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# 化痰·止咳平喘藥이 Acetylcholine에 의한 흰쥐의 氣管支平滑筋의 收縮에 미치는 影響

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# The Effects of *WhoaDam-JiHaePyungChunYak* on Contracted Tracheal Smooth Muscle with Acetylcholine in Rat

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## ABSTRACT

This study was performed to analyze the effects of *WhoaDam-JiHae PyeongChunYak* on contracted tracheal smooth muscle in rat.

Transverse strips were used for the experiment using organ bath.

The test strip was perfused with modified Krebs-Ringer Bicarbonate solution which was aerated with 95% $O_2$－5% $CO_2$ mixed gas and kept at 37℃.

*WhoaDam-JiHaePyeongChunYak* extract and acetylcholine infused tracheal strip that was contracted with acetylcholine.

The results were as follows :

1. The contractile force of tracheal srtip by acetylcholine was significantly increased by *Pinelliae Rhizoma, Arisaematis Rhizoma, Sinapis Semen, Typhonii Rhizoma, Peucedani Radix, Eriobotryae Folium, Platycodi Radix, Bambusae Caulis Taeniam, Benincasae Semen, Armeniacae Amarum Semen, Asteris Radix, Periliae Fructus, Mori cortex* and *Lepidii Semen.*

2. *Arisaematis Rhizoma*(1μℓ/mℓ, 3μℓ/mℓ, 10μℓ/mℓ) and *Asteris Radix*(1μℓ/mℓ, 3μℓ/mℓ) slightly relaxed the contracted tracheal strip by acetylcholine.

3. *Farfarae Flos* significantly relaxed the contracted tracheal strip by acetylcholine.

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4. The contractile force of tracheal srtip by acetylcholine was significantly increased by *Stemonae Radix* at 30μℓ/mℓ, on the other hand *Stemonae Radix* at 100μℓ/mℓ significantly relaxed the contracted tracheal strip by acetylcholine.

## Ⅰ. 緖 論

肺는 호흡기능을 대표하는 臟器로 東醫學에서 肺의 호흡작용은 肺氣의 宣發과 肅降作用에 의하여 완성된다.[2,6,22]

만약 肺氣의 宣發肅降에 이상이 발생하면 氣機가 鬱하거나 逆上하여 咳嗽와 哮喘의 호흡장애가 발생하니 소위 "諸氣膹鬱 皆屬於肺"의 病態生理的 현상이 나타나고, 또 宣發肅降의 失調로 水分代謝의 이상을 초래하면 痰을 형성하기도 하니 肺를 "貯痰之器"라 한다.[3,4,5]

이와같이 肺의 대표적인 呼吸機能障碍인 咳嗽와 喘症의 원인에 대하여 서양의학에서는 氣管支平滑筋의 過敏性 反應, 氣道粘膜의 炎症 및 粘液分泌의 亢進등의 氣管과 氣管支의 病變으로 인식하고 있으며, 특히 만성기관지염과 천식의 경우 기도폐색으로 인한 호흡곤란이 발생하고 氣管支平滑筋의 수축이 특징적으로 나타난다.[24,25,26,27]

한편 東醫學的으로 肺의 生理系統인 "肺系" 또는 "喉嚨"의 범주에 속하는 氣管 및 氣管支의 病變에 기인한 咳嗽와 哮喘의 치료로는 祛痰, 消痰의 효능이 있는 化痰藥과, 咳嗽와 喘症을 緩和하고 制止하는 효능이 있는 止咳平喘藥을 응용하고 있다.[1]

이에 본인은 化痰·止咳平喘藥이 氣管과 氣管支의 병변에 미치는 영향을 규명하기 위한 일환으로 흰쥐의 氣管을 적출하여 acetylcholine으로 收縮을 유발한 다음 數種의 化痰·止咳平喘藥이 氣管支平滑筋의 收縮에 미치는 영향을 측정한 바, 다음과 같은 結果를 얻었기에 보고하는 바이다.

## Ⅱ. 實 驗

### 1. 藥材 및 動物

1) 藥材

本 實驗에 사용한 藥材는 市中에서 購入 精選하여 사용하였으며, 各 藥物과 分量은 다음과 같다.

| | |
|---|---|
| 半 夏(*Pinelliae Rhizoma*) | 300g |
| 天南星(*Arisaematis Rhizoma*) | 300g |
| 白芥子(*Sinapis Semen*) | 300g |
| 白附子(*Typhonii Rhizoma*) | 300g |
| 前 胡(*Peucedani Radix*) | 300g |
| 瓜蔞仁(*Trichosanthis Fructus*) | 300g |
| 枇杷葉(*Eriobotryae Folium*) | 300g |
| 桔 梗(*Platycodi Radix*) | 300g |
| 竹 茹(*Bambusae Caulis Taeniam*) | 300g |

| | |
|---|---|
| 天竺黃(*Bambusae Concretio Silicea*) | 300g |
| 冬瓜子(*Benincasae Semen*) | 300g |
| 杏 仁(*Armeniacae Amarum Semen*) | 300g |
| 百部根(*Stemonae Radix*) | 300g |
| 紫 菀(*Asteris Radix*) | 300g |
| 款冬花(*Farfarae Flos*) | 300g |
| 蘇 子(*Perillae Fructus*) | 300g |
| 桑白皮(*Mori cortex*) | 300g |
| 葶藶子(*Lepidii Semen*) | 300g |

2) 動物

체중 300g內外의 건강한 Sprague-Dawley系 흰쥐를 固形飼料와 물을 충분히 공급하면서 10日이상 실험실 환경에 적응시킨 후, 암수 구별없이 사용하였다.

## 2. 方法

1) 檢液의 製造

各 藥物 300g을 2000ml round flask에 증류수 1000ml와 함께 넣은 뒤 直火上에서 2시간동안 가열 추출한 다음, 여과한 餘液을 rotary evaporator로 減壓 濃縮하여 100ml가 되게한 후 檢液으로 사용하였다.

2) 實驗方法

실험동물을 ether로 마취한 후 氣管을 露出시켜 氣管支平滑筋에 손상이 가지 않도록 切取한 다음 너비 2mm 정도의 環形 切片을 만들어 사용하였다.

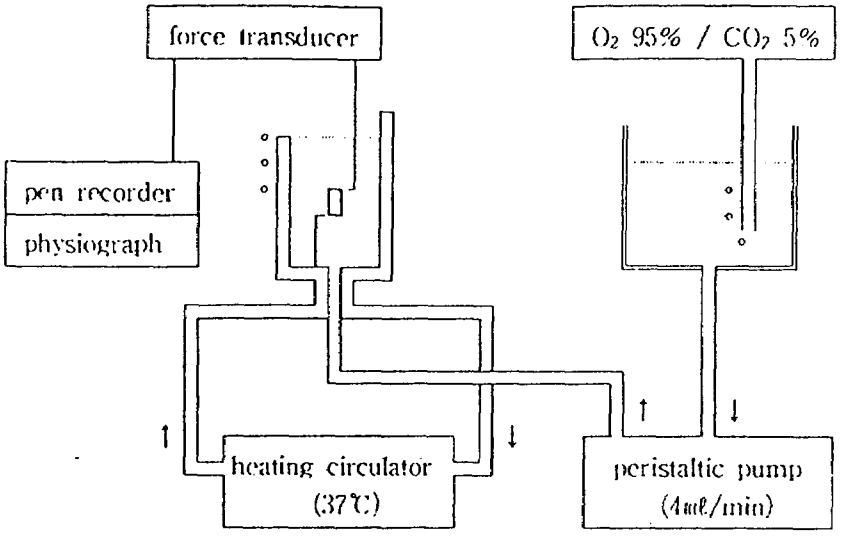
이 切片들을 95% $O_2$와 5% $CO_2$로 포화된 modified Krebs-Ringer bicarbonate 용액(NaCl 118.3, KCl 4.7, $CaCl_2$ 2.5, $MgSO_4$ 1.2, $KH_2PO_4$ 1.2, $NaHCO_3$ 25.0, Glucose 11.1 mM, pH 7.4)이 4ml/min의 속도로 흐르고 있는 organ bath (용량 1.5ml)에 옮겨 L자형 stainless steel을 이용하여 수축고정기와 근수축변환기를 연결하고 physiograph에서 등장성 수축을 기록하였다.

organ bath에서는 1시간 정도 回復시킨 다음 피동장력이 0.25g이 되게 切片의 길이를 늘려주고, 다시 1시간 정도 회복시킨 다음 실험을 시행하며, 각 실험 사이의 간격은 1시간 정도로 충분히 회복시킨 다음 시행하였다.

檢液의 투여는 acetylcholine $10^{-6}$M 을 흘려주어 收縮을 유발한 다음, 檢液을 1$\mu\ell$/ml, 3$\mu\ell$/ml, 10$\mu\ell$/ml, 30$\mu\ell$/ml, 100$\mu\ell$/ml의 농도로 각각 6回 반복 투여하여 3분간 그 변화를 기록하였다.

이상의 모든 실험은 37℃에서 시행하였다. (Figure 1)

Figure 1. A schematic representation of the 1.5cc organ bath and isometric contraction recording system.




3) 統計

統計資料는 실제 수축의 크기와 최대수축에 대한 평균과 표준편차로 표현하고 有意性 정도는 paired T-test와 unpaired T-test로 하여 有意水準 P<0.05로 검증하였다.

## III. 實驗成績

### 1. 半夏 檢液이 acetylcholine에 의한 氣管支平滑筋의 收縮에 미치는 影響

acetylcholine $10^{-6}$M 에 의한 氣管支平滑筋의 수축은 1.288±0.200g이었다.

半夏 검액이 acetylcholine $10^{-6}$M 에 의한 氣管支平滑筋의 수축에 미치는 영향은 농도를 증가시켜감에 따라 수축을 증가시키는 경향을 보였으며, 특히 100㎕/㎖에서는 유의성있는 수축의 증가를 나타내었다.(Table I, Figure 2, Figure 3)

Table I. Effects of *Pinelliae Rhizoma* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.

| Group(n=6) | Actual Contraction(g) | % Contraction |
|---|---|---|
| Control | 1.288 ± 0.200 | 100.0 |
| Test 1 | 1.346 ± 0.198 | 104.7 ± 1.9 |
| Test 2 | 1.329 ± 0.197 | 104.0 ± 4.2 |
| Test 3 | 1.396 ± 0.235 | 108.4 ± 7.0 |
| Test 4 | 1.492 ± 0.248 | 115.9 ± 7.8 |
| Test 5 | 1.717 ± 0.232 ** | 133.9 ± 7.2 |

Values are mean ± standard deviation

Control : Addition acetylchcline $10^{-6}$ M

Test 1 : Addition acetylcholine $10^{-6}$ M and *Pinelliae Rhizoma* extract 1μℓ/mℓ

Test 2 : Addition acetylcholine $10^{-6}$ M and *Pinelliae Rhizoma* extract 3μℓ/mℓ

Test 3 : Addition acetylcholine $10^{-6}$ M and *Pinelliae Rhizoma* extract 10μℓ/mℓ

Test 4 : Addition acetylcholine $10^{-6}$ M and *Pinelliae Rhizoma* extract 30μℓ/mℓ

Test 5 : Addition acetylcholine $10^{-6}$ M and *Pinelliae Rhizoma* extract 100μℓ/mℓ

* : Statistically significant compared with control group.
(** : P < 0.01)

Figure 2. Representative recordings of the effects of *Pinelliae Rhizoma* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M. ACh, acetylcholine ; P.R., *Pinelliae Rhizoma* extract ; W/O, wash out, change of bath medium with a solution to which no drug is applied.

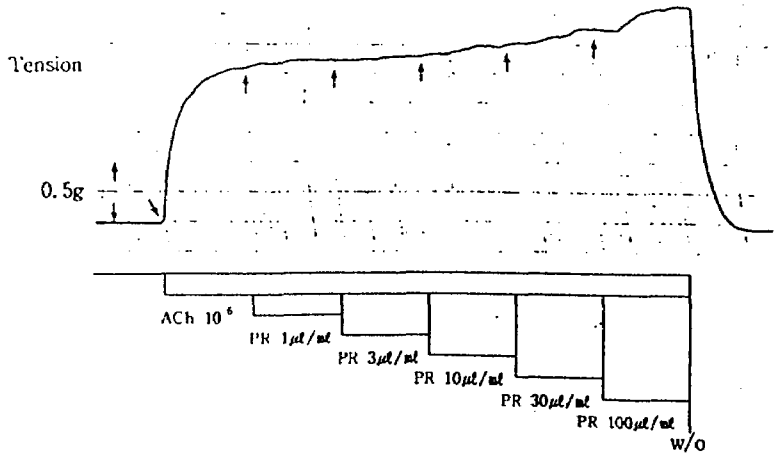
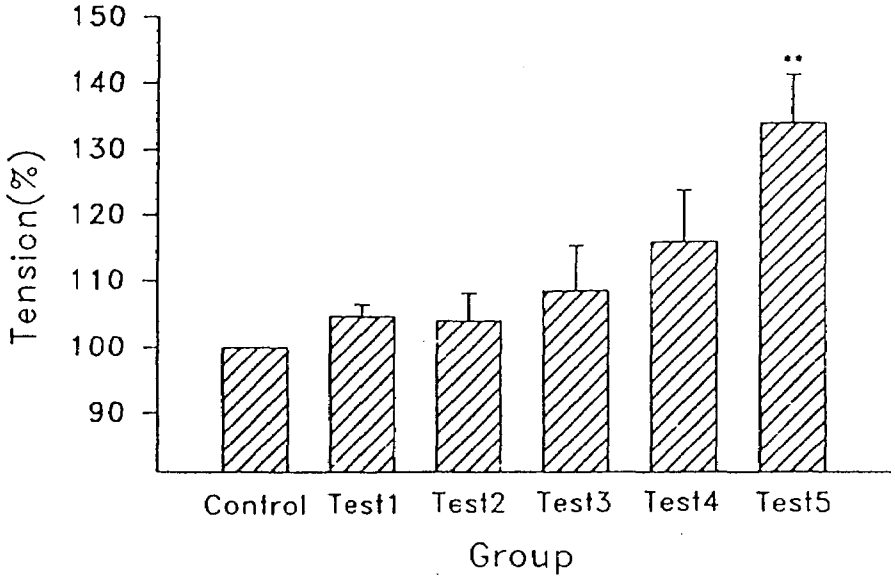


Figure 3. Comparison of the effects of *Pinelliae Rhizoma* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.




Values are mean ± standard deviation

Control : Addition acetylcholine $10^{-6}$ M

Test 1 : Addition acetylcholine $10^{-6}$ M and *Pinelliae Rhizoma* extract 1$\mu\ell$/m$\ell$

Test 2 : Addition acetylcholine $10^{-6}$ M and *Pinelliae Rhizoma* extract 3$\mu\ell$/m$\ell$

Test 3 : Addition acetylcholine $10^{-6}$ M and *Pinelliae Rhizoma* extract 10$\mu\ell$/m$\ell$

Test 4 : Addition acetylcholine $10^{-6}$ M and *Pinelliae Rhizoma* extract 30$\mu\ell$/m$\ell$

Test 5 : Addition acetylcholine $10^{-6}$ M and *Pinelliae Rhizoma* extract 100$\mu\ell$/m$\ell$

## 2. 天南星 檢液이 acetylcholine에 의한 氣管支平滑筋의 收縮에 미치는 影響

acetylcholine $10^{-6}$M 에 의한 氣管支平滑筋의 수축은 0.802± 0.065g이었다.

