

Review

Suggestion on experimental animal model of the dermatitis with dampness-heat syndrome in the traditional Korean medicine

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ABSTRACT

According to the traditional Korean medicine, Dampness-heat (DH) is an abnormal state of the body that results in a pathological accumulation of dampness and heat. DH is caused by overeating fatty, sweet foods or overdrinking alcohol. Exposure to hot and humid atmospheres is another cause of DH. Although many experimental animal model on various diseases related with DH syndrome were established, DH syndrome dermatitis model is not established. Thus, we introduce the experimental animal model of the dermatitis with DH syndrome.

Keywords Dampness-heat syndrome, traditional Korean medicine, experimental animal model, dermatitis

Dampness-heat (DH) in traditional Korean medicine (TKM)

DH (濕熱) is a concept in TKM that refers to an abnormal state of the body that results in a pathological accumulation of dampness (濕邪) and heat (熱邪). The DH pattern/syndrome is a pattern/syndrome caused by a combination of dampness and heat, either of external or of internal origin, with different manifestations according to location, e.g., jaundice (Song, 2008) when the DH accumulates in the liver and gallbladder, leucorrhea (Im, 2005) when the DH pours down, and diarrhea (Choi, 2007) for the DH in the intestines, atopic dermatitis for the DH on the skin (Kim, 2006), obesity (Lee, 1996) for the DH all over the body.

The cause of the dampness-heat

The dietary irregularity is one of the causes of the DH. It includes overeating fatty, sweet foods and alcohol. According to “Introduction to medicine: external contraction (醫學入門: 外感)”, the DH is caused by the dietary irregularities; surfeit of alcohol, cold food and condensed milk e.g. (因飲食失節或酥酪酒漿生冷過度 以致濕熱). “Complete works of Jingue (景岳全書: 集證謨齒牙 美酒厚味, 膏粱甘膩過多, 以致濕熱)”, Dongguibogam (Principles and Practice of Eastern Medicine) (東醫寶鑑: 小便門: 醇酒厚味者釀成濕熱也.), there are explained that the DH is caused by alcohol, sweet & fatty food.

In addition, the hot and humid atmospheres cause the DH. According to “Treatise on the Spleen and Stomach(脾胃論: 卷中 長夏濕熱胃困尤甚用清暑益氣湯論)”, in the midsummer, it

is at the peak of dampness and heat(時當長夏, 濕熱大勝). Introduction to medicine: external contraction (醫學入門: 外感), the DH is interaction of hot and humid in the midsummer (濕兼熱者, 長夏暑濕相搏).

Introduction of the existing experimental model on the DH syndrome

Many scientists established experimental animal model on various diseases related with DH syndrome. DH model is set up by feeding high-fat&sweet diet, putting into the artificial temperature chamber at $32 \pm 0.5^\circ\text{C}$, $60 \pm 5\%$ air humidity. This model is based on “On Dampness-heat Diseases (濕熱病篇)”. According to “On Dampness-heat Diseases”, the internal damage of greater yin, the retention and accumulation of dampness fluid, and additional infection of external pathogen causes the DH syndrome (太陰內傷 濕飲停聚, 客邪再至, 內外相引, 故病濕熱).

1. Ma et al. (2011) introduced “The mouse model of dampness-heat syndrome infected by Dengue virus”

BALB/C and C57BL/6 mice were divided a normal control group, the Dengue virus infection group, and the dampness-heat group. The body temperatures, platelet counts, virus in the separate serum, pathological changes of the liver and serological indicators were determined.

2. Cao et al. (2009) introduced “The animal model of dampness-heat jaundice syndrome”

The liver injury was induced by alpha-naphthylisothiocyanate and carbon tetrachloride respectively. The liver function tests were measured by analyzing the serum level of alanine aminotransferase, aspartate aminotransferase, alkaline phosphatase, malondialdehyde, total bilirubin, superoxide dismutase, glutathione peroxidase as well as the ratio of liver weight to body weight.

3. Zheng et al. (2011) established “The animal model of

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ulcerative colitis in rats with dampness and heat syndrome”

Rats were divided the model group, Huangqin decoction group and mesalazine group. Ulcerative colitis was induced by intrarectal administration of 2, 4, 6-trinitro-benzene-sulfonic acid. Histology analyses were performed to determine the inflammatory cell infiltration (H&E staining) and the number of mast cells (toluidine blue staining). The expression of tryptase was detected by using immunohistochemistry, and serum cytokines (IL-4 and IL-6) levels were measured using ELISA.

