

A study on the mechanism of acupuncture treatment of acne based on immune inflammation

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Author contributions

Chu-Yi Zhang conceived and wrote the manuscript. Rui Jin and Yi-Jun Feng helped write and revise the manuscript. Zhen Zhou played a guiding role in review and editing. All authors read and approved the final manuscript.

Competing interests

The authors declare no conflicts of interest.

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Abbreviations

AR, androgen receptor.

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Abstract

Acne is a chronic inflammatory skin disease involving hair follicle sebaceous glands, which is characterized by acne, papules, pustules, nodules, cysts and so on. The disorder of immune inflammation is the key link. A variety of factors participate in the immune inflammatory response of acne and interact with each other, leading to the occurrence and development of acne inflammation. Acupuncture can regulate the immune and inflammatory response through many links and improve the skin lesions. This study explains potential mechanisms of acupuncture in the treatment of acne by regulating the body's immune inflammatory response, in order to provide new ideas.

Keywords: acupuncture; acne; immunity; inflammatory reaction; mechanism

Introduction

Acne is a common chronic inflammatory skin disease involving hair follicles and sebaceous glands, mainly characterized by acne, papules, pustules, nodules, cysts and other lesions. In recent years, with the change of living environment and lifestyle, the incidence of acne is increasing year by year, and people of all ages can get sick, but it is the most common among teenagers, and its incidence is as high as 70%-87% [1]. The disease has the characteristics of chronic, repetitive, refractory and persistent, and has a certain damage [2]. Serious cases can leave permanent facial scars, which seriously affect the physical and mental health and quality of life of patients [3].

Studies have confirmed that inflammatory factors and immune abnormalities play an important role in the occurrence and development of the disease. Some studies believe that inflammatory factors run through the pathogenesis of acne and are the core pathogenesis of the disease [4]. There are many clinical reports on the treatment of acne with acupuncture, which ranks first in the disease spectrum of skin and subcutaneous tissue [5]. It has a significant clinical effect in the treatment of acne, which can effectively improve the degree of skin lesions and reduce the recurrence rate of acne patients [6, 7]. At the same time, some studies have confirmed that acupuncture can regulate the level of immune factors and reduce inflammatory response [8]. Therefore, this paper reviews the mechanism of acupuncture regulating immune inflammation in the treatment of acne in recent years, in order to provide a basis for its clinical application and future research.

Relationship between immune inflammation and acne

The pathogenesis of acne has not been fully elucidated. At present, it is believed that there are four classic pathogenesis of acne [9, 10]: excessive secretion of lipids under the action of androgen, abnormal keratosis of hair follicle sebaceous ducts and proliferation, proliferation of hair follicle microorganisms such as propionibacterium acne, inflammation and immune response. Among them, the skin inflammatory response caused by the colonization of hair follicle sebaceous glands by Propionibacterium acne is considered to be one of the central factors driving acne.

In addition, when androgen secretion increases, it promotes sebaceous gland hyperplasia and sebaceous secretion, abnormal keratosis or even occlusion of sebaceous ducts in hair follicles, a large number of proliferation and activation of propionibacterium acne, release lipase, hyaluronidase and protease to bind to Toll-like receptors, induce the release of various inflammatory factors such as IL-6, and aggravate acne inflammation and tissue damage [11-13]. Therefore, immune inflammation is affected by the other three classical pathogenesis.

In the pathogenesis of acne, the inflammatory immune response of the host is the main cause of hair follicle destruction, papules, pustules, nodules and scars. Acquired immune system and innate immune system are involved in the inflammatory mechanism of acne. Therefore, clinical inhibition of acne inflammation and regulation of immune response is an important part of treatment.

Traditional Chinese medical theoretical basis for acupuncture treatment of acne

The etiology and pathogenesis of acne have been recorded as early as Neijing, such as: "people who plaster sorghum have heat stagnation in their internal organs, so their pathological changes can produce large furuncle, sweat and see dampness, but acne", "sweat when the wind, cold and thin for the wind, Yu Naicuo" and so on. In modern times, it is mostly considered to be related to heat, poison, dampness, blood stasis and phlegm [14].

