materials and Methods



Subject and research material

Subject (without sex distinction)

- o Guinea pig with a body weight of 250 ~ 300 g
- o Rate with body a weight of 75 ~ 150 g.

Research materials

The propolis injection was made in the Pharmaceutical Faculty of Pyongyang Medical College of Kim II Sung University (the government specification: 35095-2016). [\[2\]](#),[\[3\]](#),[\[4\]](#)

0.1% adrenalin, histamine, and the propolis suspension (The Ministry of Public Health Standard 3414-92) were used as the control drug.

Method of study

The effect on the anaphylactic shock

Guinea pig is sensitized with the cow serum and pertussis–diphtheria–paratyphoid vaccine. Cow serum is injected in the armpit and pertussis–diphtheria–paratyphoid vaccine is injected in abdominal of Guinea pig (the animal was 6 weeks of age with 250 ~ 300 g of body weight).

On the 21th day after sensitization, we injected 1 mL of cow serum into the cardiac cavity of the guinea pigs to observe the change of the anaphylactic shock in the animal.

As shown in [\[Table 1\]](#), the survival rate was 100% when propolis injection concentration was administered to an anaphylactic shock model in guinea pig at a dose of 1mg/Kg.

Groups	Dose (mg/kg)	Modeling number (head)	Alive number (head)	Dead number (head)	Survival rate (%)	Average dying time (min)
Control group						
Saline water	-	5	0	5	-	5.2±0.74
Adrenalin	2.0	5	2	3	40	30.0
Propolis suspension	2.0	5	1	4	20	17.6±1.77
Study group						
Propolis injection concentration	0.2	5	0	5	0	13.4±1.03
	0.4	5	1	4	20	19.0±0.81
	0.6	5	3	2	60	25.5±0.70
	0.8	5	3	2	60	37.0±1.41
	1.0	5	5	0	100	-

Based on the survival rate and the average dying time (in guinea pig) (x±SD). SD=Standard error.

Table 1: The effect of propolis injection concentration dosages on the anaphylactic shock

From this result, we concluded that the propolis injection concentration can recover an anaphylactic shock.

And then, we injected propolis into the muscle of the guinea pig and researched the dead counts and alive counts.^[1]

The experiment to establish the mechanism of the anaphylactic shock treatment by the propolis injection

The degranulation reaction in white rat mesentery

We injected 1% egg albumin into the femoral muscle of white rat and 0.1 mL of pertussis–diphtheria–paratyphoid vaccine into the abdominal cavity for sensitization.

From the 5th day before the challenge of the shock, we injected propolis with different amounts during the 5 days.

On the 21st day from the sensitization, we injected 1% egg albumin (1 mL) into the rat tail vein to have the anaphylactic shock.

And then, we made a 2 ~3-cm incision of the dead rat abdomen along the middle line and cut off the rat's small intestine and its intestinal diverticulum, and put them into a fixed printing liquid for 20~30 min to make a mesentery sample.

Next, we researched the mesentery sample under a microscope with $\times 400$ magnification to observe the counts of degranulated and granulated mast cells.

The mast cell counts are assessed by the counts of the degranulated mast cell among 100 cells.

The experiment for the effect on the smooth muscle of guinea pig

We made an incision in the lower abdomen in the guinea pig and cut a part of the small intestine about 7 cm and then took the sample to the Magnus apparatus to draw a graph of the normal intestine movement.

We also dropped about 2 drops of 0.1% histamine to the sample to draw a graph of the smooth muscular contraction.

Next, we dropped the propolis injection with different concentrations and then researched the effect on the smooth muscle.

Results of the Study



The effect of propolis injection concentration on the anaphylactic shock and its mechanism

The effect on the anaphylactic shock

As shown in 1, the survival rate in the study group was 100% compared to the control group (saline water).

As shown in [\[Figure 1\]](#), when the sensitized guinea pig was challenged by the cow serum, we observed hair-standing, urination, and defecation after 2 min and the systemic conclusion after 3 min.



