Dietary intake of the flower extracts of German Chamomile (*Matricaria recutita* L.) inhibited compound 48/80-induced itch-scratch responses in mice

Y. Kobayashi, Y. Nakano, K. Inayama, A. Sakai, and T. Kamiya

Kyowa Hakko Kogyo Co., Ltd. Tsukuba Research Laboratories, Ibaraki, Japan

**Summary**

The antipruritic effects of the diets containing German chamomile on the compound 48/80-induced scratching in ddY mice were examined. Since it is reported that an injection of compound 48/80, but not histamine, induced scratching behaviour due to itch but not to pain in ddY mice (Kuraishi et al., 1995), compound 48/80-induced scratching in ddY mice seems to be a suitable parameter for evaluating antipruritic agents independent of histamine receptor antagonism.

In the mice fed the diet containing 1.2 w/w % of the ethyl acetate extract of dried flower of German chamomile (*Matricaria recutita* L.) for 11 days, the compound 48/80-induced scratching behaviour was significantly suppressed. The ethyl acetate extract of German chamomile dose dependently suppressed compound 48/80-induced scratching without affecting body weight increase. The ethyl acetate fraction of the ethanol extract and the ethanol extract of hot water extraction residue of German chamomile flower also showed strong inhibition on the compound 48/80-induced scratching. The inhibitory effects of the dietary intake of the German chamomile extracts on compound 48/80-induced itch-scratch response were comparable to oxatomide (10 mg/kg, p.o.), an anti-allergic agent.

**Key words:** antipruritic, itch, scratch, compound 48/80, *Matricaria recutita*, Compositae

---

**Introduction**

Pruritus, or itching, is a sensation that provokes a strong desire to scratch. Because this unpleasant sensation stimulates scratching of the lesioned skin and consequently initiates a vicious “itch-scratch” circle, pruritus is the most significant problem of cutaneous diseases like atopic dermatitis (Furue, 1998; Wahlgren, 1992). Histamine is well known to be present in skin mast cells and considered to be an important mediator of itchiness. However, histamine seemed not to be a major pruritogen in atopic dermatitis (Heyer et al., 1995; Wahlgren, 1999). In fact, anti-histamine drugs are generally prescribed for cutaneous pruritus, yet they do not ease a severe itching sensation in atopic dermatitis (Berth-Jones and Graham-Brown, 1989; Wahlgren et al. 1990). Furthermore, in case the lesioned skin area is generalized or in the face, it is often difficult to use external medicines to relieve cutaneous pruritus as occasion calls. Thus, the development of non-anti-histamine oral antipruritic drugs or functional foods is highly anticipated.

Itch is a subjective sensation and animals do not describe their sensory experiences. To precisely measure
itch in animal behavioral experiments, we should focus on itch-related behaviors that are elicited only by pruritogenic stimuli but not by other sensory stimuli like pain. Kuraishi et al. (1995) reported that the ddY mice given subcutaneous injection of pruritogenic agent, compound 48/80 (3–100 µg), into rostral back showed dose-dependent scratching at the injected site due to itch, but not to pain. Compound 48/80 is an oligomeric mixture of condensation products of N-methyl-p-p-tetrahydroxyphenylmethoxyethylamine and formaldehyde (Gietzen et al. 1983). Compound 48/80 has been widely used as a selective histamine release agent from mast cells of rats (Barrett et al. 1985; Wu et al. 1993; Ikarashi et al. 2001) and mice (He et al. 1990; Toda et al. 1988). Both histamine and compound 48/80 (Fjellner and Hägermark, 1981) have been known to produce an itch sensation in humans. However, the role of histamine in generating the itch sensation in mice is not clear (Kuraishi et al. 1995; Inagaki et al. 2001). In ddY mice, an injection of histamine induced significant amount vascular permeability increase, but did not induce frequent scratching behaviour (Inagaki et al. 2001). Since an injection of serotonin or substance P, but not histamine, induced significant increase of scratching in ddY mice (Inagaki et al. 2001) and compound 48/80 is also known to release these putative mediators for itch (Ohta et al. 1999, Saria et al. 1984), compound 48/80-induced itch-scratch responses in ddY mice seem to be a suitable parameter for evaluating non-anti-histamine antipruritic agents.