Acupuncture and moxibustion has many advantages, such as less adverse reactions, acupuncture and moxibustion commonly used in clinical treatment of acne, including filiform needle, fire needle and acupoint injection and other treatments. Filiform needle therapy is

mainly through local acupoint selection or syndrome differentiation to stimulate specific acupoints to dredge facial qi and blood meridians. Among them, facial spurs can dredge local meridians, regulate qi and blood, and speed up local metabolism. The selection of meridian acupoints, such as the application of Beishu acupoint, can regulate the function of Zang-fu organs, qi and blood and resist external evil [15, 16].

Fire needle therapy is to put specific needles into acupoints or pathological changes after heating. It has both the stimulating effect of acupuncture and the warm effect of moxibustion, which can warm yang, diverge and move qi. By heating the needle body, fire needle can warm the meridians, lift yang qi, inspire people to run in a body of qi and blood, so as to achieve the therapeutic effects of using fire to help yang, open the door to remove evil, heat and other therapeutic effects. It can promote acne local dampness and evil qi diarrhea, improve acne local blood supply, and then realize the functions of promoting blood circulation and detoxification, inducing evil to go out, reducing swelling and purulence, and so on. Fire acupuncture in the treatment of acne is through the mechanism of local and overall homology, internal and external treatment, tonifying and reducing and other mechanisms, so as to achieve the effects of warming meridians, promoting qi and blood, softening and dispersing knots, tonifying deficiency and purging excess, etc. [17-19].

Mechanism of acupuncture in the treatment of acne

As a traditional treatment method, acupuncture has played a definite clinical effect in the treatment of acne, and it is recommended as grade I evidence for the treatment of severe acne [20]. Acupuncture can improve the clinical therapeutic effect through multi-ways, multi-levels and multi-targets, and play a definite clinical effect [21].

Regulate the body's immune response

Human immune system response is mainly accomplished by specific immune response mediated by T helper cells, which can be divided into two subgroups: CD4 and CD8. According to the secretion pattern of cytokines and the function of effector factors, CD4 T cell subsets can be polarized into two subsets, namely Th1 and Th2 cells, in which Th1 cells secrete cytokines such as IL-2, γ -interferon and tumor necrosis factor, which mediate cellular immunity, while Th2 cells secrete cytokines such as IL-4 and IL-10, which mediate humoral immunity [22].

Acupuncture can improve local blood circulation, promote leukocyte exudation, enhance leukocyte phagocytosis, increase body stress, reduce inflammatory reaction of skin lesions, and reduce the levels of inflammatory factors such as TNF- α and IL-4 in skin lesions [23, 24].

Liu et al. [25] found that for patients with moderate and severe acne, the control group was treated with 5-aminolevulinic acid photodynamic therapy, and the combined group was treated with 5-aminolevulinic acid photodynamic therapy combined with fire needle treatment. The levels of TNF- α , IL-4, IL-8 and IFN- γ in the combined group were significantly lower than those before treatment, and the combined group was significantly lower than that in the control group, indicating that 5-aminolevulinic acid photodynamic therapy combined with fire needle could reduce inflammatory cells. Reduce the inflammatory reaction of skin lesions. The results of Ma et al. [26] showed that the GAGS score and serum IL-4 level of patients with mild and moderate acne were significantly decreased after treatment, suggesting that fire acupuncture combined with contact pin can improve the degree of skin lesions, improve the level of inflammatory factors and improve the clinical curative effect, indicating that its mechanism may be closely related to reducing the release of inflammatory mediators.

In addition to Th2 cell-mediated humoral immunity, humoral immunity is also mediated by IgG, IgM, IgA and complement. Some studies have found that the levels of serum IgA and IgM in patients with acne are significantly higher than those in normal subjects, and there is obvious humoral immune activation. With the aggravation of

skin lesions, their levels are significantly increased, which is positively correlated with the severity of the disease [27].

Acupuncture can increase the content of immune cells, enhance the killing ability of the body to propionibacterium acne, improve the activity of viscera, promote digestion, blood circulation and other body functions, promote the normalization of hair follicles, reduce the content of propionibacterium acne, and then alleviate the stimulation response in the body, reduce the content of IgA and IgM [28].

