

Traditional Chinese Medicine in the Treatment of HPV Infection: A Review

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Abstract: High-risk human papillomavirus (HPV) infection is a major cause of cervical cancer, while current prevention and treatment strategies remain limited. Traditional Chinese Medicine (TCM) has shown unique advantages in the prevention and treatment of HPV infection. According to TCM theory, its core pathogenesis is characterized by deficiency of healthy qi as the root and dampness, heat, and toxin as the manifestations, and it is often categorized as “leukorrheal diseases” or “abdominal masses.” Therapeutic strategies include both internal and external administration, following the principles of strengthening healthy qi, eliminating pathogens, clearing heat and dampness, promoting blood circulation, and removing toxins. A growing number of clinical studies have demonstrated that TCM can effectively promote HPV clearance, relieve clinical symptoms, regulate immune function, and improve the vaginal microenvironment, with a favorable safety profile. In the future, greater efforts should be made to establish unified efficacy evaluation criteria, optimize TCM formulations, and strengthen evidence-based research, so as to promote its broader clinical application.

1. Introduction

Human papillomavirus (HPV) is a widely prevalent DNA virus that is primarily transmitted through sexual contact or close contact with the skin and mucosal membranes ^[1]. According to oncogenic risk, HPV is classified into high-risk and low-risk types, among which HPV16 and HPV18 are the major oncogenic subtypes responsible for cervical cancer. Approximately 77% of cervical cancer cases worldwide are attributable to these two genotypes. Significant differences in HPV genotype distribution have been observed among different pathological types of cervical cancer: HPV16 is the predominant genotype in squamous cell carcinoma, accounting for as much as

63.7%, whereas the proportion of HPV18 increases markedly to 38.5% in adenocarcinoma and adenosquamous carcinoma ^[2].

In recent years, with the implementation of the national “two-cancer screening” program, the cervical cancer screening rate among Chinese women has gradually increased. A survey on cervical cancer screening in Chinese women showed that the screening rate among women aged 20–64 years was 25.7% in 2015, while 51.5% of women aged 35–64 years had undergone at least one screening examination during 2023–2024. Among them, the highest screening rate was observed in the 35–44-year age group, reaching 57.9%. However, significant urban–rural disparities remain, with the screening rate in rural areas (48.2%) being slightly lower than that in urban areas, and obvious regional inequalities still exist ^[3-4].

Despite improvements in screening coverage, the prevalence of HPV infection remains substantial. Several cross-sectional studies conducted in different regions of China have demonstrated significant geographical variation in the overall prevalence of HPV among women ^[5-11]. The reported prevalence ranges from 13.40% to 30.60%, with the highest prevalence observed in Urumqi (30.60%) ^[8] and the lowest in Fuzhou (13.40%) ^[6]. In men, a meta-analysis showed that the HPV positivity rate in the general community population was 9.63%, including 6.06% for high-risk types, whereas among hospital-based populations, the overall positivity rate reached 37.66%, with high-risk HPV accounting for 24.81% ^[12].

At present, the prevention and treatment of HPV-related diseases in Western medicine mainly rely on HPV vaccination, regular screening interventions, and local therapeutic approaches such as surgery, laser therapy, and cryotherapy ^[13]. However, these strategies still have certain limitations. Although local treatment can effectively remove lesion tissues, some patients may experience postoperative cervical functional impairment, thereby increasing the risk of adverse pregnancy outcomes such as preterm birth ^[14]. In addition, the current vaccination coverage rate in China remains relatively low, particularly among the male population ^[15]. Even the 9-valent vaccine does not cover all common high-risk HPV genotypes, such as HPV53 and HPV81 ^[11], and it has no therapeutic effect on individuals who are already infected. Meanwhile, public awareness, especially among young people, regarding HPV infection and its related diseases remains insufficient. A survey among Chinese university students indicated that although 92.8% were willing to receive or recommend vaccination, only 46.7% had adequate knowledge of cervical cancer prevention and control, and the actual vaccination rate remained low ^[15].

In summary, HPV infection has become an important threat to public health in China due to its high oncogenic potential, high prevalence, and the limited genotype coverage of currently available vaccines. Although the prevention and control system has gradually improved in recent years, certain unmet needs remain in the context of population diversity and the complexity of infection characteristics. In exploring strategies to address the limitations of current preventive and therapeutic measures, Traditional Chinese Medicine (TCM) has demonstrated broad application potential because of its advantages in antiviral activity, immune regulation, and individualized intervention. In the treatment of HPV infection, TCM may not only enhance host immune function and promote viral clearance through syndrome differentiation and treatment, but also alleviate chronic local cervical inflammation and improve the vaginal microecological environment, thereby reducing the risk of disease progression and recurrence and providing a complementary approach for the chronic management of HPV infection.