天南星 검액이 acetylcholine $10^{-6}$M 에 의한 氣管支平滑筋의 수축에 미치는 영향은 농도를 증가시켜감에 따라 1μℓ/mℓ, 3μℓ/mℓ 및 10μℓ/mℓ에서는 수축을 억제하는 경향을 보였으나, 30μℓ/mℓ와 100μℓ/mℓ에서는 수축을 증가시키는 경향을 보였으며, 특히 100μℓ/mℓ에서는 유의성있는 수축의 증가를 나타내었다.(Table II, Figure 4, Figure 5)

Table II. Effects of *Arisaematis Rhizoma* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.

| Group(n=6) | Actual Contraction(g) | % Contraction |
|---|---|---|
| Control | 0.802 ± 0.065 | 100.0 |
| Test 1 | 0.790 ± 0.069 | 98.4 ± 1.7 |
| Test 2 | 0.761 ± 0.067 | 94.8 ± 1.7 |
| Test 3 | 0.752 ± 0.071 | 93.7 ± 2.6 |
| Test 4 | 0.848 ± 0.046 | 106.1 ± 6.3 |
| Test 5 | 1.063 ± 0.073 ** | 133.3 ± 15.0 |

Values are mean ± standard deviation

Control : Addition acetylcholine $10^{-6}$ M

Test 1 : Addition acetylcholine $10^{-6}$ M and *Arisaematis Rhizoma* extract 1μℓ/mℓ

Test 2 : Addition acetylcholine $10^{-6}$ M and *Arisaematis Rhizoma* extract 3μℓ/mℓ

Test 3 : Addition acetylcholine $10^{-6}$ M and *Arisaematis Rhizoma* extract 10μℓ/mℓ

Test 4 : Addition acetylcholine $10^{-6}$ M and *Arisaematis Rhizoma* extract 30μℓ/mℓ

Test 5 : Addition acetylcholine $10^{-6}$ M and *Arisaematis Rhizoma* extract 100μℓ/mℓ

* : Statistically significant compared with control group.

(** : $P < 0.01$)

Figure 4. Representative recordings of the effects of *Arisaematis Rhizoma* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M. ACh, acetylcholine ; A.R., *Arisaematis Rhizoma* extract ; W/O, wash out, change of bath medium with a solution to which no drug is applied.

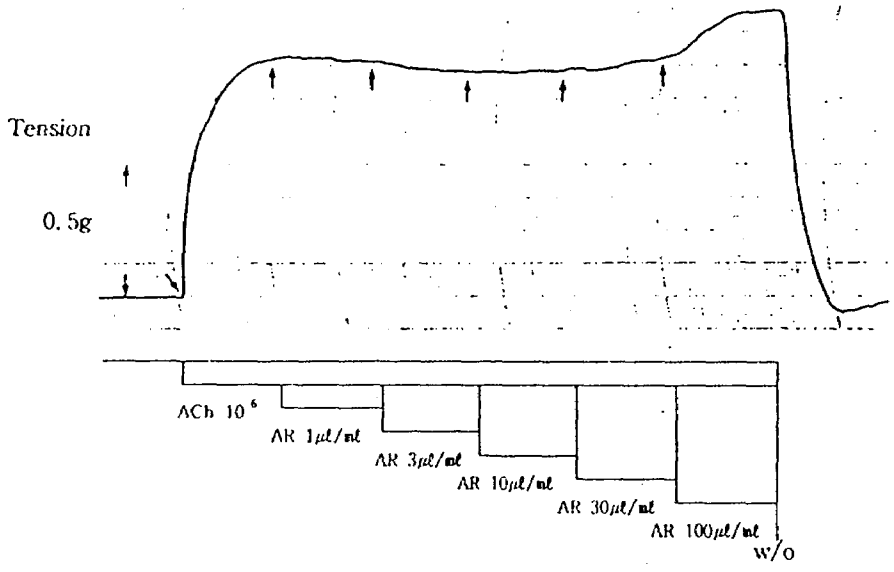
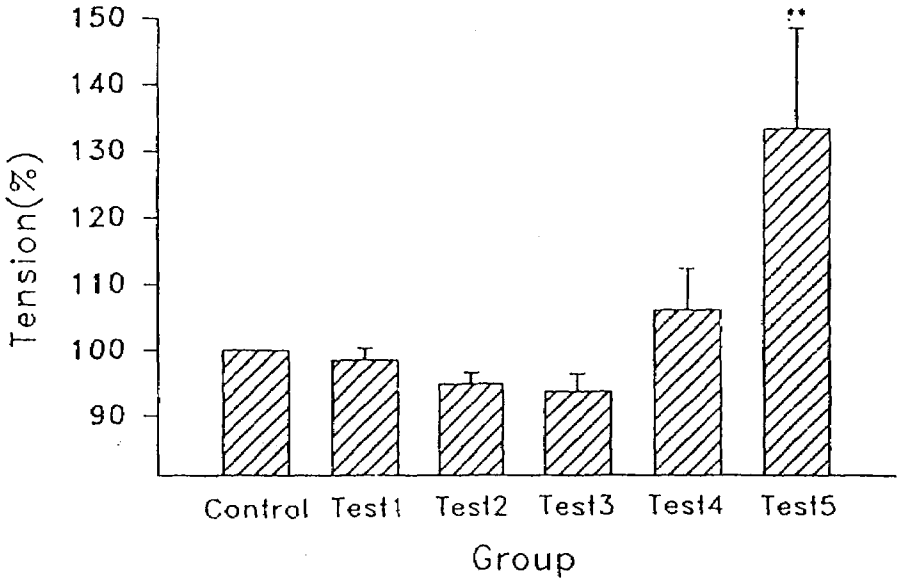


Figure 5. Comparison of the effects of *Arisaematis Rhizoma* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.




Values are mean ± standard deviation
Control : Addition acetylcholine $10^{-6}$ M
Test 1 : Addition acetylcholine $10^{-6}$ M and *Arisaematis Rhizoma* extract 1$\mu\ell$/m$\ell$
Test 2 : Addition acetylcholine $10^{-6}$ M and *Arisaematis Rhizoma* extract 3$\mu\ell$/m$\ell$
Test 3 : Addition acetylcholine $10^{-6}$ M and *Arisaematis Rhizoma* extract 10$\mu\ell$/m$\ell$
Test 4 : Addition acetylcholine $10^{-6}$ M and *Arisaematis Rhizoma* extract 30$\mu\ell$/m$\ell$
Test 5 : Addition acetylcholine $10^{-6}$ M and *Arisaematis Rhizoma* extract 100$\mu\ell$/m$\ell$

### 3. 白芥子 檢液이 acetylcholine에 의한 氣管支平滑筋의 收縮에 미치는 影響

acetylcholine $10^{-6}$M 에 의한 氣管支平滑筋의 收縮은 0.671± 0.123g이었다.

白芥子 검액이 acetylcholine $10^{-6}$M 에 의한 氣管支平滑筋의 수축에 미치는 영향은 농도를 증가시켜감에 따라 수축을 증가시키는 경향을 보였으며, 특히 3$\mu\ell$/m$\ell$, 10$\mu\ell$/m$\ell$ 및 30$\mu\ell$/m$\ell$에서는 유의성있는 수축의 증가를 나타내었다. (Table III, Figure 6, Figure 7)

Table III. Effects of *Sinapis Semen* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.

| Group(n=6) | Actual Contraction(g) | % Contraction |
|---|---|---|
| Control | 0.671 ± 0.123 | 100.0 |
| Test 1 | 0.754 ± 0.122 | 112.9 ± 5.0 |
| Test 2 | 0.971 ± 0.138 ** | 145.7 ± 8.3 |
| Test 3 | 1.258 ± 0.149 *** | 190.7 ± 26.6 |
| Test 4 | 1.298 ± 0.237 *** | 196.7 ± 38.8 |
| Test 5 | 0.729 ± 0.191 | 109.5 ± 22.1 |

Values are mean ± standard deviation

Control : Addition acetylcholine $10^{-6}$ M

Test 1 : Addition acetylcholine $10^{-6}$ M and *Sinapis Semen* extract 1μℓ/mℓ

Test 2 : Addition acetylcholine $10^{-6}$ M and *Sinapis Semen* extract 3μℓ/mℓ

Test 3 : Addition acetylcholine $10^{-6}$ M and *Sinapis Semen* extract 10μℓ/mℓ

Test 4 : Addition acetylcholine $10^{-6}$ M and *Sinapis Semen* extract 30μℓ/mℓ

Test 5 : Addition acetylcholine $10^{-6}$ M and *Sinapis Semen* extract 100μℓ/mℓ

* : Statistically significant compared with control group.
(** : P < 0.01, *** : P < 0.001)

Figure 6. Representative recordings of the effects of *Sinapis Semen* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M. ACh, acetylcholine ; S.S., *Sinapis Semen* extract ; W/O, wash out, change of bath medium with a solution to which no drug is applied.

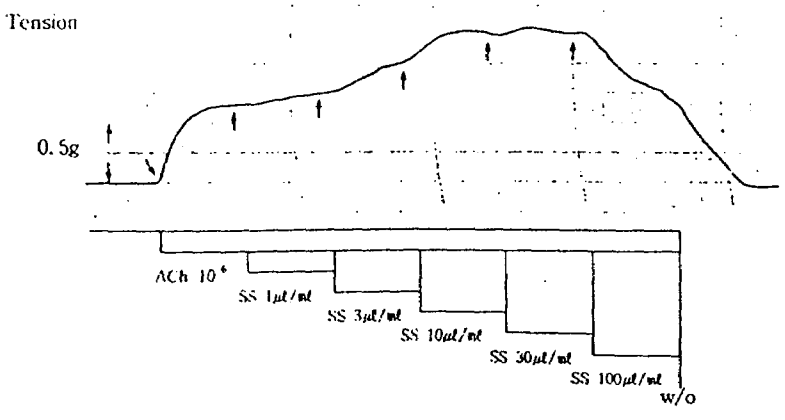
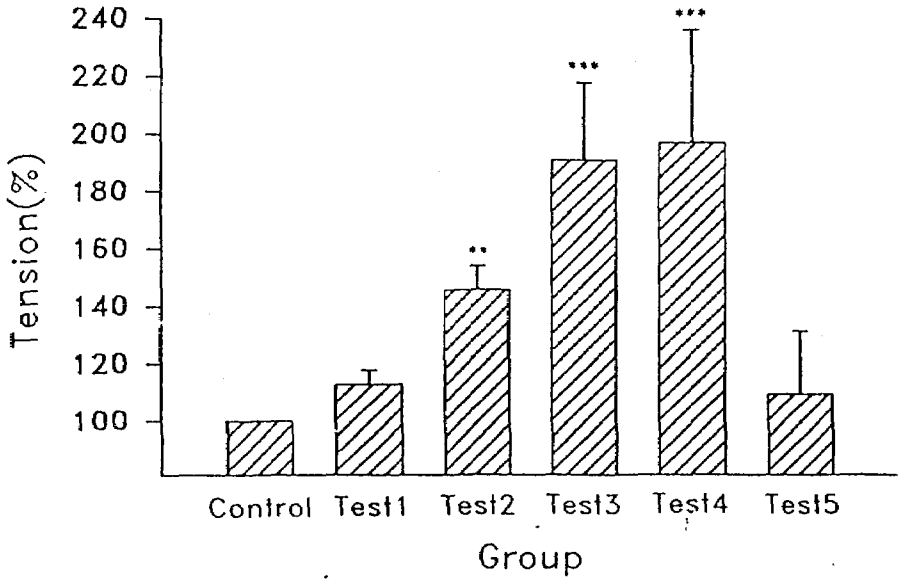


Figure 7. Comparison of the effects of *Sinapis Semen* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.




Values are mean ± standard deviation
Control : Addition acetylcholine $10^{-6}$ M
Test 1 : Addition acetylcholine $10^{-6}$ M and *Sinapis Semen* extract 1$\mu\ell$/m$\ell$
Test 2 : Addition acetylcholine $10^{-6}$ M and *Sinapis Semen* extract 3$\mu\ell$/m$\ell$
Test 3 : Addition acetylcholine $10^{-6}$ M and *Sinapis Semen* extract 10$\mu\ell$/m$\ell$
Test 4 : Addition acetylcholine $10^{-6}$ M and *Sinapis Semen* extract 30$\mu\ell$/m$\ell$
Test 5 : Addition acetylcholine $10^{-6}$ M and *Sinapis Semen* extract 100$\mu\ell$/m$\ell$

### 4. 白附子 檢液이 acetylcholine에 의한 氣管支平滑筋의 收縮에 미치는 影響

acetylcholine $10^{-6}$M 에 의한 氣管支平滑筋의 收縮은 0.540± 0.041g이었다.

白芥子 검액이 acetylcholine $10^{-6}$M 에 의한 氣管支平滑筋의 수축에 미치는 영향은 농도를 증가시켜감에 따라 수축을 증가시키는 경향을 보였으며, 특히 10$\mu\ell$/m$\ell$, 30$\mu\ell$/m$\ell$ 및 100$\mu\ell$/m$\ell$에서는 유의성있는 수축의 증가를 나타내었다.(Table Ⅳ, Figure 8, Figure 9)

Table Ⅳ. Effects of *Typhonii Rhizoma* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.

| Group(n=6) | Actual Contraction(g) | % Contraction |
|---|---|---|
| Control | 0.540 ± 0.041 | 100.0 |
| Test 1 | 0.554 ± 0.030 | 102.8 ± 3.2 |
| Test 2 | 0.559 ± 0.026 | 103.7 ± 4.9 |
| Test 3 | 0.598 ± 0.027 * | 111.1 ± 6.1 |
| Test 4 | 0.777 ± 0.035 *** | 144.5 ± 11.0 |
| Test 5 | 1.144 ± 0.081 *** | 211.8 ± 1.4 |

Values are mean ± standard deviation

Control : Addition acetylcholine $10^{-6}$ M

Test 1 : Addition acetylcholine $10^{-6}$ M and *Typhonii Rhizoma* extract 1μℓ/mℓ

Test 2 : Addition acetylcholine $10^{-6}$ M and *Typhonii Rhizoma* extract 3μℓ/mℓ

Test 3 : Addition acetylcholine $10^{-6}$ M and *Typhonii Rhizoma* extract 10μℓ/mℓ

Test 4 : Addition acetylcholine $10^{-6}$ M and *Typhonii Rhizoma* extract 30μℓ/mℓ

Test 5 : Addition acetylcholine $10^{-6}$ M and *Typhonii Rhizoma* extract 100μℓ/mℓ

* : Statistically significant compared with control group.
(* : P < 0.05, *** : P < 0.001 )

Figure 8. Representative recordings of the effects of *Typhonii Rhizoma* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M. ACh, acetylcholine ; T.R., *Typhonii Rhizoma* extract ; W/O, wash out, change of bath medium with a solution to which no drug is applied.

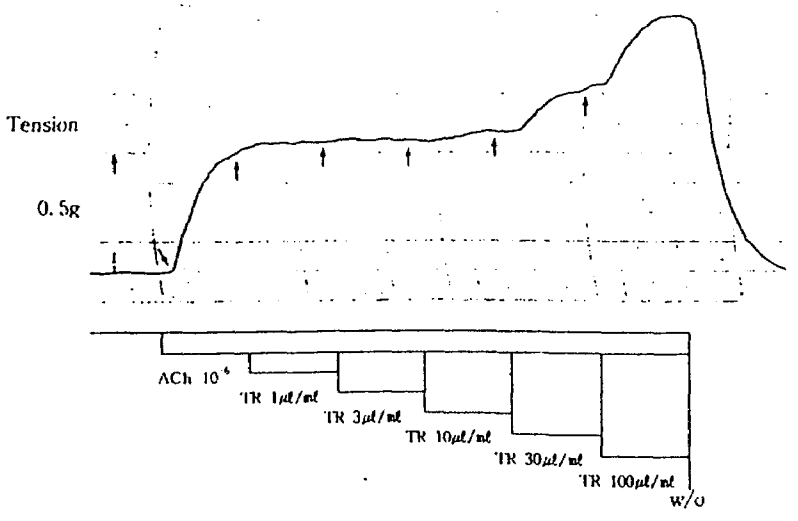
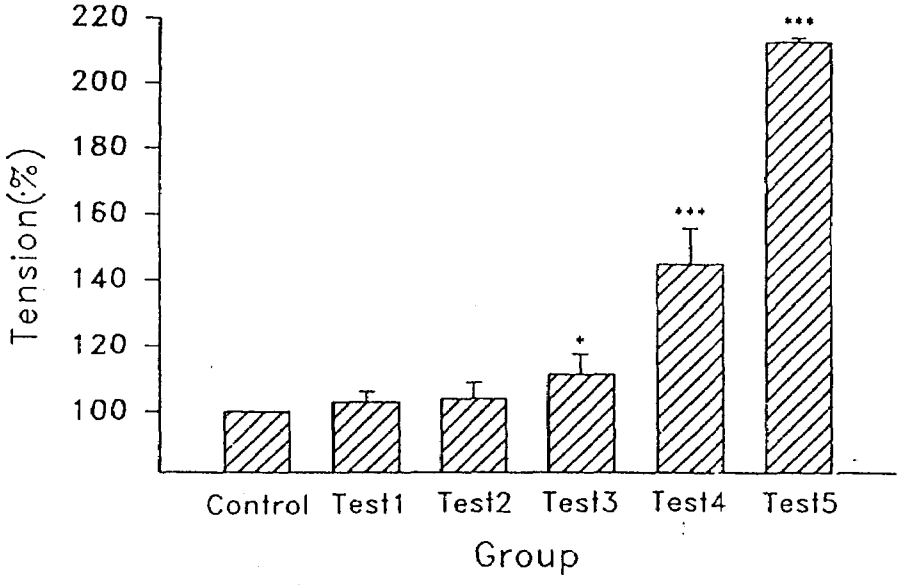


Figure 9. Comparison of the effects of *Typhonii Rhizoma* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.