Jiang et al. [29] found that after intervention, IgA and IgM of acne patients treated by fire needle combined with blood-letting puncture and cupping decreased in varying degrees, especially in the combined group. Hou et al. [30] the treatment group was treated with filiform needle combined with self-blood therapy, and the control group was treated with fusidic acid cream. After treatment, the contents of IgG, IgM and IgA in the two groups decreased, and the level of IgM and IgA in the treatment group was higher than that in the control group.

Regulate hormone level

Regulate testosterone level. One of the pathogenesis of acne is the imbalance of hormone secretion in the body, in which testosterone plays an important role. Endocrine dysfunction leads to the increase of serum free testosterone and the transformation of testosterone into more effective dihydrotestosterone. The secretion of sebaceous glands is directly controlled by dihydrotestosterone, resulting in abnormal proliferation and secretion, stasis and obstruction of the conduit opening, androgen receptor (AR) increases the expression level of sebum sterol regulatory element binding protein by enhancing the activity of fibroblast growth factor receptor, enhance the inflammatory response induced by macrophages and neutrophils to regulate sebum secretion and cause acne inflammation [31-34].

Studies have shown that the number and sensitivity of AR in sebaceous glands of acne patients are significantly higher than those of non-acne patients [35]. Modern studies on the treatment of acne with acupuncture have proved that local acupuncture acts directly on hair follicles, opens the orifice of hair follicles, and excretes inflammatory substances, so as to achieve the effect of regression of inflammation, elimination of decay, and regulation of the internal environment of the body, reduce the level of testosterone [36]. The distal selection of acupoints, such as the application of back-Shu point in acne, is related to the regulation of nerve and endocrine. By stimulating back-Shu point to regulate neurohumoral fluid and then affect the endocrine system, it can regulate hormone level and improve body immunity [37, 38].

Meng et al. [39] after the treatment of acne patients with nine needles, the skin lesion score and serum testosterone decreased significantly, suggesting that the combination of nine needles can improve the degree of skin lesions, reduce the testosterone level of acne patients and improve the clinical effect.

Regulate insulin-like growth factor level. More and more studies have found that inflammation plays an important role in the occurrence, development and regression of acne. Insulin-like growth factor (IGF-1) is also an important factor in inducing acne inflammation. With the change of lifestyle, overeating high calorie and insulin-based diet will increase IGF-1 level, increase IGF-1 activity can promote sebum secretion. After IGF-1 stimulation, sebaceous cells increase the expression of cytokines such as NF- κ B, IL-1 β , IL-8, IL-6 and TNF- α cells, release MMPs, and recruit inflammatory cells into the sebaceous units of hair follicles, thus aggravating acne [40].

Some studies have shown that acupuncture can reduce the level of IGF-1. Cui et al. [41] found that oral Qingrexiaocuo prescription combined with fire needle can effectively improve skin lesions and reduce the level of IGF-1, which is more effective than Qingrexiaocuo recipe alone. This also confirms that IGF-1 is an important factor in promoting and inducing acne, and acupuncture treatment can reduce the level of IGF-1.

Inhibition of propionibacterium acne

Propionibacterium acne is the key link in the pathogenesis of acne. Acnes can promote the proliferation of keratinocytes, and the

proliferation of propionibacterium acne has been detected in microacne. At present, a large number of studies have shown that propionibacterium acne can mediate the production of inflammatory factors such as IL-1 α , and IL-1 α can promote the conversion of free hair follicle-sebaceous gland units into acne in vitro experiment [42, 43].

Fire needle therapy in acupuncture treatment can use heat to destroy the living environment of microorganisms in an instant, inhibit the growth of propionibacterium acne in varying degrees, promote local blood circulation and accelerate metabolism, thus reduce the recurrence of acne [44-46].

