

# Usage of *Oldenlandia diffusa* for skin diseases and skin-care

Siukan Law,<sup>1</sup> Albert Wingnang Leung,<sup>2</sup> Chuanshan Xu<sup>3</sup>

<sup>1</sup>Department of Science, School of Science and Technology, The Open University of Hong Kong, Ho Man Tin, Kowloon, Hong Kong, China; <sup>2</sup>School of Graduate Studies, Lingnan University, Tuen Mun, Hong Kong, China; <sup>3</sup>Key Laboratory of Molecular Target and Clinical Pharmacology, State Key Laboratory of Respiratory Disease, School of Pharmaceutical Sciences and Fifth Affiliated Hospital, Guangzhou Medical University, Guangzhou, China

Dear Editor,

*Oldenlandia diffusa* (Bai Hua She She Cao) is a common herb in traditional Chinese medicine. It belongs to the *Rubiaceae* family and the category of “clearing heat and eliminating toxins” in traditional Chinese medicine theory. *Oldenlandia diffusa* has many pharmaceutical actions such as antimicrobial, anti-inflammatory, and anti-tumor properties. We would like to discuss the background of traditional Chinese medicine for *Oldenlandia diffusa*, its pharmaceutical activities, clinical studies, and daily usages.

*Oldenlandia diffusa* is a well-known medicinal plant and used in Chinese medicine for a long time. Based on the traditional Chinese medicine theory, *Oldenlandia diffusa* is in the category of “clear heat and eliminate toxins”. This is “light-sweet” and “cold” in nature. The functions of *Oldenlandia diffusa* include removing heat, drying dampness, and strongly neutralizing toxins to balance Yin-Yang in the human body.<sup>1</sup> Accumulating studies have shown that *Oldenlandia diffusa* possesses antimicrobial, anti-inflammatory, and anti-tumor properties.<sup>2</sup>

Chen *et al.* reported that *Oldenlandia diffusa* had a strong inflammatory response in LPS-activated macrophages. It modulated the production of NO and the levels of cytokines such as TNF-

α, IL-6, and IL-1β in LPS-treated RAW 264.7 cells causing phosphorylation of p38, JNK, and ERK1/2, also blocked the activation of NF-κB and MAPK signaling pathways to disrupt the synthesis of proinflammatory mediators.<sup>3</sup>

Zhu *et al.* indicated that *Oldenlandia diffusa* suppressed the infiltration of inflammatory cells and activation of the NF-κB signaling pathway which regulated the levels of TNF-α and IL-6 for the pathogenesis of arthritis (RA). TNF-α could enhance the properties of antioxidant and anti-inflammatory, also IL-6 could trigger the immune system by activating B-cells and releasing immunoglobulins as well as increasing the production of rheumatoid factor. These results showed that *Oldenlandia diffusa* is effective to alleviate the symptoms of arthritis in rats.<sup>4</sup>

Fu *et al.* discovered that *Oldenlandia diffusa* inhibited the proliferation of HaCaT cells by arresting HaCaT cell growth at the G1 phase and promoted cell apoptosis by inducing protein expressions of Bcl-xL and cIAP1 to cleavage caspase-3.<sup>5</sup>

Wang *et al.* indicated the anti-inflammatory mechanism of *Oldenlandia diffusa* involving NF-κB, MAPK, 5-LOX signaling pathways, and the anti-tumor mechanisms relating to PI3K/AKT, TGF-β/Smad, MAPK, STAT3 signaling pathways. *Oldenlandia diffusa* played an important role in the action of inflammatory via the regulation of NF-κB, MAPK, VEGF signaling pathways.<sup>6</sup>

Jayasooriya *et al.* identified that *Oldenlandia diffusa* inhibited the LPS-induced degradation and phosphorylation of IκBα in RAW 264.7 cells which sustained the expression of p65 in the cytosol. *Oldenlandia diffusa* also suppressed the LPS-induced DNA binding activity of NF-κB to induce the production of NO, PGE2, and TNF-α by regulating the activation of NF-κB.<sup>7</sup>