Values are mean ± standard deviation
Control : Addition acetylcholine $10^{-6}$ M
Test 1 : Addition acetylcholine $10^{-6}$ M and *Typhonii Rhizoma* extract 1$\mu\ell$/m$\ell$
Test 2 : Addition acetylcholine $10^{-6}$ M and *Typhonii Rhizoma* extract 3$\mu\ell$/m$\ell$
Test 3 : Addition acetylcholine $10^{-6}$ M and *Typhonii Rhizoma* extract 10$\mu\ell$/m$\ell$
Test 4 : Addition acetylcholine $10^{-6}$ M and *Typhonii Rhizoma* extract 30$\mu\ell$/m$\ell$
Test 5 : Addition acetylcholine $10^{-6}$ M and *Typhonii Rhizoma* extract 100$\mu\ell$/m$\ell$

5. 前胡 檢液이 acetylcholine에 의한 氣管支平滑筋의 收縮에 미치는 影響

acetylcholine $10^{-6}$M 에 의한 氣管支平滑筋의 收縮은 0.667± 0.038g이었다.

前胡 검액이 acetylcholine $10^{-6}$M 에 의한 氣管支平滑筋의 수축에 미치는 영향은 농도를 증가시켜감에 따라 전반적으로 수축을 증가시키는 경향을 보였으며, 특히 100$\mu\ell$/m$\ell$에서는 유의성있는 수축의 증가를 나타내었다.(Table V, Figure 10, Figure 11)

Table V. Effects of *Peucedani Radix* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.

| Group(n=6) | Actual Contraction(g) | % Contraction |
|---|---|---|
| Control | 0.667 ± 0.038 | 100.0 |
| Test 1 | 0.669 ± 0.046 | 100.3 ± 1.9 |
| Test 2 | 0.657 ± 0.056 | 98.3 ± 3.4 |
| Test 3 | 0.667 ± 0.070 | 99.8 ± 5.3 |
| Test 4 | 0.696 ± 0.090 | 104.1 ± 8.9 |
| Test 5 | 0.860 ± 0.114 ** | 129.0 ± 14.4 |

Values are mean ± standard deviation

Control : Addition acetylcholine $10^{-6}$ M

Test 1 : Addition acetylcholine $10^{-6}$ M and *Peucedani Radix* extract 1$\mu\ell$/m$\ell$

Test 2 : Addition acetylcholine $10^{-6}$ M and *Peucedani Radix* extract 3$\mu\ell$/m$\ell$

Test 3 : Addition acetylcholine $10^{-6}$ M and *Peucedani Radix* extract 10$\mu\ell$/m$\ell$

Test 4 : Addition acetylcholine $10^{-6}$ M and *Peucedani Radix* extract 30$\mu\ell$/m$\ell$

Test 5 : Addition acetylcholine $10^{-6}$ M and *Peucedani Radix* extract 100$\mu\ell$/m$\ell$

* : Statistically significant compared with control group.
(** : P < 0.01)

Figure 10. Representative recordings of the effects of *Peucedani Radix* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M. ACh, acetylcholine ; P.R., *Peucedani Radix* extract ; W/O, wash out, change of bath medium with a solution to which no drug is applied.

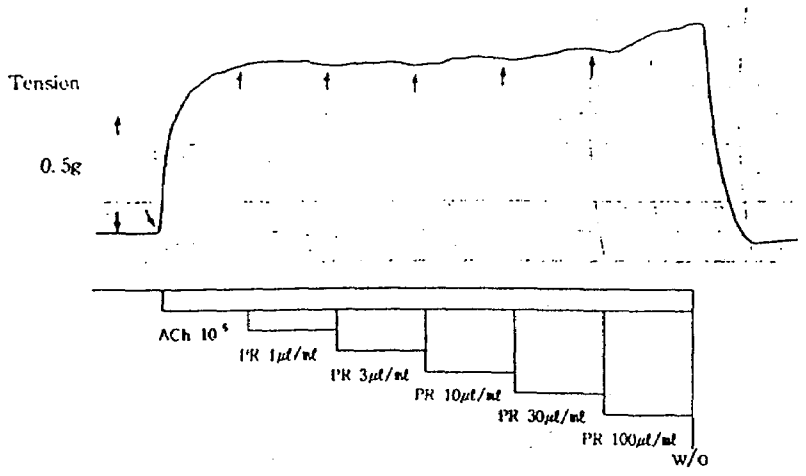
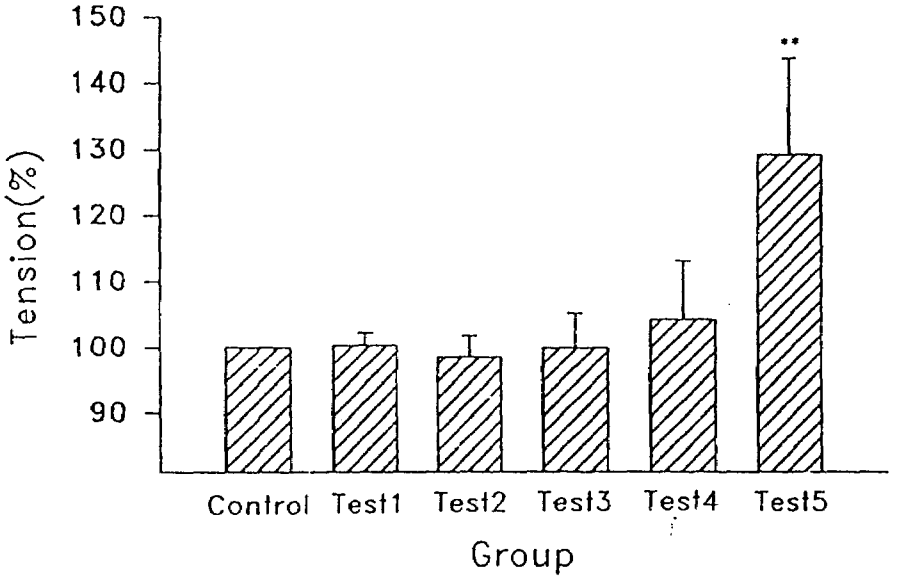


Figure 11. Comparison of the effects of *Peucedani Radix* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.




Values are mean ± standard deviation
Control : Addition acetylcholine $10^{-6}$ M
Test 1 : Addition acetylcholine $10^{-6}$ M and *Peucedani Radix* extract 1$\mu\ell$/m$\ell$
Test 2 : Addition acetylcholine $10^{-6}$ M and *Peucedani Radix* extract 3$\mu\ell$/m$\ell$
Test 3 : Addition acetylcholine $10^{-6}$ M and *Peucedani Radix* extract 10$\mu\ell$/m$\ell$
Test 4 : Addition acetylcholine $10^{-6}$ M and *Peucedani Radix* extract 30$\mu\ell$/m$\ell$
Test 5 : Addition acetylcholine $10^{-6}$ M and *Peucedani Radix* extract 100$\mu\ell$/m$\ell$

### 6. 瓜蔞仁 檢液이 acetylcholine에 의한 氣管支平滑筋의 收縮에 미치는 影響

acetylcholine $10^{-6}$M 에 의한 氣管支平滑筋의 收縮은 0.808± 0.104g이었다.

瓜蔞仁 검액이 acetylcholine $10^{-6}$M 에 의한 氣管支平滑筋의 수축에 미치는 영향은 농도를 증가시켜감에 따라 수축을 증가시키는 경향을 보였다.(Table Ⅵ, Figure 12, Figure 13)

Table VI. Effects of *Trichosanthis Fructus* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.

| Group(n=6) | Actual Contraction(g) | % Contraction |
|---|---|---|
| Control | 0.808 ± 0.104 | 100.0 |
| Test 1 | 0.833 ± 0.110 | 103.1 ± 2.9 |
| Test 2 | 0.879 ± 0.131 | 108.6 ± 3.1 |
| Test 3 | 0.908 ± 0.143 | 112.1 ± 4.6 |
| Test 4 | 0.833 ± 0.121 | 103.0 ± 5.8 |
| Test 5 | 0.867 ± 0.080 | 108.7 ± 17.5 |

Values are mean ± standard deviation

Control : Addition acetylcholine $10^{-6}$ M

Test 1 : Addition acetylcholine $10^{-6}$ M and *Trichosanthis Fructus* extract 1μℓ/mℓ

Test 2 : Addition acetylcholine $10^{-6}$ M and *Trichosanthis Fructus* extract 3μℓ/mℓ

Test 3 : Addition acetylcholine $10^{-6}$ M and *Trichosanthis Fructus* extract 10μℓ/mℓ

Test 4 : Addition acetylcholine $10^{-6}$ M and *Trichosanthis Fructus* extract 30μℓ/mℓ

Test 5 : Addition acetylcholine $10^{-6}$ M and *Trichosanthis Fructus* extract 100μℓ/mℓ

Figure 12. Representative recordings of the effects of *Trichosanthis Fructus* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M. ACh, acetylcholine ; T.F., *Trichosanthis Fructus* extract ; W/O, wash out, change of bath medium with a solution to which no drug is applied.

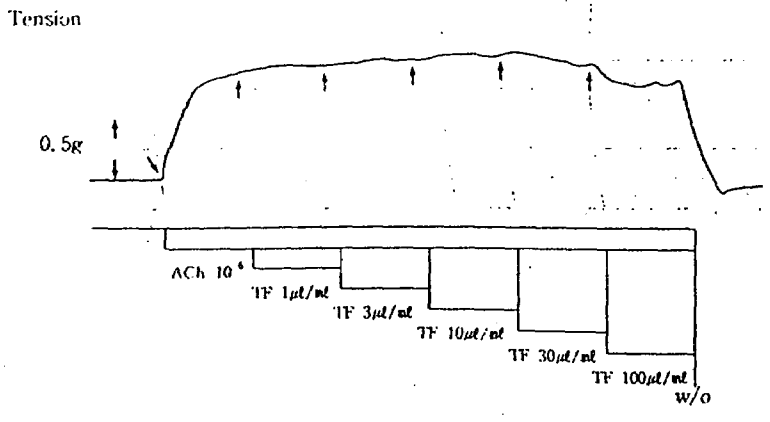
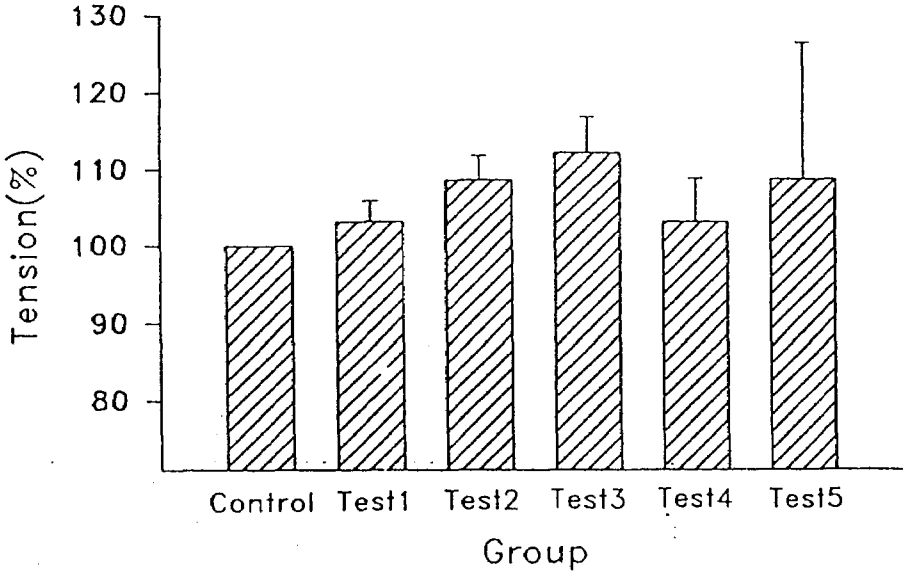


Figure 13. Comparison of the effects of *Trichosanthis Fructus* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.




Values are mean ± standard deviation
Control : Addition acetylcholine $10^{-6}$ M
Test 1 : Addition acetylcholine $10^{-6}$ M and *Trichosanthis Fructus* extract 1$\mu\ell$/m$\ell$
Test 2 : Addition acetylcholine $10^{-6}$ M and *Trichosanthis Fructus* extract 3$\mu\ell$/m$\ell$
Test 3 : Addition acetylcholine $10^{-6}$ M and *Trichosanthis Fructus* extract 10$\mu\ell$/m$\ell$
Test 4 : Addition acetylcholine $10^{-6}$ M and *Trichosanthis Fructus* extract 30$\mu\ell$/m$\ell$
Test 5 : Addition acetylcholine $10^{-6}$ M and *Trichosanthis Fructus extract* 100$\mu\ell$/m$\ell$

### 7. 枇杷葉 檢液이 acetylcholine에 의한 氣管支平滑筋의 收縮에 미치는 影響

acetylcholine $10^{-6}$M 에 의한 氣管支平滑筋의 收縮은 0.954± 0.083g이었다.

枇杷葉 검액이 acetylcholine $10^{-6}$M 에 의한 氣管支平滑筋의 수축에 미치는 영향은 농도를 증가시켜감에 따라 수축을 증가시키는 경향을 보였으며, 특히 3$\mu\ell$/m$\ell$, 10$\mu\ell$/m$\ell$, 30$\mu\ell$/m$\ell$ 및 100$\mu\ell$/m$\ell$에서는 유의성있는 수축의 증가를 나타내었다.(Table Ⅶ, Figure 14, Figure 15)

Table VII. Effects of *Eriobotryae Folium* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.

| Group(n=6) | Actual Contraction(g) | % Contraction |
|---|---|---|
| Control | 0.954 ± 0.083 | 100.0 |
| Test 1 | 1.004 ± 0.066 | 105.4 ± 2.8 |
| Test 2 | 1.054 ± 0.051 * | 110.8 ± 4.6 |
| Test 3 | 1.113 ± 0.047 ** | 117.0 ± 6.5 |
| Test 4 | 1.171 ± 0.039 ** | 123.5 ± 10.5 |
| Test 5 | 1.338 ± 0.052 *** | 140.7 ± 7.7 |

Values are mean ± standard deviation

Control : Addition acetylcholine $10^{-6}$ M

Test 1 : Addition acetylcholine $10^{-6}$ M and *Eriobotryae Folium* extract 1μℓ/mℓ

Test 2 : Addition acetylcholine $10^{-6}$ M and *Eriobotryae Folium* extract 3μℓ/mℓ

Test 3 : Addition acetylcholine $10^{-6}$ M and *Eriobotryae Folium* extract 10μℓ/mℓ

Test 4 : Addition acetylcholine $10^{-6}$ M and *Eriobotryae Folium* extract 30μℓ/mℓ

Test 5 : Addition acetylcholine $10^{-6}$ M and *Eriobotryae Folium* extract 100μℓ/mℓ

* : Statistically significant compared with control group.

(* : $P < 0.05$, ** : $P < 0.01$, *** : $P < 0.001$ )

Figure 14. Representative recordings of the effects of *Eriobotryae Folium* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M. ACh, acetylcholine ; E.F., *Eriobotryae Folium* extract ; W/O, wash out, change of bath medium with a solution to which no drug is applied.

