The antitumor and immunomodulatory effects of *Artemisia capillaris* extracts against Hepa-1c1c7 and Sarcoma 180 cancer cells

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Abstract: The *Artemisia capillaris* THUNB is a perennial herb that belongs to the family *Compositae spp* and probably the most common plant among the various herbal folk remedies being used in the treatment of abdominal pain, hepatitis, chronic liver disease, jaundice and coughing in Korea.

Recently the biological and pharmacological actions of herb have been studied well such as antibacterial, antidiabetic and antitumor activities.

This experiment was conducted to investigate the antitumor and immunomodulatory effects of *Artemisia capillaris* extracts against Hepa-1c1c7 and Sarcoma 180 cancer cells *in vitro* and *in vivo* experimental test.

First, *in vitro* test using MTT assay and SRB assay, extracts showed prominent cytotoxic effects against two kinds of cancer cell lines, respectively. The antitumor effect showed in the concentration of 250 μg /mL above of both ethanol and ethyl acetate extract, 500 μg/mL above of methanol extract, 5000 μg/mL above of water extract and above 50% cytotoxicity against Hepa-1c1c7 and Sarcoma 180.

Second, *in vivo* experimental test using 280 ICR mice, the gain of body weight in control mice bearing Sarcoma 180 ascites tumor was 1.5 times more than that of normal group mice at day 33. However, the gain of body weights in all experimental groups administerd with *Artemisia capillaris* extracts were significantly lower than that of the control mice ($P<0.05$).

The mean survival times of mice administerd with *Artemisia capillaris* extracts of 25 and 100 mg/kg for 28 days were shown to 125% and 115% longer survival time compared to that of control mice injected with saline ($P<0.05$).

Artemisia capillaris extracts showed the highest tumor inhibition effects of 42.4% and 27.2% when intraperitoneally injected at the dose of 25 and 100 mg/kg/day once daily for 28 days in ICR mice inoculated with Sarcoma 180 solid tumor cells ($P<0.05$).

On the both 28th day and 42nd day, all animals in vehicle controls, HP (Hepa-1c1c7 tumor cell inoculated vehicle control) and SP (Sarcoma 180 tumor cell inoculated vehicle control), showed tumor cells in the spleen and liver. However, the incidence and the percentages of regions occupied by tumor cells on the histopathology-histomorphometry were dramatically and dose-dependently decreased by mACH (*Artemisia capillaris* methanol extracts) treatment.

In immunohistochemistry and flow cytometry, CD3+, CD4+, CD8+ and TNF-α+ splenocytes were significantly ($p<0.05$) decreased in Hepa-1c1c7 and Sarcoma 180 inoculated vehicle controls, HP

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(Hepa-1c1c7 tumor cell inoculated vehicle control) and SP (Sarcoma 180 tumor cell inoculated vehicle control) compared to those of intact vehicle control on the both 28th day and 42nd day, respectively. These decreases of CD3+, CD4+, CD8+ and TNF-α+ cells induced by tumor inoculations were significantly ($p<0.01$, $p<0.05$) inhibited by mACH treatment regardless of the type of experiments and tumor cells inoculated.

Splenic cytokines: TNF-α, IL-1β and IL-10 contents were significantly ($p<0.05$) decreased in Hepa-1c1c7 and Sarcoma 180 inoculated vehicle controls, HP (Hepa-1c1c7 tumor cell inoculated vehicle control) and SP (Sarcoma 180 tumor cell inoculated vehicle control) compared to those of intact vehicle control on the both 28th day and 42nd day, respectively. However, these decreases of TNF-α, IL-1β and IL-10 levels induced by tumor inoculations were significantly ($p<0.01$, $p<0.05$) inhibited by mACH (*Artemisia capillaris* methanol extracts) treatment regardless of the type of experiments and tumor cells inoculated.

As results of this study, it is thought that the *Artemisia capillaris* methanol extracts have prominent antitumor and immunomodulatory effect against two kinds of cancer cell lines such as Hepa-1c1c7 and Sarcoma 180, respectively.

Key words: *Artemisia capillaris,* antitumor effect, immunomodulatory effect, splenic T-cells, cytokines