4. Zhang et al. (2013) determined “The animal model of damp-heat syndrome in rats with influenza viral pneumonia”

Wistar rats were randomly divided into 6 groups: 1) normal control group, 2) damp-heat syndrome model group, 3) Haoqingdan decoction group (high dose), 4) Haoqingdan decoction group (medium dose), 5) Haoqingdan decoction group (low dose) and 6) ribavirin group. The body temperature and weight of rats in each group were recorded after modeling. Flow cytometry was performed to determine the concentration of T lymphocyte subgroup (CD3(+)CD4(+), CD3(+)CD8(+)) The value of IFN- γ /IL-4 was detected by using ELISA.

5. Tang et al. (2010) introduced “The animal model of damp-heat syndrome with MHV-A59 infection”

Mice were randomly divided into control group, virus group, damp-heat group and model group (virus + damp-heat). Flow cytometry was performed to detected the peripheral blood CD4(+) and CD8(+) lymphocytes. The serum levels of IFN- γ and IL-4 were measured by ELISA. The expressions of NF- κ B and AQP4 in the liver and stomach were determined using immunohistochemistry.

Although many DH syndrome experimental animal models were established, animal model of the dermatitis with DH syndrome has not been introduced yet. Thus, we introduce the dermatitis model related with DH syndrome in this paper.

Suggestion on experimental animal model of the dermatitis with dampness-heat syndrome

Mice are randomly divided into normal group, DNCB group, damp-heat group and model group (DNCB + damp-heat). DH group and model group are fed high-fat&sweet diet, and are put into the artificial temperature chamber at $32 \pm 0.5^{\circ}\text{C}$, $60 \pm 5\%$ air humidity. Dermatitis induced by application of DNCB. Thickness of the epidermis and dermis is evaluated by H&E staining. Serum IgE level and IFN- γ , IL-4, IL-6 and IL-1 β in the skin tissue are determined by ELISA. The NF- κ B expression in the skin is detected by western blot analysis.

CONCLUSION

DH syndrome related with various diseases such as jaundice, hepatitis, colitis and atopic dermatitis. Many studies introduced experimental animal model on various diseases related with DH syndrome e.g. “dampness-heat jaundice syndrome”, “ulcerative colitis with dampness-heat syndrome” and “damp-heat syndrome with MHV-A59 infection”. However, dermatitis model related with DH syndrome has not been established. Thus, we propose a new experimental animal model of the dermatitis model.

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CONFLICT OF INTEREST

The authors declare that there was no conflict of interest.

REFERENCES

- Cao HX, Sun H, Jiang Xg, Lu HT, Zhang GM, Wang XJ, Sun WJ, Wu ZM, Wang P, Liu L and Zhou J. Comparative study on the protective effects of Yinchenhao Decoction against liver injury induced by alpha-naphthylisothiocyanate and carbon tetrachloride. *Chin J Integr Med.* 2009;15:204-209.
- Choi BC, An TW. Consideration of literatures on diarrhea's etioginal cause and pathological alternation. *Collection of dissertations of Institute of Korean Medicine, Deajeon University.* 2007;16:207-208.
- Im KS, Lee CH, Cho JH, Jang JB, Lee KS. A review of the literature on single herb for treatment of colporrhea. *The Journal of Oriental Obstetrics & Gynecology.* 2005;18:153-164.
- Kim SA, Kang YH. Changes in Ceramide in Stratum Comeum and Anti-inflammatory Effects of Sopungdojeok-tang on Atopic Dermatitis. *Journal of korean oriental internal medicine.* 2006;27:72-83.
- Lee SB, Keum DH, Lee MJ. Oriental and Western Medical Study on the cause and treatment of Obesity. *The Journal of Dong Guk Oriental Medicine.* 1996;5:33-52.
- Ma DJ, Huang SY and Xiong JY. Study on two strains of mouse developing dampness-heat models infected by Dengue virus. *Zhongguo Zhong Xi Yi Jie He Za Zhi.* 2011;31:820-824.
- Song JH, Kim SS, Kim BM, Na MS, Liu CH, Yoon H, Jeong HY, Kim KS. Literature Study on Jaundice of Kum-Won Sa Dae Ga. *Korean J Ori Med Physiol Pathol.* 2008; 22:1331-1346.
- Tang ZH, Su LX, Li HF, Guo JQ, Luo BD Lin PZ. Construction of MHV-A59 damp-heat mouse model and analysis of the relevant indices. *Nan Fang Yi Ke Da Xue Xue Bao.* 2010;30:2452-2454.
- Zhang SJ, Chen Z, Li GW and Wang BL. Effect of the Haoqingdan decoction on damp-heat syndrome in rats with influenza viral pneumonia. *Asian Pac J Trop Med.* 2013;6:653-657.
- Zheng XB, Liu HB, Feng YL and Dai SX. Huangqin decoction lowers the number of mast cells in ulcerative colitis in rats with dampness and heat syndrome. *Nan Fang Yi Ke Da Xue Xue Bao.* 2011;31:252-255.