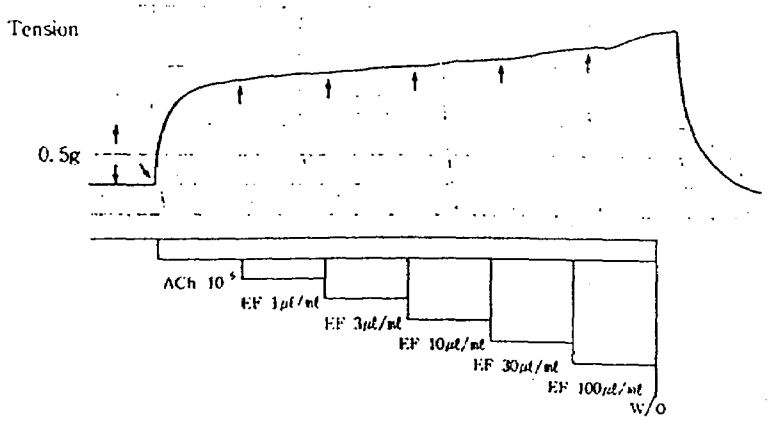
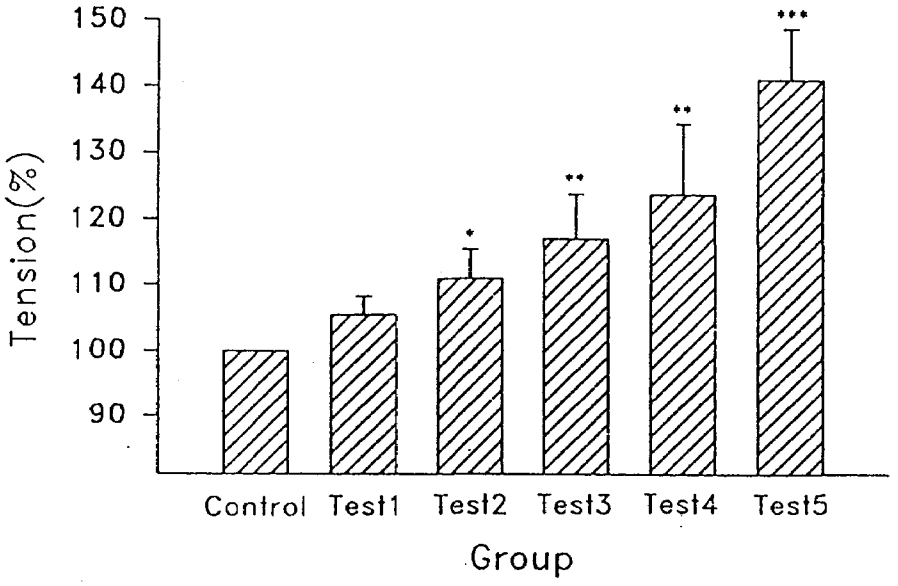


Figure 15. Comparison of the effects of *Eriobotryae Folium* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.




Values are mean ± standard deviation
Control : Addition acetylcholine $10^{-6}$ M
Test 1 : Addition acetylcholine $10^{-6}$ M and *Eriobotryae Folium* extract 1μℓ/mℓ
Test 2 : Addition acetylcholine $10^{-6}$ M and *Eriobotryae Folium* extract 3μℓ/mℓ
Test 3 : Addition acetylcholine $10^{-6}$ M and *Eriobotryae Folium* extract 10μℓ/mℓ
Test 4 : Addition acetylcholine $10^{-6}$ M and *Eriobotryae Folium* extract 30μℓ/mℓ
Test 5 : Addition acetylcholine $10^{-6}$ M and *Eriobotryae Folium* extract 100μℓ/mℓ

8. 枇杷 檢液이 acetylcholine에 의한 氣管支平滑筋의 收縮에 미치는 影響

acetylcholine $10^{-6}$M 에 의한 氣管支平滑筋의 수축은 0.761± 0.086g이었다.

枇杷 검액이 acetylcholine $10^{-6}$M 에 의한 氣管支平滑筋의 수축에 미치는 영향은 농도를 증가시켜감에 따라 수축을 증가시키는 경향을 보였으며, 특히 100μℓ/mℓ에서는 유의성있는 수축의 증가를 나타내었다.(Table Ⅷ, Figure 16, Figure 17)

Table Ⅷ. Effects of *Platycodi Radix* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.

| Group(n=6) | Actual Contraction(g) | % Contraction |
|---|---|---|
| Control | 0.761 ± 0.086 | 100.0 |
| Test 1 | 0.780 ± 0.109 | 102.5 ± 7.0 |
| Test 2 | 0.780 ± 0.098 | 102.4 ± 2.7 |
| Test 3 | 0.790 ± 0.107 | 103.7 ± 3.3 |
| Test 4 | 0.804 ± 0.090 | 105.8 ± 4.9 |
| Test 5 | 0.913 ± 0.094 * | 120.2 ± 5.0 |

Values are mean ± standard deviation

Control : Addition acetylcholine $10^{-6}$ M

Test 1 : Addition acetylcholine $10^{-6}$ M and *Platycodi Radix* extract 1μℓ/mℓ

Test 2 : Addition acetylcholine $10^{-6}$ M and *Platycodi Radix* extract 3μℓ/mℓ

Test 3 : Addition acetylcholine $10^{-6}$ M and *Platycodi Radix* extract 10μℓ/mℓ

Test 4 : Addition acetylcholine $10^{-6}$ M and *Platycodi Radix* extract 30μℓ/mℓ

Test 5 : Addition acetylcholine $10^{-6}$ M and *Platycodi Radix* extract 100μℓ/mℓ

* : Statistically significant compared with control group.
(* : $P < 0.05$)

Figure 16. Representative recordings of the effects of *Platycodi Radix* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M. ACh, acetylcholine ; P.R., *Platycodi Radix* extract ; W/O, wash out, change of bath medium with a solution to which no drug is applied.

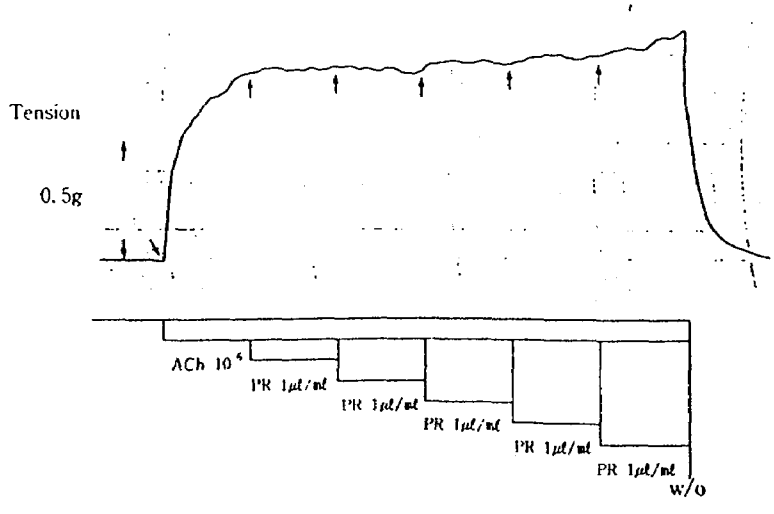
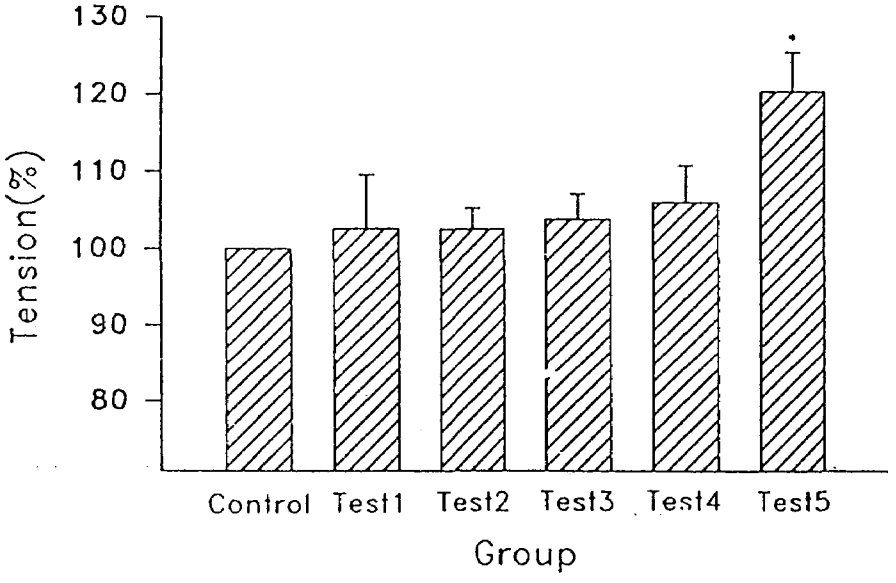


Figure 17. Comparison of the effects of *Platycodi Radix* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.




Values are mean ± standard deviation
Control : Addition acetylcholine $10^{-6}$ M
Test 1 : Addition acetylcholine $10^{-6}$ M and *Platycodi Radix* extract 1$\mu\ell$/m$\ell$
Test 2 : Addition acetylcholine $10^{-6}$ M and *Platycodi Radix* extract 3$\mu\ell$/m$\ell$
Test 3 : Addition acetylcholine $10^{-6}$ M and *Platycodi Radix* extract 10$\mu\ell$/m$\ell$
Test 4 : Addition acetylcholine $10^{-6}$ M and *Platycodi Radix* extract 30$\mu\ell$/m$\ell$
Test 5 : Addition acetylcholine $10^{-6}$ M and *Platycodi Radix* extract 100$\mu\ell$/m$\ell$

### 9. 竹茹 檢液이 acetylcholine에 의한 氣管支平滑筋의 收縮에 미치는 影響

acetylcholine $10^{-6}$M 에 의한 氣管支平滑筋의 수축은 0.783± 0.047g이었다.

竹茹 검액이 acetylcholine $10^{-6}$M 에 의한 氣管支平滑筋의 수축에 미치는 영향은 농도를 증가시켜감에 따라 수축을 증가시키는 경향을 보였으며, 특히 3μ/m$\ell$, 10$\mu\ell$/m$\ell$, 30$\mu\ell$/m$\ell$ 및 100 $\mu\ell$/m$\ell$에서는 유의성있는 수축의 증가를 나타내었다.(Table Ⅸ, Figure 18, Figure 19)

Table IX. Effects of *Bambusae Caulis Taeniam* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.

| Group(n=6) | Actual Contraction(g) | % Contraction |
|---|---|---|
| Control | 0.783 ± 0.047 | 100.0 |
| Test 1 | 0.817 ± 0.058 | 104.2 ± 3.4 |
| Test 2 | 0.858 ± 0.054 * | 109.6 ± 2.9 |
| Test 3 | 1.004 ± 0.083 *** | 128.3 ± 9.3 |
| Test 4 | 1.225 ± 0.131 *** | 156.8 ± 18.2 |
| Test 5 | 1.429 ± 0.218 *** | 182.5 ± 26.1 |

Values are mean ± standard deviation

Control : Addition acetylcholine $10^{-6}$ M

Test 1 : Addition acetylcholine $10^{-6}$ M and *Bambusae Caulis Taeniam extract 1μℓ/mℓ*

Test 2 : Addition acetylcholine $10^{-6}$ M and *Bambusae Caulis Taeniam extract 3μℓ/mℓ*

Test 3 : Addition acetylcholine $10^{-6}$ M and *Bambusae Caulis Taeniam extract 10μℓ/mℓ*

Test 4 : Addition acetylcholine $10^{-6}$ M and *Bambusae Caulis Taeniam extract 30μℓ/mℓ*

Test 5 : Addition acetylcholine $10^{-6}$ M and *Bambusae Caulis Taeniam extract 100μℓ/mℓ*

* : Statistically significant compared with control group.
(* : P < 0.05, *** : P < 0.001)

Figure 18. Representative recordings of the effects of *Bambusae Caulis Taeniam* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M. ACh, acetylcholine ; B.C.T., *Bambusae Caulis Taeniam* extract ; W/O, wash out, change of bath medium with a solution to which no drug is applied.

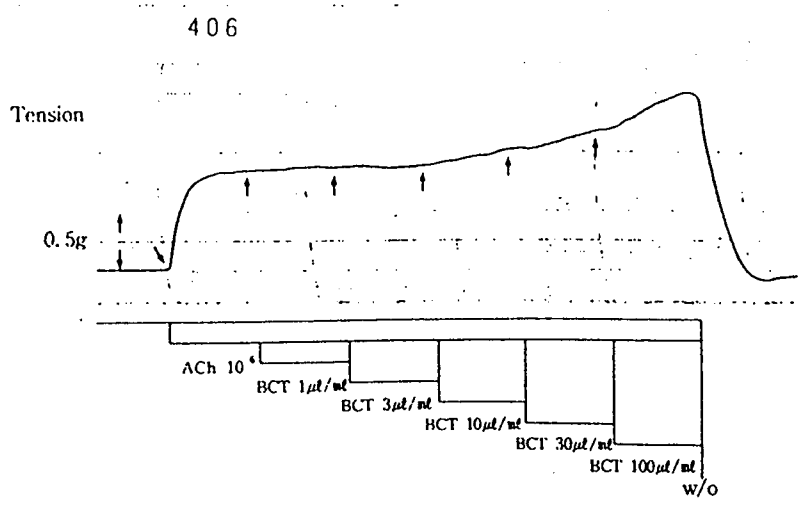
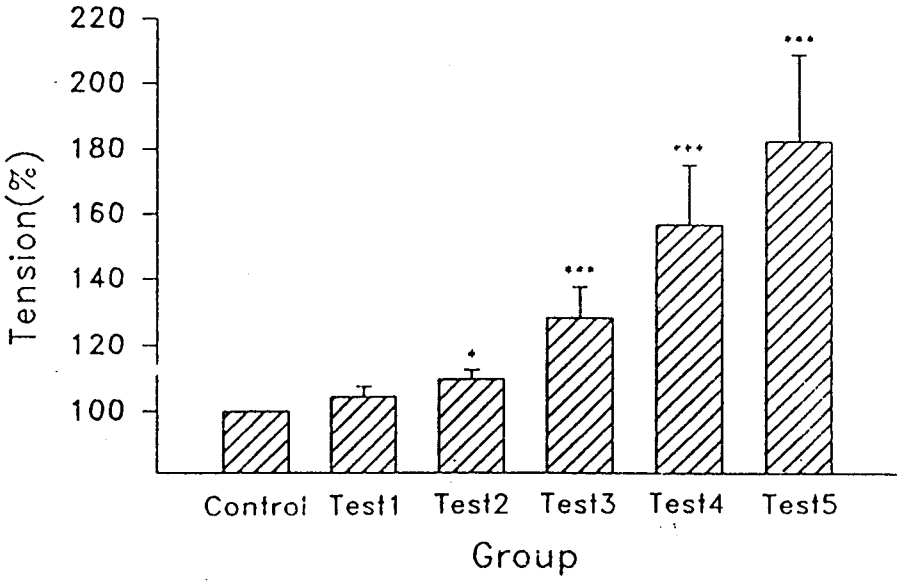


Figure 19. Comparison of the effects of *Bambusae Caulis Taeniam* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.




Values are mean ± standard deviation
Control : Addition acetylcholine $10^{-6}$ M
Test 1 : Addition acetylcholine $10^{-6}$ M and *Bambusae Concretio Silicea* extract 1μℓ/mℓ
Test 2 : Addition acetylcholine $10^{-6}$ M and *Bambusae Concretio Silicea* extract 3μℓ/mℓ
Test 3 : Addition acetylcholine $10^{-6}$ M and *Bambusae Concretio Silicea* extract 10μℓ/mℓ
Test 4 : Addition acetylcholine $10^{-6}$ M and *Bambusae Concretio Silicea* extract 30μℓ/mℓ
Test 5 : Addition acetylcholine $10^{-6}$ M and *Bambusae Concretio Silicea* extract 100μℓ/mℓ

### 10. 天竺黃 檢液이 acetylcholine에 의한 氣管支平滑筋의 收縮에 미치는 影響

acetylcholine $10^{-6}$M 에 의한 氣管支平滑筋의 收縮은 0.856± 0.092g이었다.