In this report, we examined the antipruritic effect of German chamomile extract using the compound 48/80-induced scratching model in ddY mice. German chamomile flowers, one of the most popular herbal tea in the world, have been traditionally used both internally (for gastrointestinal spasms and inflammatory diseases of the gastrointestinal tract) and externally (for skin and mucous membrane inflammations as well as bacterial skin disease, including those of the oral cavity and gums, and inflammations and irritations of the respiratory tract by inhalations) (In “The Complete German Commission E Monographs”, 1998). However, internal use of chamomile for skin irritation has not been reported. The purpose of this study was to evaluate the antipruritic effects of the dietary intake of German chamomile extracts.

### Materials and Methods

#### Animals

All the experiments were performed with male ddY mice (6-week-old, Japan SLC, Ltd., Tokyo, Japan), housed at 22 ± 2 °C under a 12-h light-dark cycle (lights on 0700–1900 h) and were provided a standard diet (CE-2, CLEA Japan Inc., Tokyo, Japan) and water ad libitum for at least 3 days for acclimation. After acclimation, mice were fasted for 24 h then divided into 2–4 groups according to the experimental protocol. One of the groups was fed the standard powder diet (control group) and the other groups were fed the powder diet containing the fine powder or the extracts of German chamomile flower prepared as described below. Powdered diet was put in a stainless feeder positioned at the corner of each cage. After 7–11 days of feeding, each animal was used for only one experiment. All experimental protocols were approved by the Animal Care and Use Committee of the Kyowa Hakko Kogyo Co., Ltd. Tsukuba Research Laboratories.

#### Process for preparing the test samples of German chamomile flower

The dried flower of German chamomile (Matricaria recutita L., Compositae, a bulk product met the Japanese standard for the raw materials of quasi-drugs, Lot No. 539200, Lot No. 449222) used in this study was purchased from Takasago Yakugyo Co. Ltd., (Osaka, Japan).

The dried flowers of German chamomile were ground to fine powder by the use of rotor speed mill (pulversette 14, Fritsch Ltd., Germany) with 0.2 mm mesh.

To 350 g of dried flower of German chamomile (Lot No. 539200), 7 l of distilled water was added and extracted under sonication for 3 h at 70 °C. After collection of the decoction, the same treatment was repeated twice. The decoction was filtered through a filter cloth (Miracloth, Calbiochem-Novabiochem Corp., CA, USA), and the filtrate was evaporated under a reduced pressure and freeze-dried to obtain 89.4 g of hot water extract.

In place of water in the above protocol, ethanol or ethyl acetate were used for extraction to obtain 45.8 g of ethanol extract or 14.0 g of ethyl acetate extract.

For the experiment of the dose dependence of ethyl acetate extract, the following extract was used. To 450 g of dried flower of German chamomile (Lot No. 449222), 91 of ethyl acetate was added and extracted as mentioned above to obtain 18.66 g of ethyl acetate extract.

For the experiment of the ethyl acetate fraction of ethanol extract, the following extract was used. To 1.8 kg of dried flower of German chamomile, 36 l of ethanol was added and extracted 3 times as mentioned above to obtain 235 g of ethanol extract. A portion of ethanol extract (54.8 g) was suspended in water followed by solvent extraction using ethyl acetate. The ethyl acetate fraction was evaporated to dryness under a reduced pressure to obtain 26.45 g of ethyl acetate fraction of ethanol extract.
For the experiment of the ethanol extract of hot water extraction residue, the following extract was used. To 200 g of dried flower of German chamomile, 6 l of distilled water was added and extracted under agitation for 30 min at 40 °C. After collection of the residue using a filter cloth (Miracloth, Calbiochem-Novabiochem Corp., CA, USA), 4 l of ethanol was added to the residue and extracted twice as mentioned above to obtain 33.9 g of ethanol extract of the residue of the hot water extraction of German chamomile.

Dimethyl sulfoxide solutions (2 mg/ml) of the extracts were subjected to high performance liquid chromatography (column: YMC-Pack Pro C18; 150 mm × 6 mm I.D., mobile phase: 2% acetate aqueous solution of acetonitrile, gradient condition (min, % of acetonitrile in mobile phase): 0, 10; 45, 55; 60, 55; 80, 100; flow rate: 1 ml/min; column oven temperature: 40 °C; detection wavelength: 320 nm; injection volume: 20 μl) for HPLC fingerprinting. The following chemicals purchased from Funakoshi Co., Ltd. (Tokyo,

**Table 1.** Effects of the diet containing powdered flower of German chamomile on compound 48/80-induced scratching and body weight in mice. The mice were fed the standard diet (control) or the diet containing 30 w/w% German chamomile flower powder for 7 days, followed by subcutaneous injection of compound 48/80 (22.5 μg/site). Immediately after the compound 48/80 injection, the number of scratching behavior was measured for 30 min. Values shown are mean ± SD (n = 4). Significant differences between standard diet group and chamomile powder diet group are indicated by *P < 0.05, **P < 0.01 (Student’s t-test).