2. TCM Understanding of the Disease Attribution of HPV Infection

TCM does not have a disease name directly corresponding to the modern term “HPV infection.” Instead, it is generally classified according to its main clinical manifestations under categories such

as “leukorrheal diseases,” “abdominal masses,” and “wart diseases.” In Synopsis of the Golden Chamber (Jin Gui Yao Lue), the term “white vaginal discharge” was recorded as one of the earliest descriptions of leukorrheal disorders, referring to increased vaginal secretions. Its clinical manifestations are partially similar to those of HPV infection ^[16]. The term “abdominal mass” (zhengjia) was formally proposed in the section on malaria, which states: “the disease may eventually form an abdominal mass” ^[17], establishing its important theoretical status in TCM gynecology. Zhengjia is mostly caused by the intermingling of qi stagnation, phlegm accumulation, and blood stasis, resulting in intra-abdominal masses. Among them, “zheng” refers to a tangible and fixed mass, whereas “jia” refers to an intangible and fluctuating accumulation. Although HPV-related lesions such as cervical intraepithelial neoplasia have not yet formed a typical solid mass, their chronic recurrent course and pathological hyperplasia are to some extent similar to the TCM concept of “blood stasis accumulation” and “palpable pathological formations.” In Huangdi Neijing · Lingshu, it is recorded that “deficiency gives rise to warts” ^[18], which is one of the earliest descriptions of the mechanism of cutaneous proliferative lesions in TCM literature. Later physicians further interpreted the pathogenesis of wart diseases based on this theory, believing that deficiency of healthy qi and failure of defensive qi to protect the exterior predispose the body to invasion by damp-heat toxins, thereby leading to wart formation.

3. CM Understanding of the Core Pathogenesis of HPV Infection

According to classical theories and modern studies, the pathogenesis of HPV-related disorders can generally be summarized as three aspects: 1. deficiency of healthy qi as the root; 2. damp-heat toxins as the manifestation; and 3. blood stasis as the pathological transformation. These three factors are interrelated and run throughout the course of the disease.

3.1. Deficiency of Healthy Qi as the Root

The Su Wen states that: “When healthy qi is preserved internally, pathogenic factors cannot invade.” This lays the theoretical foundation for the TCM concept that deficiency of healthy qi predisposes to disease, emphasizing that strong healthy qi prevents invasion by external pathogens.

Modern TCM scholars, based on classical theory, believe that the “deficiency” in HPV infection mainly originates from spleen and kidney deficiency. Spleen deficiency leads to dampness accumulation, whereas kidney deficiency weakens resistance against pathogens, forming a pathological state of “deficiency complicated by dampness”, which provides the basis for viral persistence ^[19].

3.2. Damp-Heat Toxins as the Manifestation

TCM has long emphasized that dampness is the major pathogenic factor in gynecological disorders, particularly when combined with heat. Modern scholars believe that HPV infection belongs to the category of damp-heat toxins, in which damp-heat descends to the lower burner, damages the Ren and the Dai meridians, and manifests clinically as cervical congestion, turbid leukorrhea, and increased secretions ^[20]. Professor Wang Guohua further proposed that the key pathological factor in HR-HPV infection lies in “toxicity”, which refers to excessive damp-heat stagnation that transforms into pathological toxins ^[21].

3.3. Internal Blood Stasis as the Pathological Transformation

TCM considers blood stasis to be an important pathological product responsible for chronicity and recurrence in many gynecological disorders. Modern scholars have proposed that phlegm-dampness, blood stasis, and toxic pathogens intertwine, forming substantial pathological products that aggravate viral persistence and tissue injury [22]. In the pathological progression of cervical intraepithelial lesions, blood stasis is regarded as a carrier of latent toxins, interfering with local qi and blood circulation and contributing to the persistence of lesions.

4. Core Therapeutic Principles of TCM for HPV Infection

The treatment of HPV infection in TCM is guided by the principle of “differentiating the cause through pattern identification and treating according to the underlying etiology.” Therapeutic approaches are diverse and are often combined based on the predominance of healthy qi deficiency, damp-heat, and blood stasis. The pathogenesis can be summarized as “deficiency of healthy qi as the root, damp-heat and toxin as the manifestation, and internal blood stasis as the pathological transformation,” with these three factors interweaving to collectively influence the onset and progression of the disease. Treatment emphasizes the concurrent strengthening of healthy qi and elimination of pathogenic factors, integrating the principles of clearing heat and resolving toxins, resolving stasis and dissipating masses, and invigorating the spleen and tonifying the kidney. This approach balances systemic regulation with local intervention, aiming to improve the internal environment of the body and enhance its resistance to disease. The therapeutic system encompasses internal therapy, external therapy, and various comprehensive strategies.