Deng *et al.* reported the use of *Oldenlandia diffusa* in phytotherapy for the management of psoriasis. Phytotherapy (PT) interventions included oral administration of single or multiple PTs or extracts thereof. An assessment of the clinical efficacy of psoriasis treatments based on the proportion of the Psoriasis Area Severity Index (PASI) score reduction. The significant change of *Oldenlandia diffusa* in PASI score was a 50% reduction. They considered the pharmacological actions of *Oldenlandia diffusa* including anti-inflammatory and anti-proliferative activities for psoriasis management.<sup>8</sup>

Recently, Li *et al.* indicated *Oldenlandia diffusa* as one of the traditional Chinese medicines for treating systemic scleroderma. According to the traditional Chinese medicine theory, systemic scleroderma belongs to Liver-Yin and Kidney-Yin deficiency with wind-dampness condensation, blood heat, stasis, and skin blockage causing grain skin. *Oldenlandia diffusa* is heat-clearing, removing toxic substances and dampness which functions to restore Qi of the kidney, detoxicating, dispelling wind clearing damp, and softening hard masses. The Chinese medicine decoction consisted of 15g *oldenlandia diffusa*, 12g matrimony vine, 8g *Chinese ephedra*, 20g honeysuckle, 15g *forsythia*, 15g *codonopsis*

Correspondence: Siukan Law, Department of Science, School of Science and Technology, The Open University of Hong Kong, Ho Man Tin, Kowloon, Hong Kong, China.  
E-mail: siukanlaw@hotmail.com

Key words: *Oldenlandia diffusa*; traditional Chinese medicine; skin diseases; skin-care.

Contributions: All authors contributed to the concept, acquisition, and analysis of data, drafting of the manuscript, and critical revision of the manuscript for important intellectual content which was approved as a final version for publication.

Conflicts of interest: The authors declare no conflict of interest.

Received for publication: 22 November 2020.

Revision received: 20 December 2020.

Accepted for publication: 20 December 2020.

This work is licensed under a Creative Commons Attribution NonCommercial 4.0 License (CC BY-NC 4.0).

©Copyright: the Author(s), 2020

Licensee PAGEPress, Italy

Infectious Diseases and Herbal Medicine 2020; 1:120

doi:10.4081/idhm.2020.120

*radix*, 15g *epimedium*, 8g *glycyrrhizae radix*, 20g Huai wheat of stir-fry, 12g Asiatic plantain, 15g mother of pearl, 15g mast, 15g calcined turtle shell, 12g calcined oyster shell, and 12g seaweed. The clinical results showed when the patient received treatment, symptoms were improved. Its effective rate was 100%, and the cure rate was 85%.<sup>9</sup>

In another study by Wang *et al.*, *Oldenlandia diffusa* was used to treat skin acne. Acne is hot, wet, and stasis of blood in the skin inflammation. It belongs to the category of “accumulation dampness heat and blood stasis” based on traditional Chinese medicine theory. *Oldenlandia diffusa* is one of the fumigation and washing agent. These Chinese medicine formulations consisted of 45g *oldenlandia diffusa*, 22g *drymoglossum herba drymoglossi*, 24g *herba euphorbiae thymifoliae*, 9g *herba speranskiae tuberculatae*, 21g *schefflerae octophyllae cortex*, 17g *zanthoxyli avicennae radix*, 28g *flemingiae philippinensis radix*, 25g *buttonbush root*, 10g *herba galii teneri*, 20g *herba silenes fortunei*, and 12g *herba ardisiae mamillatae*. The effective rate reached nearly 97.0%.<sup>10</sup>