<table>
<thead>
<tr>
<th>Diet</th>
<th>Scratching Behaviour (counts/30 min)</th>
<th>Inhibition of scratching (%)</th>
<th>Final Body Weight (g)</th>
<th>Body Weight Increase (g/7 day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Diet</td>
<td>128.51 ± 25.9</td>
<td>0.0</td>
<td>30.5 ± 1.5</td>
<td>10.4 ± 1.6</td>
</tr>
<tr>
<td>Diet Containing 30% Fine Powdered Flower of German Chamomile</td>
<td>90.8 ± 23.3</td>
<td>29.3</td>
<td>27.7 ± 0.8 *</td>
<td>7.5 ± 0.7 *</td>
</tr>
</tbody>
</table>

**Table 2.** Effects of the diet containing the hot water extract, ethanol extract or ethyl acetate extract of German chamomile flower on compound 48/80 (a: 23.8 μg/site; b: 16.3 μg/site)-induced scratching and body weight in mice. The mice were fed the standard diet (n = 15) or the diet containing one of the extracts (n = 6) for 11 days. The content of each extract in the diet was adjusted so as to correspond to 30 w/w% chamomile flower powder. Values shown are mean ± SD (n = 6 or 15). Significant differences between standard diet group and chamomile extract diet groups are indicated by *P < 0.05, **P < 0.01 (Dunnett’s multiple comparison test).

**a)**

<table>
<thead>
<tr>
<th>Diet</th>
<th>Scratching Behaviour (counts/30 min)</th>
<th>Inhibition of scratching (%)</th>
<th>Final Body Weight (g)</th>
<th>Body Weight Increase (g/11 day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Diet</td>
<td>105.6 ± 32.7</td>
<td>0.0</td>
<td>32.4 ± 1.3</td>
<td>13.3 ± 1.1</td>
</tr>
<tr>
<td>Diet Containing 7.7% Hot Water Ext.</td>
<td>77.4 ± 36.0</td>
<td>26.7</td>
<td>31.2 ± 1.8</td>
<td>12.4 ± 2.1</td>
</tr>
<tr>
<td>Diet Containing 3.9% EtOH Ext.</td>
<td>101.6 ± 47.5</td>
<td>3.8</td>
<td>31.6 ± 2.1</td>
<td>12.4 ± 1.7</td>
</tr>
<tr>
<td>Diet Containing 1.2% Ethyl Acetate Ext.</td>
<td>57.6 ± 22.4 **</td>
<td>45.5</td>
<td>33.4 ± 1.2</td>
<td>13.7 ± 1.3</td>
</tr>
</tbody>
</table>

**b)**

<table>
<thead>
<tr>
<th>Diet</th>
<th>Scratching Behaviour (counts/30 min)</th>
<th>Inhibition of scratching (%)</th>
<th>Final Body Weight (g)</th>
<th>Body Weight Increase (g/11 day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Diet</td>
<td>77.3 ± 35.4</td>
<td>0.0</td>
<td>33.6 ± 1.7</td>
<td>13.7 ± 1.6</td>
</tr>
<tr>
<td>Diet Containing 7.7% Hot Water Ext.</td>
<td>46.0 ± 24.5</td>
<td>40.5</td>
<td>32.7 ± 2.7</td>
<td>12.5 ± 2.9</td>
</tr>
<tr>
<td>Diet Containing 3.9% EtOH Ext.</td>
<td>57.6 ± 21.4</td>
<td>25.5</td>
<td>33.0 ± 1.2</td>
<td>14.1 ± 1.4</td>
</tr>
<tr>
<td>Diet Containing 1.2% Ethyl Acetate Ext.</td>
<td>36.8 ± 20.8 *</td>
<td>52.4</td>
<td>32.9 ± 0.4</td>
<td>13.6 ± 0.8</td>
</tr>
</tbody>
</table>
Table 3. Dose dependent effects of the ethyl acetate extract of German chamomile flower on compound 48/80 (18.8 μg/site)-induced scratching and body weight in mice. The mice were fed the standard diet or the diet containing the ethyl acetate extracts for 11 days. Values shown are mean ± SD (n = 7–9). Significant differences between standard diet group and chamomile extract diet groups are indicated by *P < 0.05, **P < 0.01 (Dunnett’s multiple comparison test).