Regulate sebaceous gland secretion

The pathogenesis of acne lies in the sebaceous glands of hair follicles. Increased sebum secretion, changes in lipid content and the ratio of lipid oxidation / antioxidant on the skin surface are important mechanisms related to the occurrence of acne. These metabonomic changes are conducive to the overgrowth and biofilm formation of epidermis acne and promote inflammation [47, 48].

Acupuncture can promote the circulation and metabolism of local tissue, in which fire needle therapy can make the damaged tissue start stress self-repair under the action of high temperature, produce better anti-inflammatory, antibacterial and inhibitory effects on microorganisms, and at the same time improve the abnormal expansion and keratosis of hair follicles, accelerate the excretion of fat suppository and purulent blood in hair follicles, accelerate skin metabolism and reduce the production of scars, and significantly improve skin lesions [49, 50].

Regulate intestinal flora

In addition to the four classic mechanisms, with the in-depth study of intestinal flora in modern medicine, the disorder of intestinal flora is also closely related to the occurrence of acne. With the increase of life pressure, poor sleep habits can affect the activities of intestinal metabolites that regulate circadian rhythm, such as short-chain fatty acids and enterococci and bacilli, resulting in acne. Intestinal flora disorders can cause a large number of proliferation of pathogenic bacteria and endotoxin into the blood, leading to the occurrence or aggravation of inflammatory reactions in the body [51].

More and more studies suggest that intestinal microorganism-mediated communication lines affect the degree of acne by affecting the levels of inflammation, oxidative stress, blood glucose control, tissue lipid levels, pathogenic bacteria, neuropeptides and mood-regulating neurotransmitters [52]. Therefore, the regulation of intestinal flora is also a key link in the treatment of acne.

Acupuncture can regulate the number, proportion and abundance of intestinal flora, and significantly improve the diversity of intestinal flora and the content of beneficial microflora, so as to achieve the purpose of adjusting intestinal flora [53]. The experiment proved that [54, 55]: after warm moxibustion at abdominal mu acupoint, it was found that the intestinal flora of rats changed significantly, in which the contents of Lactobacillus and Bifidobacterium increased significantly, which were typical beneficial bacteria in the intestine, it can inhibit inflammatory reaction, improve immunity and protect intestinal mucosa. After acupuncture at Zusanli, Tianshu and Sanyinjiao points, through the detection of peripheral blood and intestinal mucosa of the patient, it was found that the contents of pro-inflammatory factors TNF- α and IL-8 decreased significantly, while the contents of inflammatory inhibitory factors IL-10 increased significantly. It is further explained that acupuncture can exert protective mechanism on the body, regulate intestinal flora disorder, and regulate inflammatory factors [56, 57].

In summary, acupuncture can affect the immune inflammatory response and cure acne by regulating the levels of hormones in the body, such as reducing the levels of AR receptor and IGF-1; reducing the content of propionibacterium acne; regulating sebaceous gland secretion; regulating intestinal flora and other factors. The mechanism is shown in the following Figure 1.

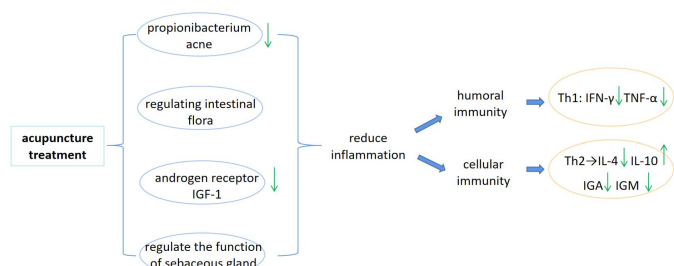


Figure 1 Mechanism of acupuncture treatment of acne based on immune inflammation

Conclusion

Acne is one of the most common skin diseases in dermatology clinical work, but its pathogenesis is very complex, there are still many links need to be further studied and elaborated. The disorder of immune inflammation is a key link in the occurrence and development of acne, which is closely related to hormone levels, propionibacterium acne, sebaceous gland secretion and intestinal flora. Acupuncture can regulate immune and inflammatory response, improve skin lesions and reduce recurrence through multiple links, have a significant effect on the treatment of acne.