天竺黃 검액이 acetylcholine $10^{-6}$M 에 의한 氣管支平滑筋의 수축에 미치는 영향은 농도를 증가시켜감에 따라 수축을 증가시키는 경향을 보였다.(Table X, Figure 20, Figure 21)

Table X. Effects of *Bambusae Concretio Silicea* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.

| Group(n=6) | Actual Contraction(g) | % Contraction |
|---|---|---|
| Control | 0.856 ± 0.092 | 100.0 |
| Test 1 | 0.880 ± 0.095 | 102.7 ± 1.1 |
| Test 2 | 0.917 ± 0.092 | 107.2 ± 2.2 |
| Test 3 | 0.934 ± 0.100 | 110.0 ± 3.2 |
| Test 4 | 0.946 ± 0.105 | 110.5 ± 0.9 |
| Test 5 | 0.967 ± 0.107 | 112.9 ± 1.4 |

Values are mean ± standard deviation

Control : Addition acetylcholine $10^{-6}$ M

Test 1 : Addition acetylcholine $10^{-6}$ M and *Bambusae Caulis Taeniam* extract 1μℓ/mℓ

Test 2 : Addition acetylcholine $10^{-6}$ M and *Bambusae Caulis Taeniam* extract 3μℓ/mℓ

Test 3 : Addition acetylcholine $10^{-6}$ M and *Bambusae Caulis Taeniam* extract 10μℓ/mℓ

Test 4 : Addition acetylcholine $10^{-6}$ M and *Bambusae Caulis Taeniam* extract 30μℓ/mℓ

Test 5 : Addition acetylcholine $10^{-6}$ M and *Bambusae Caulis Taeniam* extract 100μℓ/mℓ

Figure 20. Representative recordings of the effects of *Bambusae Concretio Silicea* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M. ACh, acetylcholine ; B. C.S., *Bambusae Concretio Silicea* extract ; W/O, wash out, change of bath medium with a solution to which no drug is applied.

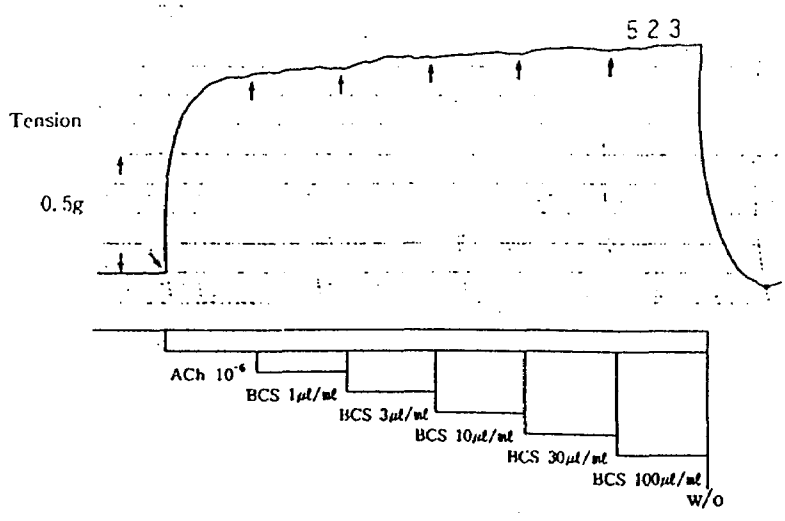
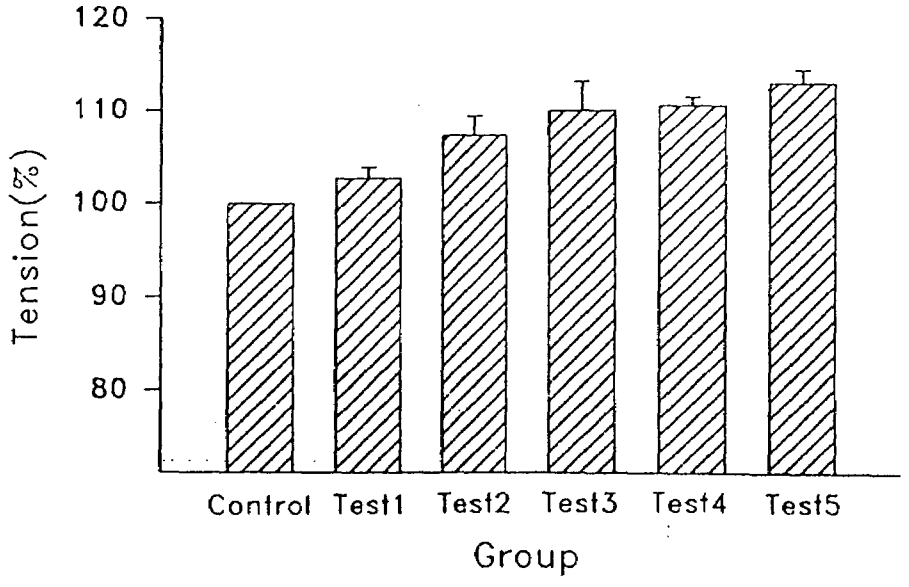


Figure 21. Comparison of the effects of *Bambusae Concretio Silicea* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.




Values are mean ± standard deviation
Control : Addition acetylcholine $10^{-6}$ M
Test 1 : Addition acetylcholine $10^{-6}$ M and *Bambusae Concretio Silicea* extract 1 μℓ/mℓ
Test 2 : Addition acetylcholine $10^{-6}$ M and *Bambusae Concretio Silicea* extract 3 μℓ/mℓ
Test 3 : Addition acetylcholine $10^{-6}$ M and *Bambusae Concretio Silicea* extract 10 μℓ/mℓ
Test 4 : Addition acetylcholine $10^{-6}$ M and *Bambusae Concretio Silicea* extract 30 μℓ/mℓ
Test 5 : Addition acetylcholine $10^{-6}$ M and *Bambusae Concretio Silicea* extract 100μℓ/mℓ

### 11. 冬瓜子 檢液이 acetylcholine에 의한 氣管支平滑筋의 收縮에 미치는 影響

acetylcholine $10^{-6}$M 에 의한 氣管支平滑筋의 收縮은 1.117± 0.116g이었다.

冬瓜子 검액이 acetylcholine $10^{-6}$M 에 의한 氣管支平滑筋의 수축에 미치는 영향은 농도를 증가시켜감에 따라 수축을 증가시키는 경향을 보였으며, 특히 30μℓ/mℓ와 100μℓ/mℓ에서는 유의성있는 수축의 증가를 나타내었다.(Table XI, Figure 22, Figure 23)

Table XI. Effects of *Benincasae Semen* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.

| Group(n=6) | Actual Contraction(g) | % Contraction |
|---|---|---|
| Control | 1.117 ± 0.116 | 100.0 |
| Test 1 | 1.138 ± 0.116 | 101.9 ± 2.2 |
| Test 2 | 1.150 ± 0.081 | 103.3 ± 4.9 |
| Test 3 | 1.225 ± 0.085 | 110.1 ± 6.0 |
| Test 4 | 1.292 ± 0.102 ** | 116.1 ± 7.1 |
| Test 5 | 1.463 ± 0.116 *** | 131.6 ± 11.0 |

Values are mean ± standard deviation

Control : Addition acetylcholine $10^{-6}$ M

Test 1 : Addition acetylcholine $10^{-6}$ M and *Benincasae Semen* extract 1$\mu\ell$/m$\ell$

Test 2 : Addition acetylcholine $10^{-6}$ M and *Benincasae Semen* extract 3$\mu\ell$/m$\ell$

Test 3 : Addition acetylcholine $10^{-6}$ M and *Benincasae Semen* extract 10$\mu\ell$/m$\ell$

Test 4 : Addition acetylcholine $10^{-6}$ M and *Benincasae Semen* extract 30$\mu\ell$/m$\ell$

Test 5 : Addition acetylcholine $10^{-6}$ M and *Benincasae Semen* extract 100$\mu\ell$/m$\ell$

* : Statistically significant compared with control group.
(** : P < 0.01, *** : P < 0.001)

Figure 22. Representative recordings of the effects of *Benincasae Semen* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M. ACh, acetylcholine ; B.S., *Benincasae Semen* extract ; W/O, wash out, change of bath medium with a solution to which no drug is applied.

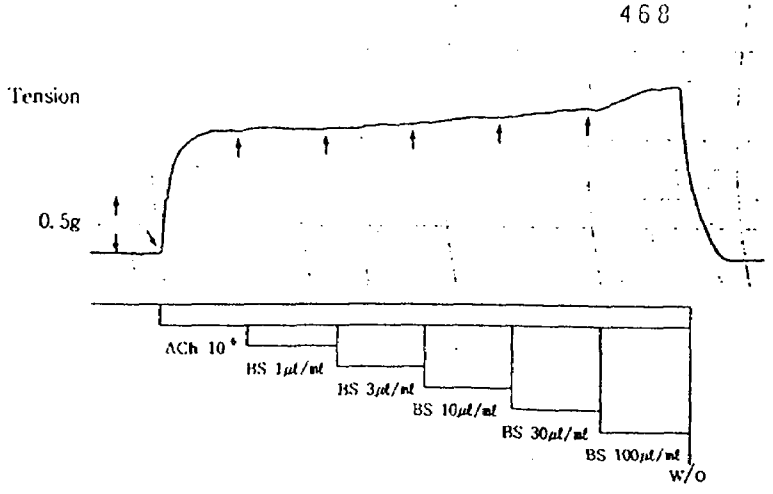
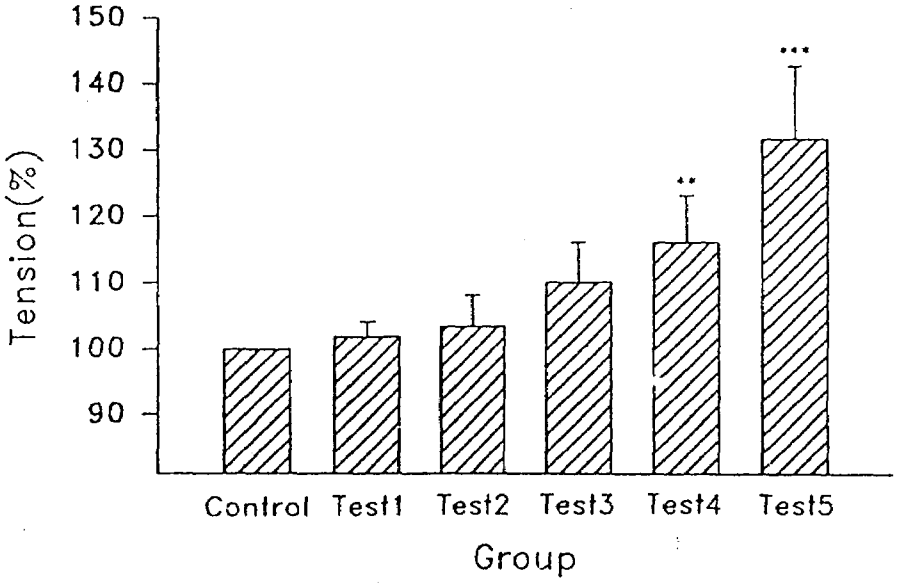


Figure 23. Comparison of the effects of *Benincasae Semen* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.




Values are mean ± standard deviation
Control : Addition acetylcholine $10^{-6}$ M
Test 1 : Addition acetylcholine $10^{-6}$ M and *Benincasae Semen* extract 1$\mu\ell$/m$\ell$
Test 2 : Addition acetylcholine $10^{-6}$ M and *Benincasae Semen* extract 3$\mu\ell$/m$\ell$
Test 3 : Addition acetylcholine $10^{-6}$ M and *Benincasae Semen* extract 10$\mu\ell$/m$\ell$
Test 4 : Addition acetylcholine $10^{-6}$ M and *Benincasae Semen* extract 30$\mu\ell$/m$\ell$
Test 5 : Addition acetylcholine $10^{-6}$ M and *Benincasae Semen* extract 100$\mu\ell$/m$\ell$

### 12. 杏仁 檢液이 acetylcholine에 의한 氣管支平滑筋의 收縮에 미치는 影響

acetylcholine $10^{-6}$M 에 의한 氣管支平滑筋의 收縮은 0.640± 0.029g이었다.

杏仁 검액이 acetylcholine $10^{-6}$M 에 의한 氣管支平滑筋의 수축에 미치는 영향은 농도를 증가시켜감에 따라 수축을 증가시키는 경향을 보였으며, 특히 30μ/m$\ell$ 및 100$\mu\ell$/m$\ell$에서는 유의성있는 수축의 증가를 나타내었다.(Table XII, Figure 24, Figure 25)

Table Ⅻ. Effects of *Armeniacae Amarum Semen* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.

| Group(n=6) | Actual Contraction(g) | % Contraction |
|---|---|---|
| Control | 0.640 ± 0.029 | 100.0 |
| Test 1 | 0.659 ± 0.038 | 102.9 ± 1.9 |
| Test 2 | 0.663 ± 0.049 | 103.5 ± 3.5 |
| Test 3 | 0.688 ± 0.061 | 107.4 ± 5.1 |
| Test 4 | 0.742 ± 0.058 ** | 115.9 ± 4.4 |
| Test 5 | 0.880 ± 0.025 *** | 137.6 ± 3.1 |

Values are mean ± standard deviation

Control : Addition acetylcholine $10^{-6}$ M

Test 1 : Addition acetylcholine $10^{-6}$ M and *Armeniacae Amarum Semen* extract 1 $\mu\ell$/m$\ell$

Test 2 : Addition acetylcholine $10^{-6}$ M and *Armeniacae Amarum Semen* extract 3 $\mu\ell$/m$\ell$

Test 3 : Addition acetylcholine $10^{-6}$ M and *Armeniacae Amarum Semen* extract 10 $\mu\ell$/m$\ell$

Test 4 : Addition acetylcholine $10^{-6}$ M and *Armeniacae Amarum Semen* extract 30 $\mu\ell$/m$\ell$

Test 5 : Addition acetylcholine $10^{-6}$ M and *Armeniacae Amarum Semen* extract 100 $\mu\ell$/m$\ell$

* : Statistically significant compared with control group.

(** : P < 0.01, *** : P < 0.001)

Figure 24. Representative recordings of the effects of *Armeniacae Amarum Semen* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M. ACh, acetylcholine ; A. A.S., *Armeniacae Amarum Semen* extract ; W/O, wash out, change of bath medium with a solution to which no drug is applied.

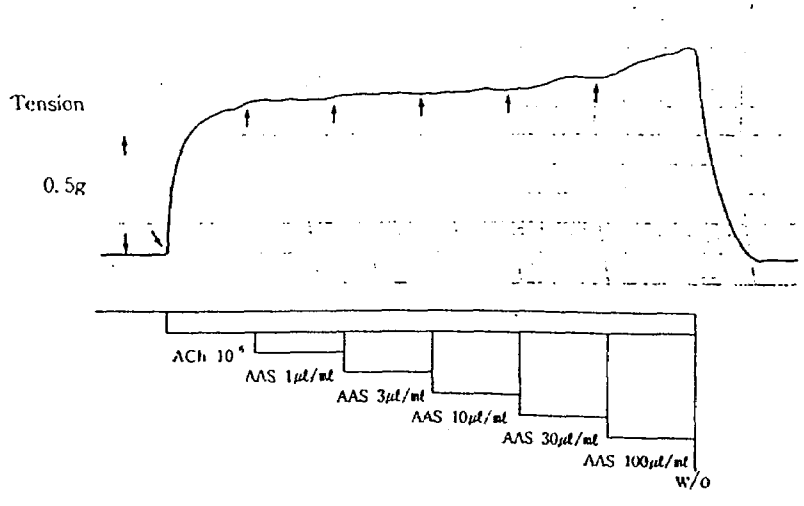
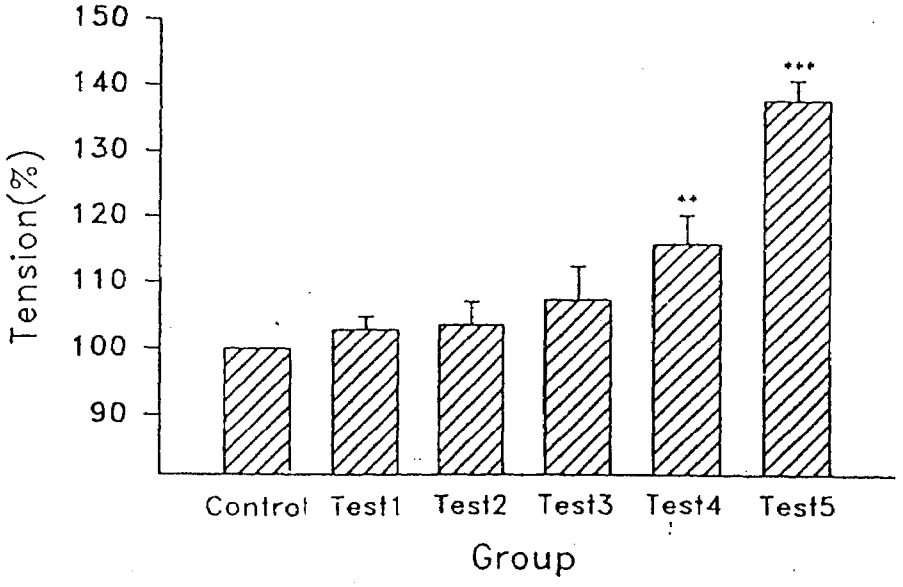


Figure 25. Comparison of the effects of *Armeniacae Amarum Semen* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.