<table>
<thead>
<tr>
<th></th>
<th>Scratching Behaviour (counts/30 min)</th>
<th>Inhibition of scratching (%)</th>
<th>Final Body Weight (g)</th>
<th>Body Weight Increase (g/11 day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Diet</td>
<td>151.7 ± 14.8</td>
<td>0.0</td>
<td>36.2 ± 1.2</td>
<td>10.9 ± 0.6</td>
</tr>
<tr>
<td>Diet Containing 0.41% Ethyl Acetate Ext.</td>
<td>141.6 ± 16.8</td>
<td>6.7</td>
<td>37.0 ± 1.5</td>
<td>11.8 ± 1.2</td>
</tr>
<tr>
<td>Diet Containing 1.24% Ethyl Acetate Ext.</td>
<td>93.4 ± 16.5 *</td>
<td>38.4</td>
<td>35.3 ± 1.6</td>
<td>9.9 ± 1.5</td>
</tr>
</tbody>
</table>

Table 4. Effects of the diet containing the ethyl acetate fraction of the ethanol extract of German chamomile flower on compound 48/80 (15.0 μg/site)-induced scratching and body weight in mice. The mice were fed the standard diet (n = 24) or the diet containing ethanol extract or ethyl acetate fraction of the ethanol extract (n = 16) for 10 days. The content of each extract in the diet was adjusted so as to correspond to 30 w/w% chamomile flower powder. Values shown are mean ± SD (n = 16–24). Significant differences between standard diet group and chamomile extract diet groups are indicated by *P < 0.05, **P < 0.01 (Dunnett’s multiple comparison test).

<table>
<thead>
<tr>
<th></th>
<th>Scratching Behaviour (counts/30 min)</th>
<th>Inhibition of scratching (%)</th>
<th>Final Body Weight (g)</th>
<th>Body Weight Increase (g/10 day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Diet</td>
<td>94.1 ± 43.1</td>
<td>0.0</td>
<td>31.1 ± 1.5</td>
<td>10.3 ± 1.4</td>
</tr>
<tr>
<td>Diet Containing 3.9% EtOH Ext.</td>
<td>71.6 ± 36.1</td>
<td>25.9</td>
<td>31.5 ± 2.0</td>
<td>10.5 ± 1.9</td>
</tr>
<tr>
<td>Diet Containing 1.9% of Ethyl Acetate Fraction of Ethanol Ext.</td>
<td>53.7 ± 29.0 *</td>
<td>42.9</td>
<td>30.6 ± 1.7</td>
<td>9.5 ± 1.7</td>
</tr>
</tbody>
</table>

Table 5. Effects of the diet containing the ethyl acetate fraction of the ethanol extract of German chamomile flower on compound 48/80 (16.3 μg/site)-induced scratching and body weight in mice. The mice were fed the standard diet (n = 11) or the diet containing ethyl acetate fraction of the ethanol extract or ethanol extract of the residue of hot water extraction (n = 8) for 10 days. The content of each extract in the diet was adjusted so as to correspond to 30 w/w% chamomile flower powder. Values shown are mean ± SD (n = 8–11). Significant differences between standard diet group and chamomile extract diet groups are indicated by *P < 0.05, **P < 0.01 (Steel’s multiple comparison test).

<table>
<thead>
<tr>
<th></th>
<th>Scratching Behaviour (counts/30 min)</th>
<th>Inhibition of scratching (%)</th>
<th>Final Body Weight (g)</th>
<th>Body Weight Increase (g/10 day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Diet</td>
<td>92.1 ± 54.7</td>
<td>0.0</td>
<td>32.5 ± 1.7</td>
<td>13.0 ± 1.4</td>
</tr>
<tr>
<td>Diet Containing 2.01% of Ethyl Acetate Fraction of Ethanol Ext.</td>
<td>50.0 ± 17.2 **</td>
<td>45.7</td>
<td>31.3 ± 2.5</td>
<td>12.1 ± 2.3</td>
</tr>
<tr>
<td>Diet Containing 5.09% of Ethanol Ext. of Hot Water Ext. Residue</td>
<td>56.6 ± 29.3 **</td>
<td>61.5</td>
<td>31.2 ± 1.6</td>
<td>11.4 ± 1.1</td>
</tr>
</tbody>
</table>
Japan) were used for standards: apigenin and apigenin-7-glucoside. Each compound was identified by comparing its retention time and UV spectrum with those of the standards.