References

- Ju Q. Chinese acne treatment guidelines (2019 revised edition). *J Clin Dermatol* 2019;48(9):583–588. <http://doi.org/10.16761/j.cnki.1000-4963.2019.09.020>
- Xia LC, Ding H. Clinical observation of Dong Shi Qi acupoint combined with fire needle therapy in the treatment of acne vulgaris. *J Tradit Chin Med* 2018;24(2):76–77. http://med.wanfangdata.com.cn/Paper/Detail?id=PeriodicalP_aper_hnzydb201802024&dbid=WF_QK
- Ashton R, Weinstein M. Acne vulgaris in the pediatric patient. *Pediatr Rev* 2019;40:577–589. <http://doi.org/10.1542/pir.2018-0137>
- Wang L, Li CN. Observation on the efficacy of Xijiaodihuang decoction combined with western medicine in the treatment of acne vulgaris. *Shaanxi Tradit Chin Med* 2017;38(10):1447–1448. <http://doi.org/10.3969/j.issn.1000-7369.2017.10.064>
- Du YH, Li J, Sun DW, et al. Study on Disease Spectrum of Modern Acupuncture in China. *Chin Acupunct moxibustion* 2007;27(5):373–378. http://med.wanfangdata.com.cn/Paper/Detail?id=PeriodicalP_aper_zgzj200705015&dbid=WF_QK
- Chen R, Li B, Du YH, Wang Y. Comprehensive evaluation of the efficacy of acupuncture in the treatment of acne vulgaris. *Liaoning J Tradit Chine Med* 2012;39(2):331–333. http://med.wanfangdata.com.cn/Paper/Detail?id=PeriodicalP_aper_lzyzz201202065&dbid=WF_QK
- Zhou Y, Niu SF, Pan XD. Analysis of efficacy and patient satisfaction of traditional acupuncture combined with drugs in the treatment of acne vulgaris. *Chin Cosmetic Med* 2019;28(6):136–139. http://med.wanfangdata.com.cn/Paper/Detail?id=PeriodicalP_aper_zgmryxzz201906038&dbid=WF_QK
- Jiang DD, Jia LS. Effect of puncture and cupping combined with fire on immune level of pustular acne. *Chin Med Theatre* 2022;37(1):38–40. http://med.wanfangdata.com.cn/Paper/Detail?id=PeriodicalP_aper_gylt202201016&dbid=WF_QK
- Barinova An. Etiology, pathogenesis, classification and clinical picture of acne vulgaris. Modern view of the problem. *Russian Fam Doctor* 2018;22(3):14–22. <https://journals.eco-vector.com/RFD/article/viewFile/10476/>
- Gu SY, Zhang X. Progress in the treatment of acne vulgaris. *Chin J Aesthet Med* 2019;28(12):170–173. http://med.wanfangdata.com.cn/Paper/Detail?id=PeriodicalP_aper_zgmryxzz201912050&dbid=WF_QK
- Kayran MA, Karadag AS, Ai-khuzaei S, Chen WC, Parish LC. Antibiotic resistance in acne: mechanisms, complications and management. *Am J Clin Dermatol* 2020;21(6):813–819. <http://doi.org/10.1007/s40257-020-00556-6>
- Feng S, Chen YX, Lu XC, Zhang YC, Chen Q. Research progress of inflammatory cytokines and their gene expression in inflammatory mechanism of acne. *Nati Med Front China* 2013;8(23):17–19. <http://doi.org/10.3969/j.issn.1673-5552.2013.23.0009>