Values are mean ± standard deviation
Control : Addition acetylcholine $10^{-6}$ M
Test 1 : Addition acetylcholine $10^{-6}$ M and *Armeniacae Amarum Semen* extract 1$\mu\ell$/m$\ell$
Test 2 : Addition acetylcholine $10^{-6}$ M and *Armeniacae Amarum Semen* extract 3$\mu\ell$/m$\ell$
Test 3 : Addition acetylcholine $10^{-6}$ M and *Armeniacae Amarum Semen* extract 10$\mu\ell$/m$\ell$
Test 4 : Addition acetylcholine $10^{-6}$ M and *Armeniacae Amarum Semen* extract 30$\mu\ell$/m$\ell$
Test 5 : Addition acetylcholine $10^{-6}$ M and *Armeniacae Amarum Semen* extract 100$\mu\ell$/m$\ell$

### 13. 百部根 檢液이 acetylcholine에 의한 氣管支平滑筋의 收縮에 미치는 影響

acetylcholine $10^{-6}$M 에 의한 氣管支平滑筋의 收縮은 0.792± 0.036g이었다.

百部根 검액이 acetylcholine $10^{-6}$M 에 의한 氣管支平滑筋의 수축에 미치는 영향은 농도를 증가시켜감에 따라 1$\mu\ell$/m$\ell$, 3$\mu\ell$/m$\ell$, 10$\mu\ell$/m$\ell$ 및 100$\mu\ell$/m$\ell$에서는 이완시키는 경향을 보였으나, 30$\mu\ell$/m$\ell$에서 수축을 증가시키는 경향을 보였으며, 특히 30$\mu\ell$/m$\ell$와 100$\mu\ell$/m$\ell$에서는 유의성이 인정되었다.(Table X III, Figure 26, Figure 27)

Table XIII. Effects of *Stemonae Radix* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.

| Group(n=6) | Actual Contraction(g) | % Contraction |
|---|---|---|
| Control | 0.792 ± 0.036 | 100.0 |
| Test 1 | 0.769 ± 0.053 | 97.0 ± 2.6 |
| Test 2 | 0.746 ± 0.044 | 94.2 ± 2.5 |
| Test 3 | 0.775 ± 0.056 | 97.9 ± 4.3 |
| Test 4 | 0.865 ± 0.060 * | 109.1 ± 3.6 |
| Test 5 | 0.705 ± 0.083 * | 88.8 ± 7.2 |

Values are mean ± standard deviation

Control : Addition acetylcholine $10^{-6}$ M

Test 1 : Addition acetylcholine $10^{-6}$ M and *Stemonae Radix* extract 1μℓ/mℓ

Test 2 : Addition acetylcholine $10^{-6}$ M and *Stemonae Radix* extract 3μℓ/mℓ

Test 3 : Addition acetylcholine $10^{-6}$ M and *Stemonae Radix* extract 10μℓ/mℓ

Test 4 : Addition acetylcholine $10^{-6}$ M and *Stemonae Radix* extract 30μℓ/mℓ

Test 5 : Addition acetylcholine $10^{-6}$ M and *Stemonae Radix* extract 100μℓ/mℓ

* : Statistically significant compared with control group.
(* : $P < 0.05$)

Figure 26. Representative recordings of the effects of *Stemonae Radix* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M. ACh, acetylcholine ; S.R., *Stemonae Radix* extract ; W/O, wash out, change of bath medium with a solution to which no drug is applied.

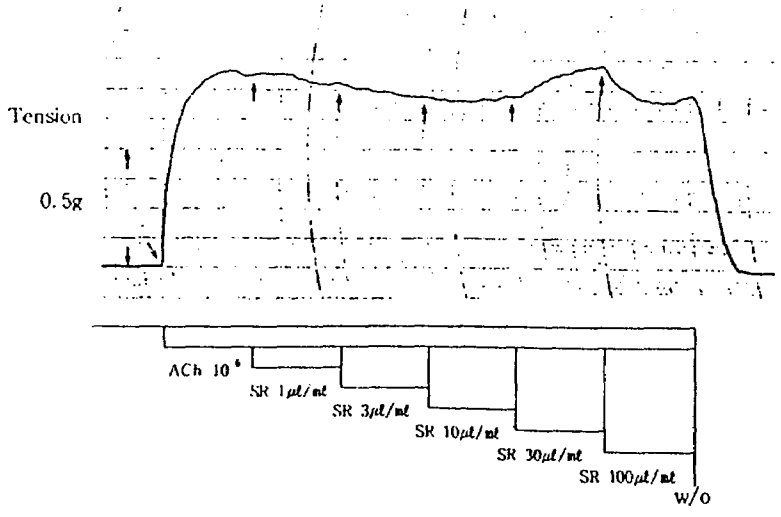
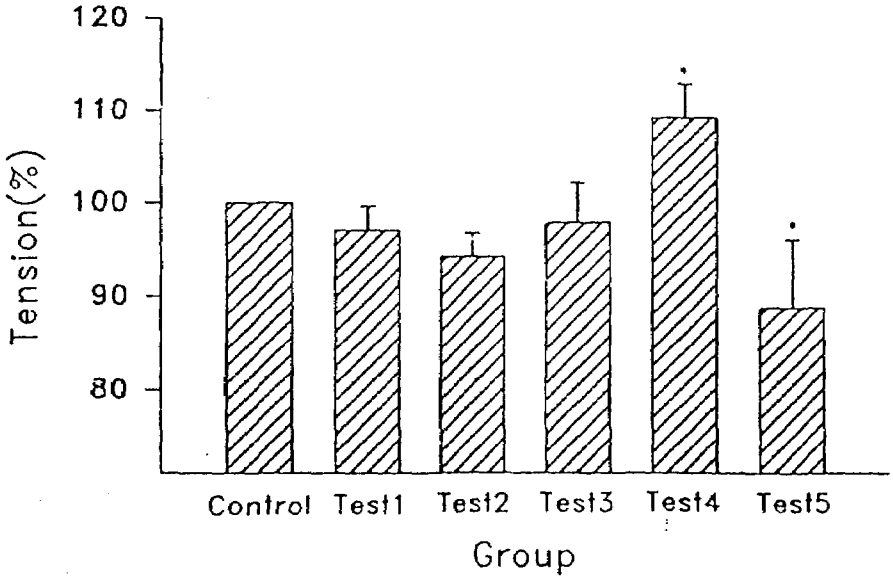


Figure 27. Comparison of the effects of *Stemonae Radix* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.




Values are mean ± standard deviation
Control : Addition acetylcholine $10^{-6}$ M
Test 1 : Addition acetylcholine $10^{-6}$ M and *Stemonae Radix* extract 1μℓ/mℓ
Test 2 : Addition acetylcholine $10^{-6}$ M and *Stemonae Radix* extract 3μℓ/mℓ
Test 3 : Addition acetylcholine $10^{-6}$ M and *Stemonae Radix* extract 10μℓ/mℓ
Test 4 : Addition acetylcholine $10^{-6}$ M and *Stemonae Radix* extract 30μℓ/mℓ
Test 5 : Addition acetylcholine $10^{-6}$ M and *Stemonae Radix* extract 100μℓ/mℓ

### 14. 紫菀 檢液이 acetylcholine에 의한 氣管支平滑筋의 收縮에 미치는 影響

acetylcholine $10^{-6}$M에 의한 氣管支平滑筋의 收縮은 0.569± 0.044g이었다.

紫菀 검액이 acetylcholine $10^{-6}$M에 의한 氣管支平滑筋의 수축에 미치는 영향은 농도를 증가시켜감에 따라 1μℓ/mℓ, 3μℓ/mℓ에서는 이완시키는 경향을 보였으나, 10μℓ/mℓ, 30μℓ/mℓ 및 100μℓ/mℓ에서 수축을 증가시키는 경향을 보였으며, 특히 30μℓ/mℓ와 100μℓ/mℓ에서는 유의성있는 수축의 증가를 나타내었다.(Table XⅣ, Figure 28, Figure 29)

Table XIV. Effects of *Asteris Radix* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.

| Group(n=6) | Actual Contraction(g) | % Contraction |
|---|---|---|
| Control | 0.569 ± 0.044 | 100.0 |
| Test 1 | 0.534 ± 0.043 | 93.8 ± 1.6 |
| Test 2 | 0.528 ± 0.046 | 92.7 ± 2.8 |
| Test 3 | 0.613 ± 0.038 | 107.8 ± 2.8 |
| Test 4 | 0.807 ± 0.047 *** | 142.0 ± 6.1 |
| Test 5 | 0.798 ± 0.094 ** | 141.1 ± 20.0 |

Values are mean ± standard deviation

Control : Addition acetylcholine $10^{-6}$ M

Test 1 : Addition acetylcholine $10^{-6}$ M and *Asteris Radix* extract 1μℓ/mℓ

Test 2 : Addition acetylcholine $10^{-6}$ M and *Asteris Radix* extract 3μℓ/mℓ

Test 3 : Addition acetylcholine $10^{-6}$ M and *Asteris Radix* extract 10μℓ/mℓ

Test 4 : Addition acetylcholine $10^{-6}$ M and *Asteris Radix* extract 30μℓ/mℓ

Test 5 : Addition acetylcholine $10^{-6}$ M and *Asteris Radix* extract 100μℓ/mℓ

* : Statistically significant compared with control group.
(** : P < 0.01, *** : P < 0.01 )

Figure 28. Representative recordings of the effects of *Asteris Radix* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M. ACh, acetylcholine ; A.R., *Asteris Radix* extract ; W/O, wash out, change of bath medium with a solution to which no drug is applied.

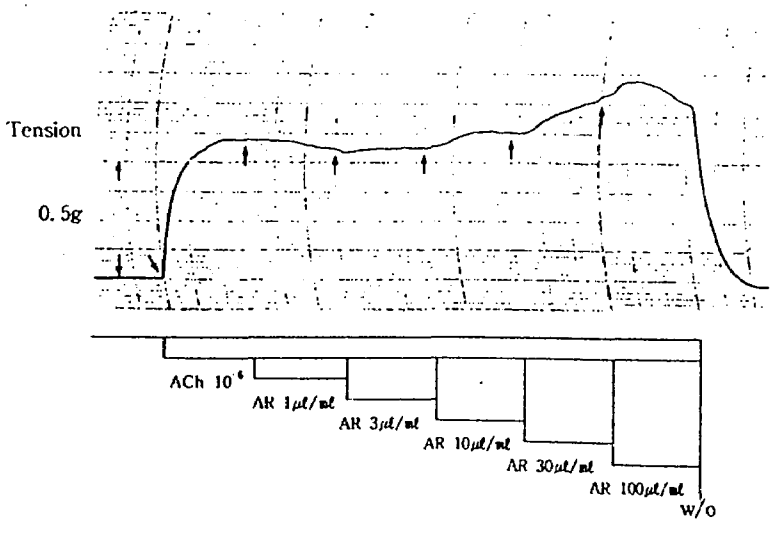
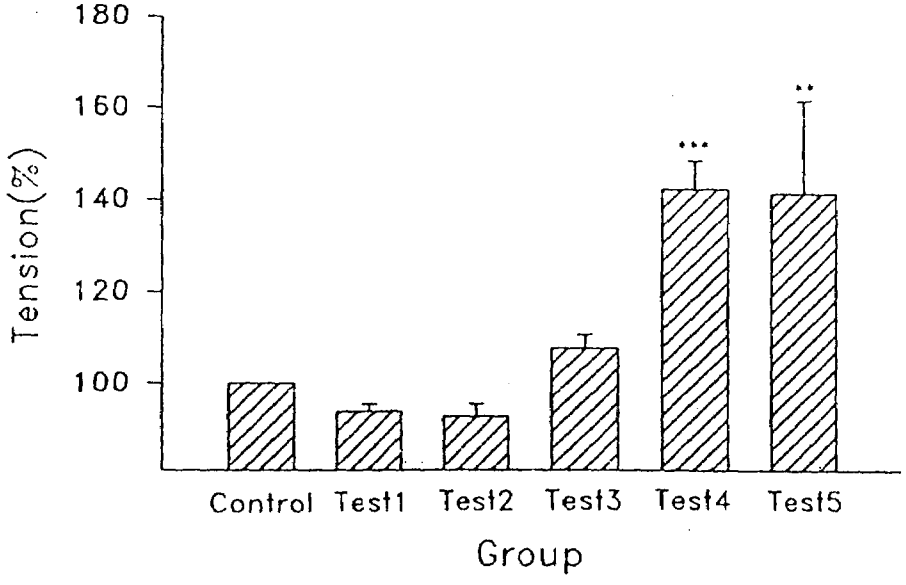


Figure 29. Comparison of the effects of *Asteris Radix* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.




Values are mean ± standard deviation
Control : Addition acetylcholine $10^{-6}$ M
Test 1 : Addition acetylcholine $10^{-6}$ M and *Asteris Radix* extract 1$\mu\ell$/m$\ell$
Test 2 : Addition acetylcholine $10^{-6}$ M and *Asteris Radix* extract 3$\mu\ell$/m$\ell$
Test 3 : Addition acetylcholine $10^{-6}$ M and *Asteris Radix* extract 10$\mu\ell$/m$\ell$
Test 4 : Addition acetylcholine $10^{-6}$ M and *Asteris Radix* extract 30$\mu\ell$/m$\ell$
Test 5 : Addition acetylcholine $10^{-6}$ M and *Asteris Radix* extract 100$\mu\ell$/m$\ell$

15. 款冬花 檢液이 acetylcholine에 의한 氣管支平滑筋의 收縮에 미치는 影響

acetylcholine $10^{-6}$M 에 의한 氣管支平滑筋의 收縮은 0.685± 0.140g이었다.

款冬花 검액이 acetylcholine $10^{-6}$M 에 의한 氣管支平滑筋의 수축에 미치는 영향은 농도를 증가시켜감에 따라 1$\mu\ell$/m$\ell$, 3$\mu\ell$/m$\ell$ 및 10$\mu\ell$/m$\ell$에서는 수축을 증가시키는 경향을 보였으나, 30$\mu\ell$/m$\ell$와 100$\mu\ell$/m$\ell$에서는 이완시키는 경향을 보였으며, 특히 100$\mu\ell$/m$\ell$에서는 유의성있는 이완을 나타내었다.(Table X V, Figure 30, Figure 31)

Table X V. Effects of *Farfarae Flos* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.

| Group(n=6) | Actual Contraction(g) | % Contraction |
|---|---|---|
| Control | 0.685 ± 0.140 | 100.0 |
| Test 1 | 0.723 ± 0.141 | 105.8 ± 1.8 |
| Test 2 | 0.755 ± 0.143 | 110.6 ± 2.4 |
| Test 3 | 0.751 ± 0.144 | 109.9 ± 2.7 |
| Test 4 | 0.636 ± 0.126 | 93.0 ± 1.7 |
| Test 5 | 0.467 ± 0.077 ** | 68.8 ± 4.9 |

Values are mean ± standard deviation

Control : Addition acetylcholine $10^{-6}$ M

Test 1 : Addition acetylcholine $10^{-6}$ M and *Farfarae Flos* extract 1μℓ/mℓ

Test 2 : Addition acetylcholine $10^{-6}$ M and *Farfarae Flos* extract 3μℓ/mℓ

Test 3 : Addition acetylcholine $10^{-6}$ M and *Farfarae Flos* extract 10μℓ/mℓ

Test 4 : Addition acetylcholine $10^{-6}$ M and *Farfarae Flos* extract 30μℓ/mℓ

Test 5 : Addition acetylcholine $10^{-6}$ M and *Farfarae Flos* extract 100μℓ/mℓ

* : Statistically significant compared with control group.
(** : P < 0.01)

Figure 30. Representative recordings of the effects of *Farfarae Flos* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M. ACh, acetylcholine ; F.F., *Farfarae Flos* extract ; W/O, wash out, change of bath medium with a solution to which no drug is applied.