**Compound 48/80-induced scratching tests**

Compound 48/80-induced scratching tests were performed according to the method described by Kuraishi et al. (1995) with a small modification. Before testing, the test samples of German chamomile were fed to the mice in the diets for 7–11 days and the mice (4 animals per observation) were individually placed into an acrylic cage (26 × 18 × 30), which subsequently served as the observation chamber, for 30 min for acclimation. After the acclimation period, a 0.125-mg/ml saline solution of compound 48/80 (Sigma Chemical Co., St. Louis, MO, USA) was injected subcutaneously (15.0–23.8 μg/site) into the rostral part of the back of mice to provoke scratching behaviour. Immediately after subcutaneous injection of compound 48/80, the mice were put back to the same chambers and their scratching behaviors were counted for 30 min. Mice generally scratched several times with the hind paws for about 1 sec and a series of these movements was counted as one bout of scratching. As a control, mice fed standard diet were injected with compound 48/80 at a dose adjusted to 0.5 or 0.75 mg per kg average body weight of control mice. The dose (0.5 or 0.75 mg per kg average body weight of control mice) was selected by a preliminary test before each experiment. All the animals in the same experiment received the same amount of compound 48/80. The degree of inhibition of scratching was calculated based on the accumulated scratching counts of the control group being 100%. The experiments were performed between 1000–1600 h.

**Drugs**

Oxatomide (Kyowa Hakko Kogyo Co., Ltd., Tokyo, Japan) was prepared in 0.5% methyl cellulose 400 (Kishida Chemical, Osaka, Japan) aqueous solution and administered orally 1 h before compound 48/80 injection.

**Statistical Analysis**

The data are presented as the mean ± SD. The statistical significances of differences between groups was analyzed as follows: In experiments containing two experimental groups, either Student’s or Welch’s t-test was employed to evaluate the statistical differences after the variances of the data were evaluated with the F-test (P < 0.05). For data including three or more experimental groups, either Turkey’s parametric multiple

---

**Fig. 1.** Time course of scratching after a subcutaneous injection of compound 48/80. Male ddY mice (ca. 25 g body weight) were given an injection of compound 48/80 at the dose of 12.5 mg/site (ca. 0.5 mg/kg; closed diamond) or 25.0 μg/site (ca. 1.0 mg/kg; closed circle). Scratching was counted every 5 min for 30 min after compound 48/80 injection. Number of scratch is indicated cumulatively. Values shown are mean ± SD (n = 6).

**Fig. 2.** Effects of oxatomide on compound 48/80 (20.0 μg/site)-induced scratching behaviour in ddY mice. Scratching was counted for 30 min after compound 48/80 injection. Oxatomide was administered orally 1 h before. Values shown are mean ± SD (n = 12). Significant differences between vehicle group (0 mg/kg) and oxatomide groups are indicated by *P < 0.05, **P < 0.01 (Steel’s multiple comparison test).
comparison test or Steel's nonparametric multiple comparison test was used after Bartlett's analysis (P < 0.05). P values less than 0.05 were considered as indicative of significance. P values were expressed as *p < 0.05 and **p < 0.01.

Results and Discussion

Compound 48/80 dose-dependently elicited scratching of the skin around the injected site by the hind paws, when injected subcutaneously into the rostral back (Fig. 1). The effect of compound 48/80 had almost subsided by 30 min after the injection. Therefore, compound 48/80-induced scratching was counted for 30 min after subcutaneous injection of this compound.

To examine the antipruritic effect of German chamomile flower, mice were fed the diet containing 30 w/w% of fine powdered dried German chamomile flower for 11 days, and the compound 48/80 (22.5 μg/site)-induced scratching tests was performed. The compound 48/80-induced itch-scratch response of German chamomile flower powder diet group was inhibited by 29.3% in comparison with the standard diet group (Table 1). The mice fed the German chamomile flower powder diet grew well (7.5 g/week) and no particular abnormality was recognized, but the increase in body weight in German chamomile flower powder diet group was significantly reduced in comparison with the standard diet group. There was no significant difference in the amounts of diet intake between the groups; standard diet group 60.5 ± 6.6 g, flower powder diet group 62.7 ± 5.5 g. However, the calorie intake would be much less in the flower powder diet group because of the high content (30% of the dry weight of the diet) of dried powder of German chamomile flower rich in non-digestible fibers. Therefore, the reduction of body weight increase would be due to the reduction of calorie intake. In fact, the other diets containing various German chamomile flower extracts (0.4–5.1% of

Fig. 3. The HPLC profile of the ethyl acetate extract of German chamomile. Peak 1 – Apigenin-7-O-glucoside; Peak 2 – Apigenin.