- Yan XZ, Qu QQ, Huang LP, Yang Z, Bi YF. Effect of autologous blood therapy on the expression of TLR2 in CD14~+ monocytes and the concentration of IL-8 and TNF-α in serum of patients with acne vulgaris. *Clin Res Pract* 2020;5(10):22–24. <http://doi.org/10.19347/j.cnki.2096-1413.202010009>
- LU J, LU Z. Acupuncture combined with cupping and circling moxibustion for 40 cases of acne. *World J Acupunct Moxibustion* 2018;28(2):134–136. <http://doi.org/10.1016/j.wjam.2018.06.002>
- Tan JY, Peng M, Zhou Y, Wang XT, Liu ZQ, Han XL. Clinical observation of facial acupuncture combined with collateral puncture and cupping at back Shu point in the treatment of acne vulgaris. *Chin Med Mod Distance Educ China* 2022;20(2):122–124. <http://doi.org/10.3969/j.issn.1672-2779.2022.02.047>
- Zuo SZ. *Clinical observation of acupuncture and cupping combined with moxibustion in the treatment of acne with yin deficiency*. Guangzhou: Guangzhou University of traditional Chinese Medicine; 2015.
- Xu CB. Development of fire needle and research progress in the treatment of acne. *Chin J Ethnomed Ethnopharm* 2016;25(2):25–26. http://med.wanfangdata.com.cn/Paper/Detail?id=PeriodicalP_aper_zgmzmjyzz201602014&dbid=WF_QK
- Yang LN, Li JL. Clinical research progress of fire acupuncture in the treatment of acne. *China Med Cosmetology* 2018;8(9):79–83. <http://doi.org/10.19593/j.issn.2095-0721.2018.09.024>
- Zhang B, Zhang M, Liu Q. Clinical observation of fire needle combined with Qingredu capsule in the treatment of moderate and severe acne vulgaris. *Shi Zhenguo Med* 2018;29(4):888–889. <http://doi.org/10.3969/j.issn.1008-0805.2018.04.039>
- Du YH. *Evidence-based acupuncture therapy*. Beijing: people's Health Publishing House; 2014.
- Ren JR, Zhang LT. Clinical research progress of characteristic therapy of traditional Chinese medicine in the treatment of acne. *Chin J Dermatol venereol Integr tradit Chin West Med* 2021;20(3):325–328. <http://doi.org/10.3969/j.issn.1672-0709.2021.03.030>
- Lee TB, Byun EJ, Kim HS. Potential Role of the Microbiome in Acne: A Comprehensive Review. *J Clin Med* 2019;8(7):987. <http://doi.org/10.3390/jcm8070987>
- Zhang CH, Ou Y, Liu ZX, Gu F, Han HJ. Observation on the efficacy of fire needle combined with Yinhu decoction in the treatment of acne vulgaris with heat accumulation of lung and stomach. *Chin J tradit Chinese Med* 2018;33(9):503–505. http://med.wanfangdata.com.cn/Paper/Detail?id=PeriodicalP_aper_zgyxzb201809134&dbid=WF_QK
- Zhao AJ, Li L, Cao YL. Effect of fire needle combined with halomethasone ointment on symptom score and serum inflammatory factors in patients with neurodermatitis. *Chin Aesthet Med* 2021;30(4):125–128. http://med.wanfangdata.com.cn/Paper/Detail?id=PeriodicalP_aper_zgmryxzz202104036
- Liu TT, Fang H, Wan Y, et al. Efficacy of 5-aminolevulinic acid photodynamic combined with fire needle in the treatment of

