The Effect of Pharmacopuncture with Polygonum cuspidatum Sieb et Zucc. Solution on Collagen-induced Arthritis in Wistar Rats

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Abstract

목적: 호장근( Polygonum cuspidatum Sieb et Zucc.)은 관절통, 만성 기관지염, 황달, 월경분순, 고혈압 등의 치료제로 사용되고 있는 약물로서, 본 연구에서는 끔찍의 류마티스 관절염 병태모델에서 호장근 약침이 류마티스 관절염에 미치는 영향에 대해 관찰하였다. 

방법: 본 연구에서는 bovine type II collagen으로 유발된 원주의 류마티스 관절염 병태모델에서 인체의 족삼리(ST36)에 상응하는 부위에 호장근 약침액을 주입한 후, 체중변화, 족부종의 변화, 족근관절폭의 변화, cytokine의 변화, NOS 발현 양상을 관찰하였다.

결과: 족부종 감소율은 고농도 호장근 약침군에서 높았고, 족근관절폭 감소율은 고농도 및 저농도 호장근 약침군에서 대조군에 비하여 유의하게 높게 관찰되었다. 족부 삼출물 내의 TNF-α 함량은 고농도 호장근 약침군에서 높았고, IL-1β 함량은 고농도 및 저농도 호장근 약침군에서 대조군에 비하여 유의하게 높게 관찰되었다. 대뇌 피질에서 NOS 양성 신경세포수는 고농도 및 저농도 호장근 약침군에서 대조군에 비하여 유의하게 낮게 관찰되었다.

결론: 이상의 결과에서 호장근 약침은 type II collagen으로 유발된 원주의 류마티스 관절염 병태모델에서 염증 반응을 억제하는 효과가 있는 것으로 사료된다.

Key words: Nitric oxide synthase, Pharmacopuncture, Polygonum cuspidatum Sieb et Zucc.(PC), Rheumatoid arthritis

1. Introduction

Rheumatoid arthritis (RA) is a type of chronic inflammatory disease which starts as a non-pyogenic proliferative synovitis and ultimately proceeds to
ankylosing arthritis accompanied by demolition of the articular cartilage and bone. Although its prevalence is high and, the exact reason has not been clarified, but it is presumed to be an autoimmune disease influenced by environmental causes and genetic predisposition. Also it is thought to be caused by continuous damage of joint tissues by diverse infection-causing disease which is isolated by lymphocyte, macrophagocyte, synobiocyte, etc. Currently, non-steroidal anti-inflammatory drugs (NSAIDs), adrenocortical hormones, disease-modifying anti-rheumatic drugs, anti-TNF-α drugs, immunosuppressive agents, and cell cytotoxicity inhibitors are used as remedies for rheumatoid arthritis. However, as long-term injection of these drugs may cause serious side effects, a more effective and safer remedy is needed.

Pharmacopuncture is a type of acupuncture that herbal ingredients through a thin tube for the purpose of combining the effects of the herb and acupuncture. The agents used in pharmacopuncture are not refined for a desired effect and not produced by sterile, standardized processes under strict medical surveillance. Currently many agents know to have a beneficial effect on rheumatoid arthritis are being tested with pharmacopuncture to determine their ability to relieve the symptoms associated with rheumatoid arthritis.

*Polygonum cuspidatum* Sieb et Zucc. (PC) is a medicinal herb used as a remedy for arthralgia, chronic bronchitis, jaundice, menstrual irregularity, and hypertension, among other diseases. Results from current research using PC extract shows that it has antioxidant and anti-inflammatory effects. Also, compounds derived from PC including resveratrol, quercetin, and emodin are known to have powerful anti-inflammatory effects.

The aim of this study, therefore, was to evaluate the influence of PC pharmacopuncture treatment on *in vivo* and *ex vivo* biomarkers such as inflammatory response and autoimmune response in a bovine type II collagen-induced rheumatoid arthritis (RA) model.

## II. Materials and Methods

### 1. Animals

Wistar rats (male, 5-6 weeks old) were obtained from the Hanlym Laboratory Animal Company (Seoul, Korea). The animals were housed in a temperature-controlled environment (25 ± 3 °C, 55 ± 5 % humidity). All animals were exposed to a 12 hour light-dark cycle and had ad libitum access to food and water. Procedures involving animals and their care conformed to institutional guidelines, which were in full compliance with current laws and policies (*Guide for the Care and Use of Laboratory Animals*, National Academy Press, 1996).

### 2. Induction of collagen-induced arthritis

RA was induced by modifying a method described by Trentham. Bovine type II collagen (Chondrex Inc., Redmond, WA, USA, 6mg/ml) was solubilized in 0.05 M acetic acid with stirring at 4°C for more than 12 hours. N-acetylmuramyl L-alanyl D-isoglutamine (MDP) (Sigma-Aldrich, St Louis, MO, USA, 2mg/ml) was put in distilled water and dissolved by stirring. The collagen solution and MDP solution were mixed at a 1:1 ratio and kept in -80°C. In day 1 of the experiment, this solution was made suspension by mixing it...