

An Ameliorative Effects of Swimming combined with Korean *Berchemia* roots on Adjuvant-induced Arthritis in Rats

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Abstract. We undertook this study to clarify effects of swimming combined with the extract of *Korean Berchemia*, *Berchemia berchemiaefolia* roots (*B*-extract) in adjuvant-induced arthritis rats. Rats were divided four groups: control (group I), arthritis (group II), arthritis with *B*-extract (group III) and swimming combined with arthritis+*B*-extract groups (group IV). The serum IL-6 and TNF- α concentrations in group III and IV were significantly lower than those of group II. The IL-6 and TNF- α concentrations in group IV were significantly lower than those of group III, but higher than those of group I. The inflammatory and injury levels on the knee joints were histologically lower in group III and IV than in group II. The degree of joint injury in group IV was histologically less than that of group III. We first demonstrated that the extract of *Korean Berchemia*, *Berchemia berchemiaefolia* roots may offer therapeutic effect and that swimming combined with the extract may promise more useful effects on the arthritis.

Key words: Rheumatoid arthritis, *Korean Berchemia berchemiaefolia* roots, TNF- α , IL-6, Histological examination.

1 Introduction

Rheumatoid arthritis (RA) is an autoimmune and chronic erosive inflammatory disease characterized by a severe progressive synovitis in peripheral joints followed by destruction of joints and ankylosis, leading chronic edema and inflammation of the synovial tissue that lines joints. More effective therapeutic strategies for RA including synthetic modifying antirheumatic drugs and/or biologic agents have been developed, but they carry potential risks (Agarwal, 2011). Additionally, nonsteroidal medications and corticosteroids are required as adjunctive therapy (Whelton and Hamilton, 1991). We designed this study to investigate the effects of swimming combined with the extract of *Korean Berchemia*, *Berchemia berchemiaefolia* roots, which is a Korean traditional herb, on adjuvant-induced arthritis in male rats.

2 Materials and Methods

Sprague-Dawley strain male albino rats (aged-6 weeks, weighing 180-200 g) had free access to standard laboratory L feed and water *ad libitum*. The study was approved by the Animal Ethics Committee of Catholic university of Pusan. The rats were divided into 4 groups; each group containing 5 animals. Group I was control, group II was adjuvant-induced arthritis (arthritis), group III was arthritis with administration of the extract of *Korean Berchemia*, *Berchemia berchemiaefolia* roots (B-extract), and group IV was swimming combined with B-extract in arthritis. Arthritis was induced in rats by injection of 0.5 ml of Complete Freund's Adjuvant (CFA) containing 10 mg/ml *Mycobacterium tuberculosis* (Sigma, St, Louis, Mo, USA) into the foot pad of the right and left hind paws and articular capsule, respectively. At four days after this procedures, the same injection was also applied into the rats. At five days after a third injection, the rats having grade 4 of arthritis index were selected and were used for this study (Trentham et al., 1977). The 70% ethanol extracts were mixed with saline solution and about 0.4 mL of the solution (500 mg/kg) were administered to the rats by oral route for eight weeks in group III and IV. Swimming was carried out in sized 100cm×65cm×40cm of pool for 10 min. After the eight weeks of experiments, all of rats were anesthetized by ether and 7 mL of blood was collected directly from the abdominal cava. The blood was used for measuring tumor necrosis factor- α (TNF- α) and interleukin-6 (IL-6) concentrations.

3 Results

Serum TNF- α concentrations in group III (52.10±9.58 pg/mL) and IV (26.95±3.76 pg/mL) were significantly lower than those of group II (68.17±6.40 pg/mL) (Fig. 1). TNF- α concentrations in group II and III were significantly higher than those of group I (20.72±2.47 pg/mL). In group IV TNF- α concentrations (26.95±3.76 pg/mL) were significantly lower than those of group III (52.10±9.58 pg/mL) but similar to group I (20.72±2.47 pg/mL). Serum IL-6 concentrations were significantly lower in group III (168.94±34.85 pg/mL) and IV 101.36±4.11 pg/mL than in group II (253.74±68.07 pg/mL) (Fig. 2). IL-6 concentrations in group IV were significantly lower than those of group III but similar to group I (90.14±9.55).

4 Discussion

Berchemia berchemiaefolia have traditionally used as an antitoxic or antiinflammatory herb in some countries of Asia. Even though protective effect of *Berchemia* on experimental hepatic injuries and antimicrobial activities reported in past (Gundidza and Sibanda , 1991;Sato et al., 1995), there have been few studies for the useful effects of *Korean Berchemia* roots.

We first demonstrated that the extract of *Korean Berchemia*, *Berchemia berchemiaefolia* roots may offer therapeutic effect and that swimming combined with the extract may promise more useful effects on the arthritis.

References

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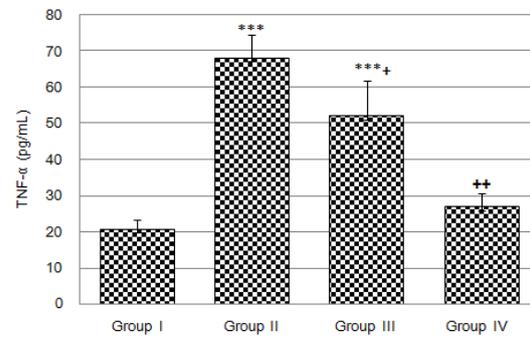


Fig. 1. Serum concentrations of TNF- α in four groups.

TNF- α concentrations in group IV (swimming combined with B-extract) were lower than those of group II (adjuvant-induced arthritis) and group III (B-extract). ***, $p < 0.0001$ (compared with group I); +, $p < 0.01$; **, $p < 0.0001$ (compared with group II and III).

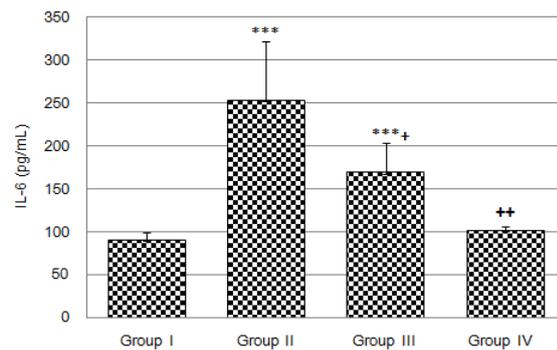


Fig. 2. Serum concentrations of interleukin-6 (IL-6) in four groups.

IL-6 concentrations in group IV (swimming combined with B-extract) were lower than those of group II (adjuvant-induced arthritis) and group III (B-extract). ***, $p < 0.0001$ (compared with group I); +, $p < 0.01$; **, $p < 0.0001$ (compared with group II and III).