Nowadays, there is a cosmetic product developed by Kim’s research team in Korea. *Oldenlandia diffusa* is disclosed as one of the whitening compositions for the skin because there are several bioactive components in the *Oldenlandia diffusa* extract such as betulin, betulinic acid, ursolic acid, oleanolic acid, stigmaterol,  $\beta$ -sitosterol,  $\beta$ -glycyrrhetic acid, *p*-coumaric acid, glucoside, and hentriacontane which possesses the anti-inflammatory and antiviral effect. If *Oldenlandia diffusa* extract combines with *Rheum undulatum* extract, and *Broussonetia kazinoki* extract, it exhibits superior melanogenesis inhibition and skin whitening cosmetics. Its function is to protect the skin to prevent Ultra-Violet (UV) irradiation and change the skin color within 8 weeks. The ointment ingredients content contains 0.1g *Oldenlandia diffusa*, *Rheum undulatum*, and *Broussonetia kazinoki* extract, 8.0g glycerine, 4.0g butylene, 15.0g liquid paraffin, 7.0g  $\beta$ -glucan, 3.0g carbomer caprylic/capric triglyceride, 1.0g squalene, 1.5g Cetearyl glucoside, 0.4g sorbitan stearate, 1.0g Cetearyl alcohol, and 4.0g anti-septic adequate fragrance adequate pigment adequate beeswax.<sup>11</sup>

The above information demonstrates that *Oldenlandia diffusa* has potential in treating skin diseases and skin-care. However, much more work needs to be done for supporting *Oldenlandia diffusa* in the Chinese medicine decoction and its cosmetic product combined with other Chinese medicine herbs including the study on antimicrobial, anti-inflammatory, and anti-tumor activities, as well as its safety evaluation.

## References

1. Sacred Lotus Chinese Medicine. Bai Hua She She Cao (Oldenlandia or Heydyotis). 2020. Accessed: 14 Nov 2020. Available from: <https://www.sacredlotus.com/go/chinese-herbs/substance/bai-hua-she-she-cao-oldenlandia-heydyotis>
2. Ovesná Z, Vachálková A, Horváthová K, Tóthová D. Pentacyclic triterpenoic acids: new chemoprotective compounds. *Minireview. Neoplasma* 2004;51:327-33.
3. Chen Y, Lin Y, Li Y, Li C. Total flavonoids of Hedyotis diffusa Willd inhibit inflammatory responses in LPS-activated macrophages via suppression of the NF- $\kappa$ B and MAPK signaling pathways. *Exp Ther Med* 2016;11:1116-22.
4. Zhu H, Liang QH, Xiong XG, et al. Anti-inflammatory effects of *p*-Coumaric acid, a natural compound of Oldenlandia diffusa, on arthritis model rats. *Evid Based Complement Alternat Med* 2018;5198594.
5. Fu DD, Song XF, Li ZG, et al. Effects of Hedyotis diffusa extract on epidermal growth factor induced proliferation, apoptosis, and TNF- $\alpha$  induced inflammatory factors of HaCaT Cells. *Chin J Integr Med* 2016;36:975-80.
6. Wang X, Ma C, Yang P, et al. Research progress of anti-inflammatory and anti-tumor effects of Hedyotis Diffusa Willd. *Chin J Mod Appl Pharm* 2020;37:2420-7.
7. Jayasooriya RGTP, Kang CH, Cho YH, et al. Aqueous extract of Oldenlandia diffusa suppresses LPS-induced iNOS, COX-2 and TNF- $\alpha$  expression in RAW 264.7 cells via the NF- $\kappa$ B activity. *Trop J Pharm Res* 2011;10:403-11.
8. Deng S, May BH, Zhang AL, et al. Phytotherapy in the management of psoriasis: a review of the efficacy and safety of oral interventions and the pharmacological actions of the main plants. *Arch Dermatol Res* 2014;306:211-29.
9. Li X. Medicine for treating systemic scleroderma. 2017. Accessed: 15 Nov 2020. Available from: <https://patents.google.com/patent/CN106620353A/en>
10. Wang J. Traditional Chinese medicinal smoking lotion for treating acne, 2016. Accessed: 15 Nov 2020. Available from: <https://patents.google.com/patent/CN105853557A/en>
11. Kim EJ, Rho HS, Kim SJ, et al. Whitening composition for external skin application containing Oldenlandia diffusa willd, Rheum undulatum, and Broussonetia kazinoki extract. 2008. Accessed: 15 Nov 2020. Available from: <https://patents.google.com/patent/US8647683B2/en>