Fig. 4. The HPLC profile of the ethanol extract of German chamomile. Peak 1 – Apigenin-7-O-glucoside; Peak 2 – Apigenin.
the dry weight of the diet) showed no significant effects on the body weight increase (Tables 2–5).

To understand the characteristics of antipruritic activity in German chamomile flower, the effects of various extracts of German chamomile flower were examined (Table 2a, 2b). The mice were fed the diet containing the extract at an amount corresponding to 30 w/w% German chamomile flower powder in the diet. Each diet was fed for 11 days, followed by the compound 48/80-induced scratching tests with the injection of compound 48/80 at high dose (23.8 μg/site; Table 2a) or at low dose (16.3 μg/site; Table 2b). The ethyl acetate extract significantly inhibited the itch-scratch responses caused by both doses of compound 48/80. The inhibition of scratching responses was 45.5% in the high dosage group, and 52.4% in the low dosage group. Other extracts did not inhibit the scratching responses significantly. There were no significant effects of the German chamomile extracts on the body weight (Table 2). The antipruritic effect of the ethyl acetate extract of German chamomile was dose dependent (Table 3).

The effects of oxatomide, an anti-allergic agent with histamine H1 receptor antagonistic property (Auwouters et al. 1977), on the scratching behavior induced by compound 48/80 in ddY mice are shown in Fig. 2. Oxatomide at a dose of 10 mg/kg administered orally 1 h before compound 48/80 injection significantly inhibited the scratching behavior in ddY mice (inhibition of scratching: 37.9%). Oxatomide (10 mg/kg, p.o.) is reported to inhibit the substance P-induced scratching behavior in ddY mice through an action independent of the antagonistic action on histamine H1 receptors (Inagaki et al., 2000). But no further inhibition of compound 48/80-induced scratching behavior was observed at a higher dose (30 mg/kg). Thus the dietary intake of the German chamomile ethyl acetate extract exerted marked antipruritic effects on compound 48/80-induced itch-scratch responses comparable to oxatomide.

The HPLC profile of the ethyl acetate extract of German chamomile is shown in Fig. 3. Because all the major peaks in the HPLC profiles of ethyl acetate extract were found also in the ethanol extract (Fig. 4), we supposed the existence of the inhibitory factors on the antipruritic activity of German chamomile flower. Therefore the effects of solvent extraction of the ethanol extract on the antipruritic activity on compound 48/80 (18.8 μg/site)-induced scratching was examined. As shown in Table 4, the removal of water-soluble materials from the ethanol extract significantly enhanced its antipruritic activity (inhibition of scratching: 42.9%). The ethyl acetate extract of hot water extraction residue of German chamomile flower also showed strong inhibitory effects (inhibition of scratching: 38.5%) on the compound 48/80 (16.3 μg/site)-induced scratching (Table 5). These results indicates a possible existence of water-soluble, ethyl acetate-insoluble factor that has inhibitory effect on the antipruritic activity of German chamomile flower.

Thus we have shown that the dietary intake of the German chamomile extracts exerted marked antipruritic effects on compound 48/80-induced itch-scratch responses. We are now trying to elucidate the mechanism of action and isolate active constituents from these extracts.

Acknowledgement

The authors wish to acknowledge Dr. A. Karasawa, Ph. D., Dr. S. Ichikawa, Ph. D., Mr. K. Hayashi and Ms. K. Miyake of Pharmaceutical Research Institute, Kyowa Hakko Kogyo Co., Ltd., Shizuoka, Japan for the advises and technical support.

References


Address
Yoshinori Kobayashi, Ph.D., Niigata University of Pharmacy and Applied Life Sciences 265-1, Higashijima, Niitsu-shi, Niigata 956-8603 Japan
Fax: ++81-250-25-5021;
e-mail: kobaysahi@niigatayakudai.jp