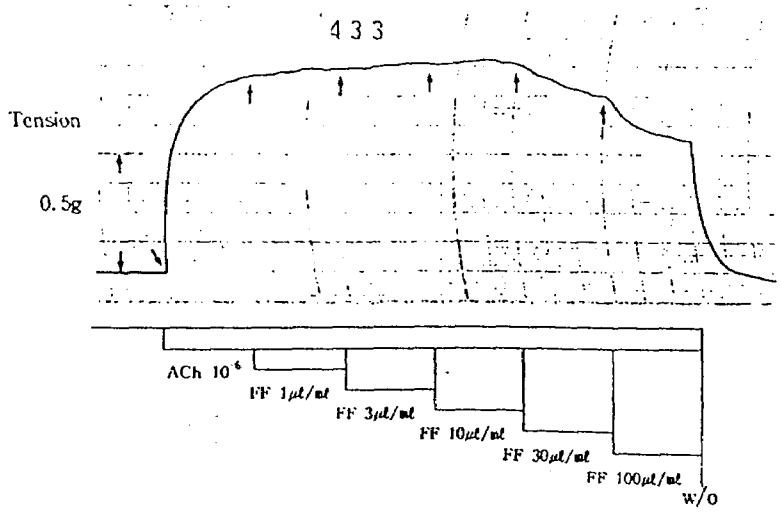
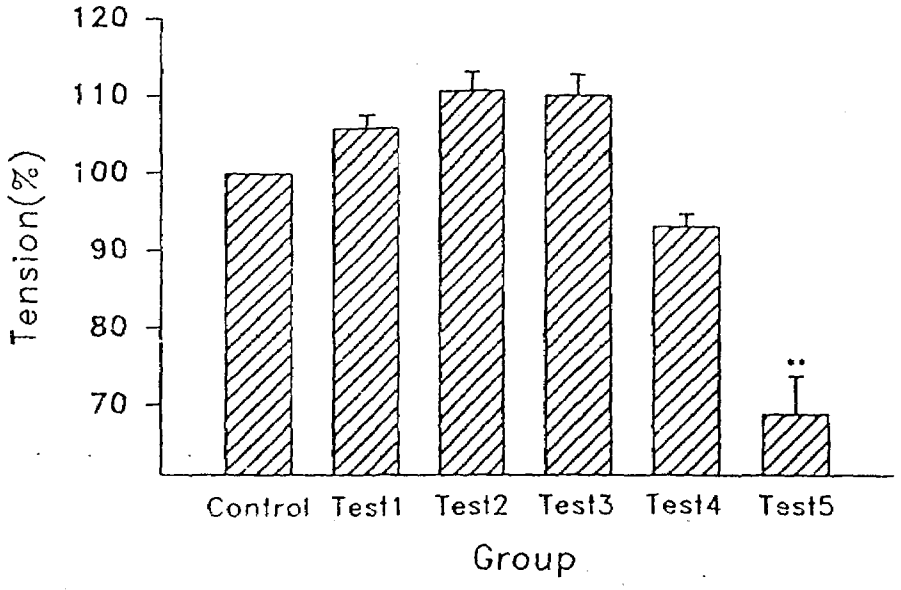


Figure 31. Comparison of the effects of *Farfarae Flos* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.




Values are mean ± standard deviation
Control : Addition acetylcholine $10^{-6}$ M
Test 1 : Addition acetylcholine $10^{-6}$ M and *Farfarae Flos* extract 1$\mu\ell$/m$\ell$
Test 2 : Addition acetylcholine $10^{-6}$ M and *Farfarae Flos* extract 3$\mu\ell$/m$\ell$
Test 3 : Addition acetylcholine $10^{-6}$ M and *Farfarae Flos* extract 10$\mu\ell$/m$\ell$
Test 4 : Addition acetylcholine $10^{-6}$ M and *Farfarae Flos* extract 30$\mu\ell$/m$\ell$
Test 5 : Addition acetylcholine $10^{-6}$ M and *Farfarae Flos* extract 100$\mu\ell$/m$\ell$

16. 蘇子 檢液이 acetylcholine에 의한 氣管支平滑筋의 收縮에 미치는 影響

acetylcholine $10^{-6}$M 에 의한 氣管支平滑筋의 收縮은 0.557± 0.066g이었다.

蘇子 검액이 acetylcholine $10^{-6}$M 에 의한 氣管支平滑筋의 수축에 미치는 영향은 농도를 증가시켜감에 따라 수축을 증가시키는 경향을 보였으며, 특히 10$\mu\ell$/m$\ell$, 30$\mu\ell$/m$\ell$ 및 100$\mu\ell$/m$\ell$에서는 유의성있는 수축의 증가를 나타내었다.(Table X VI, Figure 32, Figure 33)

Table XVI. Effects of *Perillae Fructus* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.

| Group(n=6) | Actual Contraction(g) | % Contraction |
|---|---|---|
| Control | 0.557 ± 0.066 | 100.0 |
| Test 1 | 0.577 ± 0.060 | 104.0 ± 2.5 |
| Test 2 | 0.598 ± 0.059 | 107.7 ± 3.7 |
| Test 3 | 0.665 ± 0.079 * | 119.7 ± 6.3 |
| Test 4 | 0.850 ± 0.110 *** | 152.9 ± 8.0 |
| Test 5 | 1.190 ± 0.078 *** | 215.1 ± 15.6 |

Values are mean ± standard deviation

Control : Addition acetylcholine $10^{-6}$ M

Test 1 : Addition acetylcholine $10^{-6}$ M and *Perillae Fructus* extract 1μℓ/mℓ

Test 2 : Addition acetylcholine $10^{-6}$ M and *Perillae Fructus* extract 3μℓ/mℓ

Test 3 : Addition acetylcholine $10^{-6}$ M and *Perillae Fructus* extract 10μℓ/mℓ

Test 4 : Addition acetylcholine $10^{-6}$ M and *Perillae Fructus* extract 30μℓ/mℓ

Test 5 : Addition acetylcholine $10^{-6}$ M and *Perillae Fructus* extract 100μℓ/mℓ

* : Statistically significant compared with control group.
(* : $P < 0.05$, *** : $P < 0.001$ )

Figure 32. Representative recordings of the effects of *Perillae Fructus* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M. ACh, acetylcholine ; P.F., *Perillae Fructus* extract ; W/O, wash out, change of bath medium with a solution to which no drug is applied.

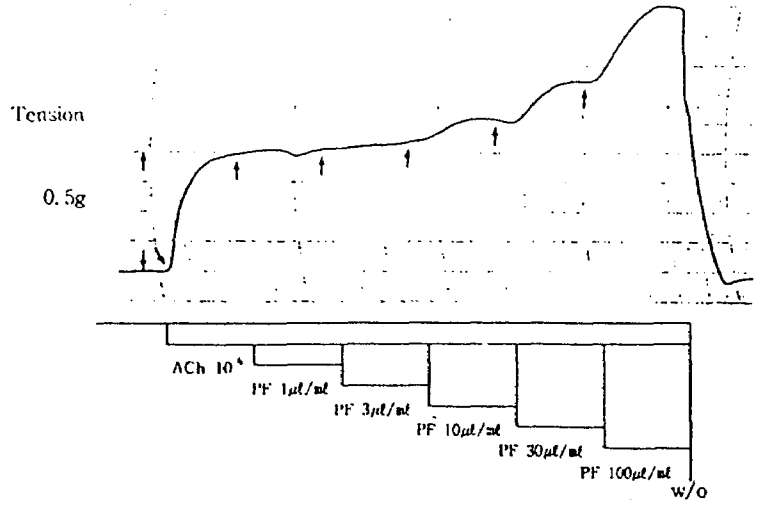
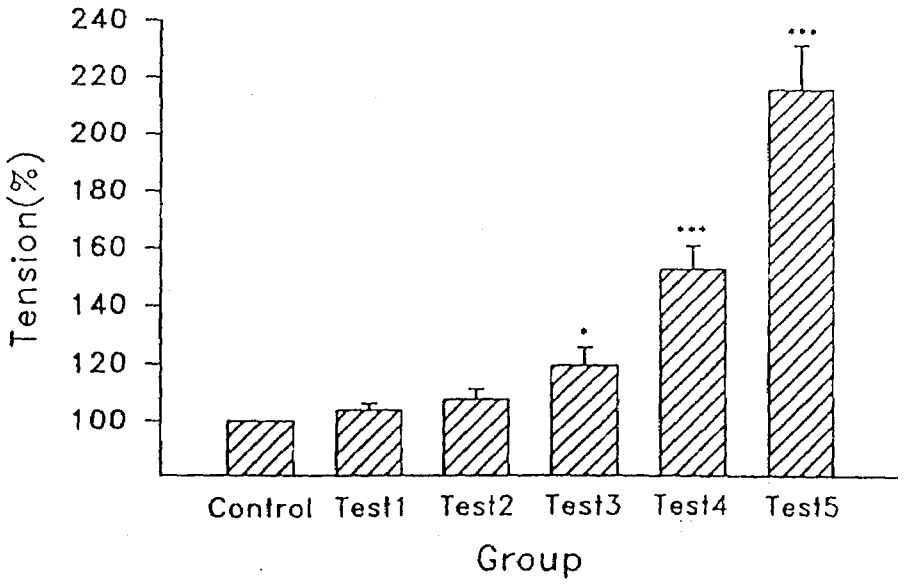


Figure 33. Comparison of the effects of *Perillae Fructus* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.




Values are mean ± standard deviation
Control : Addition acetylcholine $10^{-6}$ M
Test 1 : Addition acetylcholine $10^{-6}$ M and *Perillae Fructus* extract 1$\mu\ell$/m$\ell$
Test 2 : Addition acetylcholine $10^{-6}$ M and *Perillae Fructus* extract 3$\mu\ell$/m$\ell$
Test 3 : Addition acetylcholine $10^{-6}$ M and *Perillae Fructus* extract 10$\mu\ell$/m$\ell$
Test 4 : Addition acetylcholine $10^{-6}$ M and *Perillae Fructus* extract 30$\mu\ell$/m$\ell$
Test 5 : Addition acetylcholine $10^{-6}$ M and *Perillae Fructus* extract 100$\mu\ell$/m$\ell$

### 17. 桑白皮 檢液이 acetylcholine에 의한 氣管支平滑筋의 收縮에 미치는 影響

acetylcholine $10^{-6}$M 에 의한 氣管支平滑筋의 收縮은 0.711±0.103g이었다.

桑白皮 검액이 acetylcholine $10^{-6}$M 에 의한 氣管支平滑筋의 수축에 미치는 영향은 농도를 증가시켜감에 따라 수축을 증가시키는 경향을 보였으며, 특히 100$\mu\ell$/m$\ell$에서는 유의성있는 수축의 증가를 나타내었다.(Table X Ⅶ, Figure 34, Figure 35)

Table XVII. Effects of *Mori Cortex* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.

| Group(n=6) | Actual Contraction(g) | % Contraction |
|---|---|---|
| Control | 0.711 ± 0.103 | 100.0 |
| Test 1 | 0.725 ± 0.092 | 102.2 ± 3.1 |
| Test 2 | 0.740 ± 0.081 | 104.5 ± 5.1 |
| Test 3 | 0.759 ± 0.076 | 107.4 ± 7.6 |
| Test 4 | 0.788 ± 0.086 | 111.4 ± 7.6 |
| Test 5 | 0.871 ± 0.076 * | 123.5 ± 10.4 |

Values are mean ± standard deviation

Control : Addition acetylcholine $10^{-6}$ M

Test 1 : Addition acetylcholine $10^{-6}$ M and *Mori Cortex* extract 1μℓ/mℓ

Test 2 : Addition acetylcholine $10^{-6}$ M and *Mori Cortex* extract 3μℓ/mℓ

Test 3 : Addition acetylcholine $10^{-6}$ M and *Mori Cortex* extract 10μℓ/mℓ

Test 4 : Addition acetylcholine $10^{-6}$ M and *Mori Cortex* extract 30μℓ/mℓ

Test 5 : Addition acetylcholine $10^{-6}$ M and *Mori Cortex* extract 100μℓ/mℓ

* : Statistically significant compared with control group.
(* : $P < 0.05$)

Figure 34. Representative recordings of the effects of *Mori Cortex* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M. ACh, acetylcholine ; M.C., *Mori Cortex* extract ; W/O, wash out, change of bath medium with a solution to which no drug is applied.

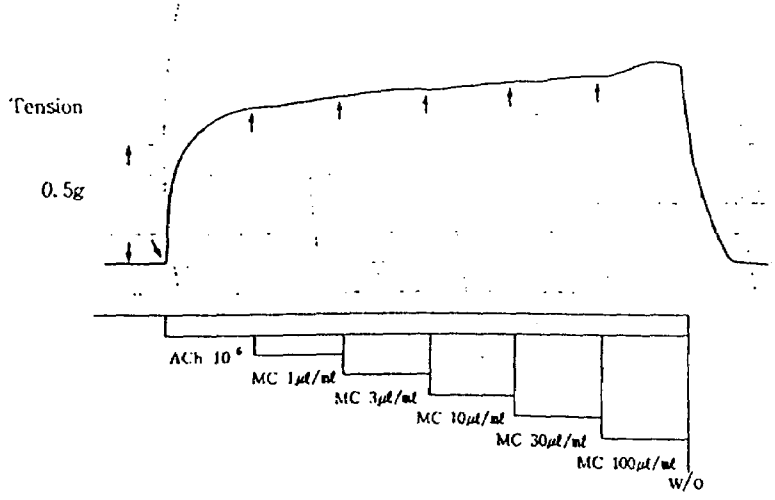
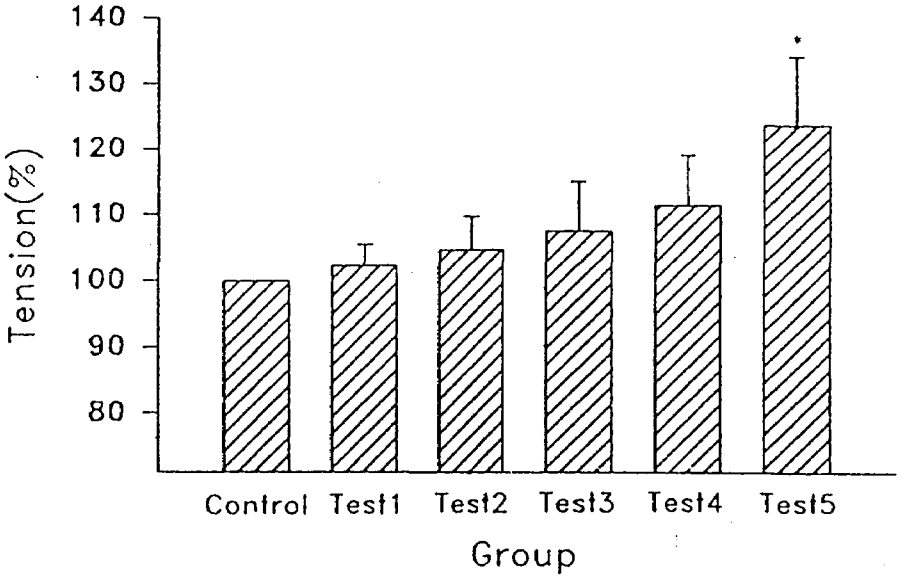


Figure 35. Comparison of the effects of *Mori Cortex* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.




Values are mean ± standard deviation
Control : Addition acetylcholine $10^{-6}$ M
Test 1 : Addition acetylcholine $10^{-6}$ M and *Mori Cortex* extract 1$\mu\ell$/m$\ell$
Test 2 : Addition acetylcholine $10^{-6}$ M and *Mori Cortex* extract 3$\mu\ell$/m$\ell$
Test 3 : Addition acetylcholine $10^{-6}$ M and *Mori Cortex* extract 10$\mu\ell$/m$\ell$
Test 4 : Addition acetylcholine $10^{-6}$ M and *Mori Cortex* extract 30$\mu\ell$/m$\ell$
Test 5 : Addition acetylcholine $10^{-6}$ M and *Mori Cortex* extract 100$\mu\ell$/m$\ell$

### 18. 桑葚子 檢液이 acetylcholine에 의한 氣管支平滑筋의 收縮에 미치는 影響

acetylcholine $10^{-6}$M 에 의한 氣管支平滑筋의 수축은 0.871±0.058g이었다.