- moderate and severe acne. *Chin Aesthet Med* 2022;31(5):1–5. http://med.wanfangdata.com.cn/Paper/Detail?id=PeriodicalP_aper_zgmryxzz202205001&dbid=WF_QK
26. Ma YZ, Zhu T, Meng LQ, et al. Clinical observation of fire needle combined with acupuncture in the treatment of mild to moderate acne vulgaris. *Shanxi tradit Chin Med* 2022;38(7):30–31. <http://doi.org/10.20002/j.issn.1000-7156.2022.07.012>
 27. Kayran MA, Karadag AS, Ai-khuzaei S, et al. Antibiotic resistance in acne: Mechanisms, complications and management. *Am J Clin Dermatol* 2020;21(6):813–819. <http://doi.org/10.1007/s40257-020-00556-6>
 28. Zhang XM. *Clinical study of acupuncture combined with easy cupping in the treatment of acne (gastrointestinal damp-heat type)*. Changchun: Changchun University of Chinese Medicine; 2022.
 29. Jiang DD, Jia LS. Effect of puncture and cupping combined with fire on immune level of pustular acne. *Nati Med Forum* 2022;37(1):38–40. http://med.wanfangdata.com.cn/Paper/Detail?id=PeriodicalP_aper_gylt202201016&dbid=WF_QK
 30. Hou XF, Li DD, Li HX, et al. Efficacy of fire needle combined with self-blood therapy in the treatment of acne and its effect on serum inflammatory factors and immune function. *Shanxi tradit Chin Med* 2021;42(7):951–953. <http://doi.org/10.3969/j.issn.1000-7369.2021.07.038>
 31. Zhang L, Hu ZB. Research progress on the mechanism of acne inflammation. *Shandong Med* 2018;58(34):110–112. <http://doi.org/10.3969/j.issn.1002-266X.2018.34.034>
 32. Huang SC, Chen L. Effect of serum sex hormone level on the pathogenesis and treatment of acne. *J Liaoning Univ of tradit Chin Med* 2013;15(11):169–171.
 33. Lu W, Zhu LG, Tian QM, et al. Effect of acupoint catgut embedding, fire needle and ear acupuncture on post-pubertal acne and serum sex hormone level. *Chin Acupunct* 2018;38(8):833–838. <http://doi.org/10.13703/j.0255-2930.2018.08.010>
 34. Zhang B, Zhang M, Liu Q. Clinical observation of fire needle combined with Qingredu capsule in the treatment of moderate and severe acne vulgari. *Shi Zhen Med Med* 2018;29(4):888–889. <http://doi.org/10.3969/j.issn.1008-0805.2018.04.039>
 35. Pan QL, Shao L, Chen LJ, et al. Research progress on the pathogenesis of acne. *J diagn treat Dermatol vener Dis* 2018;25(6):377. <http://doi.org/10.3969/j.issn.1674-8468.2018.06.014>
 36. Wang ZT, Yang H, Wei QL, et al. Research progress on the application of fire needle in dermatosis. *Clin Res tradit Chin Med* 2020;12(12):105–107. <http://qikan.cqvip.com/Qikan/Article/Detail?id=7101926014>
 37. Zhang X. *Clinical study on catgut embedding therapy at back Shu point in the treatment of peri-menopausal syndrome*. Taiyuan: Shanxi University of traditional Chinese Medicine; 2020.
 38. Yang XH, Yang L. Observation on the efficacy of auricular point pressing combined with traditional Chinese medicine in the treatment of acne vulgaris. *Clin Res Tradit Chin Med* 2018;10(12):83–85. <http://qikan.cqvip.com/Qikan/Article/Detail?id=675675278>
 39. Meng LQ, Ma YZ, Wang HP, et al. Clinical efficacy of combination of nine needles in the treatment of acne vulgaris and its effect on serum testosterone level. *Clin Res Tradit Chin Med* 2022;14(18):98–101. <http://doi.org/10.3969/j.issn.1674-7860.2022.18.030>
 40. Baldwin H, Tan J. Effects of Diet on Acne and Its Response to Treatment. *Am J Clin Dermatol* 2021;22(1):55–65. <http://doi.org/10.1007/s40257-020-00542-y>
 41. Cui J, Wei MG. Clinical study on 30 cases of damp-heat accumulation acne treated by fire needle combined with "Qingre Xiaocuo prescription". *Jiangsu Tradit Chin Med* 2022;54(10):49–52. <http://doi.org/10.19844/j.cnki.1672-397X.2022.10.016>