Figure 1: The anaphylactic shock state alive modeling

As shown in [\[Figure 2\]](#), when we injected the propolis injection concentration into the convulsing guinea pig, we observed standing, sleeping, hair-standing, and fixed posture after 6 min, but the reflect was normal and the guinea pig was recovered after 90 min.



Figure 2: The guinea pig recovered from the shock condition (1.0 mg/kg propolis)

As shown in [\[Table 1\]](#), the survival rate was 100% when propolis injection concentration was administered to an anaphylactic shock model in guinea pig at a dose of 1mg/Kg, 60% at a dose of 0.8 and 0.6mg/Kg on experimental group. The survival rate was 40% the survival rate when adrenaline was administered at a dose of 2.0mg/Kg on control group. From this result, we concluded propolis injection concentration could recover from an anaphylactic shock.

The experiment to establish the mechanism of the anaphylactic recovery by the propolis injection concentration

The effect on the counts of normal mast cells and degranulated cells in white rat mesentery

As summarized in [\[Table 2\]](#), the counts of the degranulated cells in the white rat mesentery decreased remarkably in the study group compared to the contrast group.

Groups	Dose (mg/kg)	Modeling number (head)	x±SE (/mm ²)	
			Normal mast cell count	Degranulated cell count
Control group				
Saline water	-	7	16.7±1.8	83.3±1.9
Propolis suspension	3.0	7	49.6±1.6	50.4±1.6
Study group				
Propolis injection	0.1	7	27.6±1.6	72.4±1.6
concentration	0.9	7	35.4±1.5	64.6±1.5
	1.8	7	46.0±1.5	54.0±1.6*
	2.7	7	60.8±2.1	39.1±2.1*
	3.6	7	91.5±1.8	85±1.8**

*P<0.01 (compared with contrast group), **P<0.01 (compared with propolis suspension injection). SE=Standard error

Table 2: The effect on the counts of normal mast cells and degranulated cells in rat mesentery

The contraction of the intestinal smooth muscle by histamine and the effect of propolis injection concentration

We observed the effect of propolis on the histamine receptor (H₁). As shown in [Table 3] and [Figure 3], histamine increases the contraction of intestinal smooth muscles but Propolis injection concentration reversed the effect of the histamine. Histamine was administered again subsequently, but the contraction of smooth muscles didn't appear. Therefore we found out that it acts as a H₁ receptor antagonist.

Histamine dose (dilution time)	Propolis injection concentration dose (dilution time)	Modeling number	Change of tensility (tendo)	
			Depression	Nondepression
1×10 ⁻⁴	1×10 ⁻⁵	6	4	2
1×10 ⁻⁴	1×10 ⁻³	6	6	-

Table 3: The effect of propolis injection concentration on the abscised intestinal part (in guinea pig)

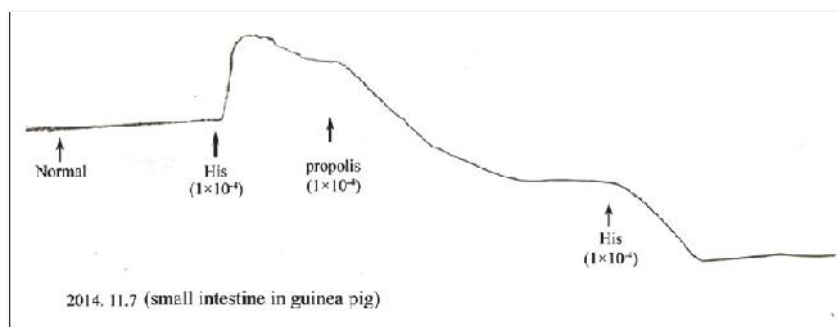


Figure 3: Histamine receptor block effect by the propolis injection concentration

Conclusion

1. The propolis injection concentration makes it possible to recover from the anaphylactic shock significantly
2. The action mechanism of the anaphylactic shock recovery by the propolis injection concentration blocks the histamine receptor and depression of the mast cell degranulation.

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Conflicts of interest

There are no conflicts of interest.

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