桑葚子 검액이 acetylcholine $10^{-6}$M에 의한 氣管支平滑筋의 수축에 미치는 영향은 농도를 증가시켜감에 따라 수축을 증가시키는 경향을 보였으며, 특히 3$\mu\ell$/m$\ell$, 10$\mu\ell$/m$\ell$, 30$\mu\ell$/m$\ell$ 및 100$\mu\ell$/m$\ell$에서는 유의성있는 수축의 증가를 나타내었다.(Table XVIII, Figure 36, Figure 37)

Table Ⅶ. Effects of *Lepidii Semen* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.

| Group(n=6) | Actual Contraction(g) | % Contraction |
|---|---|---|
| Control | 0.871 ± 0.058 | 100.0 |
| Test 1 | 0.917 ± 0.044 | 105.4 ± 2.6 |
| Test 2 | 1.000 ± 0.057 ** | 115.0 ± 3.1 |
| Test 3 | 1.246 ± 0.084 *** | 143.1 ± 3.1 |
| Test 4 | 1.575 ± 0.127 *** | 180.8 ± 6.6 |
| Test 5 | 1.750 ± 0.149 *** | 201.0 ± 12.7 |

Values are mean ± standard deviation

Control : Addition acetylcholine $10^{-6}$ M

Test 1 : Addition acetylcholine $10^{-6}$ M and *Lepidii Semen* extract 1μℓ/mℓ

Test 2 : Addition acetylcholine $10^{-6}$ M and *Lepidii Semen* extract 3μℓ/mℓ

Test 3 : Addition acetylcholine $10^{-6}$ M and *Lepidii Semen* extract 10μℓ/mℓ

Test 4 : Addition acetylcholine $10^{-6}$ M and *Lepidii Semen* extract 30μℓ/mℓ

Test 5 : Addition acetylcholine $10^{-6}$ M and *Lepidii Semen* extract 100μℓ/mℓ

* : Statistically significant compared with control group.
(** : P < 0.01, *** : P < 0.001)

Figure 36. Representative recordings of the effects of *Lepidii Semen* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M. ACh, acetylcholine ; L.S., *Lepidii Semen* extract ; W/O, wash out, change of bath medium with a solution to which no drug is applied.

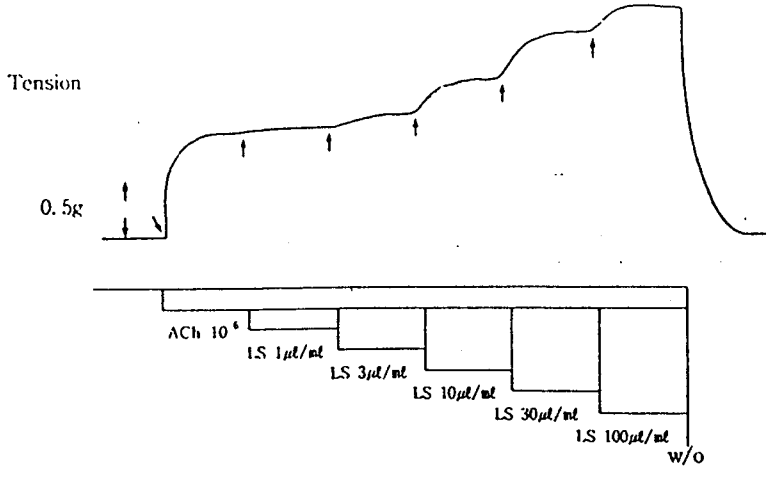
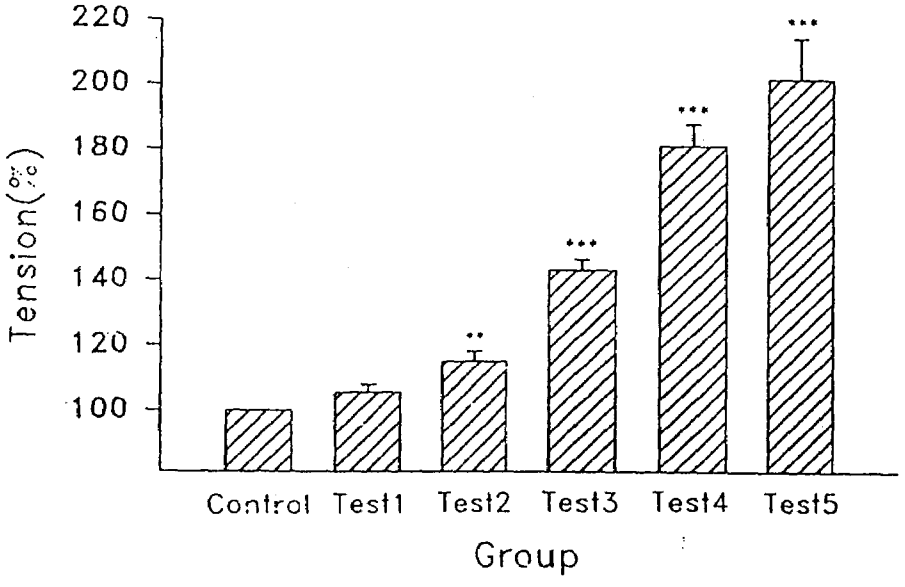


Figure 37. Comparison of the effects of *Lepidii Semen* extract on the precontracted rat tracheal strips with acetylcholine $10^{-6}$ M.




Values are mean ± standard deviation
Control : Addition acetylcholine $10^{-6}$ M
Test 1 : Addition acetylcholine $10^{-6}$ M and *Lepidii Semen* extract 1$\mu\ell$/m$\ell$
Test 2 : Addition acetylcholine $10^{-6}$ M and *Lepidii Semen* extract 3$\mu\ell$/m$\ell$
Test 3 : Addition acetylcholine $10^{-6}$ M and *Lepidii Semen* extract 10$\mu\ell$/m$\ell$
Test 4 : Addition acetylcholine $10^{-6}$ M and *Lepidii Semen* extract 30$\mu\ell$/m$\ell$
Test 5 : Addition acetylcholine $10^{-6}$ M and *Lepidii Semen* extract 100$\mu\ell$/m$\ell$

## Ⅳ. 考 察

肺는 呼吸系統의 生理機能을 대표하는 臟器로 主氣, 司呼吸하여[6,22] 체내외의 氣體交換을 주관한다.

즉 肺의 호흡은 宣發과 肅降작용에 의하여 淸氣를 吸入하고 濁氣를 呼出하며, 만약 宣發과 肅降작용의 이상으로 氣機가 鬱하거나 逆上하면 호흡기능에 영향을 미쳐 胸悶, 咳嗽, 喘促, 呼吸不利等이 나타난다.[2,17,20,22]

또한 肺氣의 宣發과 肅降작용은 水液代謝에 영향을 미치는데, 宣發작용에 의하여 水液을 全身에 散布하고 代謝후의 水液을 汗孔을 통하여 배출하며 肅降작용에 의하여 膀胱에 下輸되어 배설되기도 한다. 그러므로 水液代謝가 失調되면 水濕이 內聚하여 痰飮을 형성하기도 한다.[2]

특히 咳嗽와 哮喘은 肺의 대표적인 病變으

로, 咳嗽의 咳는 有聲無痰한 것을, 嗽는 無聲有痰한 것을 말하며, 有聲有痰한 것을 咳嗽라 한다.[13,16,18]

哮喘의 哮는 呼吸時에 喉中에 痰聲이 있는 것을 말하고 喘은 呼吸이 急促한 것을 말한다.[13,16,18,21]

咳嗽와 哮喘의 원인은 크게 外感과 內傷으로 分類하는데, 외부의 邪氣가 皮毛나 肺衛에 侵襲하거나 內傷으로 肺氣가 壅塞不宣하고 淸肅을 못하면 氣가 逆上하여 咳嗽를 發하고, 水液代謝의 이상을 초래하여 水濕이 정체되면 痰을 형성한다.[3,4,5,11,19]

서양의학에서 咳嗽와 哮喘은 氣管支平滑筋의 過敏性 反應, 氣道粘膜의 炎症 및 粘液分泌의 亢進등의 氣管과 氣管支의 病變으로 인식하고 있다.[24,25,26,27,30,31]

그러므로 咳嗽와 哮喘은 모두 痰이나 기침과 密接한 聯關을 갖고 있음을 알 수 있고, 여러 원인에 의한 氣道粘膜의 炎症이나 刺戟性 물질 및 氣管支平滑筋의 수축과 확장에 수반되는 기침과 痰, 호흡곤란이 주된 증상이다.

이에 대한 治療는 일반적으로 祛痰 혹은 消痰시키는 효능이 있는 化痰藥과 咳嗽, 喘息을 緩和 或은 制止하는 효능이 있는 止咳平喘藥을 使用한다.[1]

이상으로부터 咳嗽와 哮喘은 서양의학적으로 기관 및 기관지의 병변과 관련하여 인식하고 있으므로, 東醫學에서 咳嗽와 哮喘의 치료에 응용되는 化痰·止咳平喘藥이 氣道에 일정한 영향을 미칠 것으로 생각되어, 數種의 化痰·止咳平喘藥이 acetylcholine에 의한 흰쥐의 기관지평활근 수축에 미치는 영향을 관찰하였다.

실험결과 化痰藥인 半夏, 白芥子, 白附子, 前胡, 枇杷葉, 桔梗, 竹茹 및 冬瓜子는 유의성있게 氣管支平滑筋의 수축을 증가시켰고, 瓜蔞仁, 天竺黃은 수축을 증가시키는 경향이 있었으나 유의성은 인정되지 않았다.

天南星은 저농도(1μℓ/mℓ, 3μℓ/mℓ, 10μℓ/mℓ)에서 이완시키는 경향을 보였으나 유의성은 인정되지 않았고, 고농도(30μℓ/mℓ, 100μℓ/mℓ)에서는 유의성있게 수축을 증가시켰다.

化痰藥인 半夏·天南星·白芥子·白附子·前胡·瓜蔞仁·枇杷葉·桔梗·竹茹·天竺黃·冬瓜子가 대부분 氣管支平滑筋의 수축을 증가시킨 것은, 化痰藥의 止咳시키는 약리작용을 痰이 많은 咳嗽나 痰飮으로 인한 氣喘, 咯痰으로 인하여 기도가 시원스럽지 못한 병증에 응용하는 바[1], 수축된 氣管支平滑筋의 이완에 의하여 止咳·祛痰의 효능을 나타내기보다는 肺의 宣發·肅降작용을 통한 인체의 水液代謝를 조절함으로써 치료효과를 나타낼 것으로 보이고, 특히 기침이나 열 및 많은 양의 咯痰을 특징으로 하는 기관지확장증에 응용할 수 있을 것으로 생각된다.

天南星·前胡가 저농도에서 유의성은 인정되지 않았으나 氣管支平滑筋의 수축을 이완시키는 경향을 보였고, 기도의 점액분비를 증가시켜 祛痰작용이 있다[15,23]고 한 것으로 보아, 咯痰의 배출을 용이하게 하는 것이 氣管支平滑筋의 발작적 수축을 억제함으로써 호흡장애를 개선시킬 수 있을 것으로 추측된다.

止咳平喘藥인 杏仁, 蘇子, 桑白皮, 葶藶子는 유의성있게 기관지 평활근의 수축을 증가시켰고, 紫菀은 저농도(1μℓ/mℓ, 3μℓ/mℓ)에서 이완시키는 경향을 보였으나 유의성은 인정되지 않았고, 고농도(30μℓ/mℓ, 100μ//mℓ)에서는 유의성있는 수축의 증가를 나타내었다.

杏仁·蘇子·桑白皮·葶藶子·紫菀이 氣管支平滑筋의 수축을 증가시킨 것은, 일반적으로 咳嗽가 痰을 끼고 있고 痰이 많게 되면 또한 咳嗽에 이르게 되므로[1], 祛痰과 平喘하는 藥性이 氣管支平滑筋의 이완보다 인체의 水液代謝를 조절하여 祛痰시키는 藥理작용을

통하여 止咳·平喘의 효능을 나타낼 것으로 보인다.

百部根은 농도의 차이에 따라 상반된 결과를 보였는데, 30μℓ/mℓ에서는 유의성있는 수축의 증가를 나타내었고, 100μℓ/mℓ에서는 유의성있는 이완을 나타내었다.

款冬花는 저농도(1μℓ/mℓ, 3μℓ/mℓ, 10μℓ/mℓ)에서 수축을 증가시키는 경향을 보였으나 유의성은 인정되지 않았고, 고농도(100μℓ/mℓ)에서는 유의성있는 이완효과를 나타내었다.

百部根·紫菀·款冬花가 氣管支平滑筋의 수축을 이완시킨 것은 氣味가 甘溫하여 散寒·能緩·能和하고 潤肺下氣하며 止咳시키는 藥理작용[1,12,14,17,18]이 肺의 肅降작용을 조절함으로써 氣機의 逆上을 방지하여 收縮을 억제시킨 것으로 생각된다.

또한 氣管支平滑筋의 수축으로 인한 呼吸困難時에 많은 粘液性 喀痰을 배출시킨 후 호전된다[24]는 것으로 볼 때, 장액성 물질의 분비에 의하여 喀痰의 배출을 용이하게 함으로써 호흡장애를 개선시키는 효과를 나타내고, 이에 동반되어 氣管支平滑筋의 발작적 수축도 억제될 것으로 생각된다.

天南星·百部根·紫菀·款冬花는 약물의 농도에 따라 수축과 이완의 상반된 경향을 나타내어 농도에 의존한 拮抗작용을 할 것으로 추측되며, 따라서 약물 투여시에 적정량의 선택이 중요할 것으로 사료된다.

天南星, 前胡, 桔梗, 紫菀, 款冬花가 氣道의 粘液分泌를 증가시켜 祛痰作用이 있다[15,23]고 한 것은, 氣道의 상피세포에 있는 배상세포(goblet cell)가 점액성(mucus) 물질을 분비하여 口腔을 통하여 들어 온 異物質을 잡아 덩어리로 만들고 섬모(cilia)의 운동에 의해서 밖으로 배출시키고, 점막하선(submucosal gland)은 장액성(serous) 물질을 분비하여 섬모의 운동이 원활할 수 있도록 하므로[27,29], 장액성 물질을 분비하여 喀痰의 배출을 容易하게 한 것으로 추측된다.

이상에서 化痰·止咳平喘藥이 氣管과 氣管支의 병변에 미치는 영향을 규명하기 위한 실험의 결과, 咳嗽와 哮喘에 應用되는 多數의 處方들이 氣管支平滑筋의 收縮을 抑制하는 것으로 보아[7,8,9,10], 氣管支平滑筋의 수축을 이완시키는 百部根·紫菀·款冬花외의 化痰·止咳平喘藥의 효능은 다른 藥物과 相互作用을 通하여 氣管支平滑筋을 이완시키기 보다는 生體내에서 이루어지는 藥物의 代謝産物에 의한 영향으로 생각되며, 이는 肺의 肅降작용을 조절하여 氣機의 逆上을 방지하고, 水液代謝를 원활하게 하여 痰의 生成과 咳嗽, 哮喘을 일으키는 機轉에 全般的으로 作用하여 效能을 나타낼 것으로 思料된다.

## V. 結 論

氣管支平滑筋의 수축에 미치는 數種의 化痰·止咳平喘藥의 效能을 알아 보기 위한 실험에서 다음과 같은 結論을 얻었다.

1. 化痰藥中 半夏, 天南星, 白芥子, 白附子, 前胡, 枇杷葉, 桔梗, 竹茹, 冬瓜子와 止咳平喘藥中 杏仁, 紫菀, 蘇子, 桑白皮, 葶藶子는 氣管支平滑筋의 수축에 대 하여 有意性있게 수축을 증가시켰다.

2. 化痰藥中 天南星과 止咳平喘藥中 紫菀, 款冬花는 濃度에 依存하여 氣管支平滑筋의 收縮을 抑制하는 傾向을 보였으며, 款冬花는 有意性있게 수축을 이완시켰다.

3. 百部根은 氣管支平滑筋의 수축에 대하여 30μℓ/mℓ에서는 有意性있는 수축을 증가시켰고, 100μℓ/mℓ에서는 有意性있게 수축을 이완시켰다.

4. 天南星, 百部根, 紫菀, 款冬花는 氣管支

平滑筋의 수축에 대하여 濃度에 依存한 拮抗作用이 있는 것으로 思料된다.

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