 42. Fenini G, Contassot E, French LE. Potential of IL-1, IL-18 and Inflammasome Inhibition for the Treatment of Inflammatory Skin Diseases. *Front Pharmacol* 2017;8:278. <http://doi.org/10.3389/fphar.2017.00278>
 43. Yang L, Lin XY. Research progress of acne and skin barrier. *Chin J Integr Tradit Chin West Med Dermatol vener Dis* 2021;20(4):416–419. <http://doi.org/10.3969/j.issn.1672-0709.2021.04.028>
 44. Fan SY, Liang J, Zhao XH. Observation on the efficacy of red and blue light therapeutic apparatus combined with Yiqing tablet and chloramphenicol Raisuoxin tincture in the treatment of acne vulgaris. *Med Diet Ther Health* 2020;18(9):122–124. http://med.wanfangdata.com.cn/Paper/Detail?id=PeriodicalP_aper_yxslyjk202009034
 45. Liu J, Luo RJ, Jiang ZQ, et al. Clinical study of Fire Needle combined with Quzhi Xiaocuo Formula in the treatment of normal Acne. *Shandong J Tradit Chin Med* 2021;40(4):385–389. <http://doi.org/10.16295/j.cnki.0257-358x.2021.04.010>
 46. Guo YM, Lu T, Zhang SP, et al. Clinical observation of fire needle combined with red and blue light in the treatment of moderate acne vulgaris. *J diagn treat Dermatol Vener Dis* 2019;26(4):229–231. <http://doi.org/10.3969/j.issn.1674-8468.2019.04.007>
 47. Cong TX, Hao D, Wen X, Li XH, He G, Jiang X. From pathogenesis of acne vulgaris to anti-acne agents. *Arch Dermatol Res* 2019;311(5):337–349. <http://doi.org/10.1007/s00403-019-01908-x>
 48. Choi CW, Choi JW, Park KC, Youn SW. Facial sebum affects the development of acne, especially the distribution of inflammatory acne. *J Eur Acad Dermatol Venereol* 2011;27(3):301–306. <http://doi.org/10.1111/j.1468-3083.2011.04384.x>
 49. Zhou JY, Li M, Zhu LL, et al. Action mechanism and clinical application of fire needle. *J Liaoning Univ Tradit Chin Med* 2016;18(7):86–88. <http://doi.org/10.13194/j.issn.1673-842x.2016.07.026>
 50. Beylot C, Auffret N, Poli F, et al. Propionibacterium acnes: an update on its role in the pathogenesis of acne. *J Eur Acad Dermatol Venereol* 2014;28(3):271–278. <http://doi.org/10.1111/jdv.12224>
 51. Gloster HM, Gebauer LE, Mistur RL. Cutaneous manifestations of gastrointestinal disease. *Absolute Dermatol Rev* 2016:77–75. https://link.springer.com/chapter/10.1007/978-3-319-03218-4_48
 52. Wang C, Zhang LY, Huang WX. Analysis of the relationship between intestinal flora and acne: a retrospective study of 110 intestinal microflora samples. *Chin Cosmet Med* 2018;27(9):9–12. https://wenku.baidu.com/view/549b1ae6905f804d2b160b4e767f5acfa0c78379?fr=xueshu_top&wkts=1676431378948
 53. Zhu J, Zhu B, Lu G, et al. Based on the theory of brain-gut axis mediated by intestinal microflora, a new idea of acupuncture to prevent stroke was discussed. *Emer Tradit Chin Med* 2021;30(3):463–467. <http://doi.org/10.3969/j.issn.1004-745X.2021.03.023>
 54. Huang KY, Liang S, Fu SP, et al. To explore the application of gastrointestinal conditioning in acupuncture treatment of encephalopathy based on brain-gut axis theory. *J Tradit Chin Med* 2016;57(13):1099–1104. <http://doi.org/10.13288/j.11-2166/r.2016.13.006>
 55. Zhang X, Jiang HH, Zhao HQ, et al. Effect of probiotics combined with acupuncture on inflammatory factors in patients with diarrhea irritable bowel syndrome. *Shanxi Med J* 2016;45(18):2150–2152. <http://doi.org/10.3969/j.issn.0253-9926.2016.18.018>
 56. Si YC, Miao WN, He JY, et al. To explore the regulation mechanism of Jianpi Yiqi acupuncture on intestinal flora and TLR4 of obese rats based on "brain-intestine-bacteria" axis. *Chin J Tradit Chin Med* 2017;32(10):4457–4460.

57. <https://d.wanfangdata.com.cn/periodical/zgyyxb201710032>
Xue T, Wang L, Wu YQ, et al. Effect of acupuncture on serum inflammatory factors and intestinal flora in rats with stress gastric ulcer. *Acupuncture Research* 2020;45(5):379–383. <http://doi.org/10.13702/j.1000-0607.190929>