4.1. Internal Therapy

Numerous clinical studies have demonstrated that Chinese herbal compound prescriptions based on the therapeutic principles of clearing heat, eliminating dampness and resolving toxins, activating blood circulation, resolving masses, strengthening healthy qi, and tonifying the spleen and kidney show significantly superior efficacy when combined with recombinant human interferon $\alpha 2b$ (rhIFN α -2b) compared with interferon monotherapy in the treatment of persistent HPV infection.

These combined therapies exhibit comprehensive advantages in promoting HPV negative conversion, improving TCM syndrome symptoms (such as excessive leukorrhea, yellowish or turbid discharge, pruritus, and damp-heat manifestations), and increasing the overall clinical response rate.

Representative prescriptions include Zhidai Paidu Decoction, Modified Ermiao Granules, Modified Yihuang Decoction, Jiedu Xiaoliu Decoction, and Wandai Decoction, among others (Table 1).

For example, Zhidai Paidu Decoction [23] primarily employs *Phellodendron chinense* (Huangbai) and *Sophora flavescens* (Kushen) to clear heat and dry dampness, thereby eliminating damp-heat accumulation in the lower burner. *Atractylodes lancea* (Cangzhu) and *Poria cocos* (Fuling) are used to strengthen the spleen and resolve dampness, addressing the source of damp-heat generation. Additionally, raw *Astragalus membranaceus* (Huangqi) and stir-fried *Atractylodes macrocephala* (Baizhu) are included to tonify qi and strengthen the spleen, thereby reinforcing the body's vital qi and facilitating pathogen elimination. This formula integrates both tonifying and eliminating strategies, aligning with the underlying pathogenesis. Modern studies have demonstrated that this prescription exerts synergistic effects through multiple immunomodulatory pathways. It significantly reduces the levels of pro-inflammatory cytokines such as IL-6 and TNF- α while increasing the expression of the immune-activating cytokine IL-2. These effects help restore the

balance of the immune microenvironment, thereby enhancing viral clearance and promoting the negative conversion of high-risk HPV (HR-HPV).

Table 1. Summary of representative studies.

Researcher and intervention	Main therapeutic principle	Sample size	Treatment duration	Main efficacy outcomes (combination group)
Li Haitao, Niu Wusheng et al. Zhidai Paidu Decoction + rhIFN α -2b	Clear heat, dry dampness, detoxify, strengthen spleen and kidney	109	4 months	Overall response rate: 88.46%
Zhao Yue, Zhang Li et al. Modified Ermiao Granules + rhIFN α -2b	Tonify qi, strengthen spleen, eliminate dampness and toxins	57	6 months	Negative conversion rate: 68.97%
Jiang Yuanyuan, Huang Yongjie et al. Qingre Tiaoxue Decoction + rhIFN α -2b	Clear heat, remove dampness, activate blood circulation	64	3 months	Overall response rate: 93.75%
Lin Canzhen, Luo Qiang et al. Jiedu Quyu Decoction + rhIFN α -2b	Detoxify, remove blood stasis, clear heat and dampness	298	3 months	Higher negative conversion rate; significantly reduced viral load
Kang Shufang, Zhou Yue et al. Modified Yihuang Decoction + rhIFN α -2b	Clear heat, remove dampness, strengthen spleen and kidney	214	1.5 months	Negative conversion rate: 57.94%
Zheng Lixiang, Mao Lisi et al. Jiedu Xiaoliu Decoction + rhIFN α -2b	Eliminate dampness and toxins, tonify qi	78	3 months	Negative conversion rate: 84.62%
Zhou Fen, He Xiaoyun et al. Wandai Decoction + rhIFN α -2b gel	Strengthen spleen, soothe liver, eliminate dampness	80	3 months	Overall response rate: 92.5%
Zhang Yonghui, Hu Hongjuan et al. Jianpi Jiedu Formula + rhIFN α -2b gel + Baofukang suppository	Strengthen spleen, eliminate dampness, tonify qi	330	3 months	Reduced HR-HPV DNA load; improved TCM syndrome scores

Modified Ermiao Granules ^[24] contain *Phellodendron chinense* (Huangbai) and *Paris polyphylla* (Chonglou) as the principal herbs to clear heat, dry dampness, purge fire, and detoxify, directly targeting damp-heat and toxic fire. Stir-fried *Atractylodes lancea*, stir-fried *Atractylodes macrocephala*, and raw *Coix lacryma-jobi* (Yiyiren) are added to strengthen the spleen and resolve dampness, aiming to reinforce vital qi while eliminating pathogenic factors. Through this balanced combination, the formula eliminates pathogens without damaging healthy qi and tonifies the body without retaining pathogenic factors, thereby achieving the therapeutic effects of clearing heat, drying dampness, detoxifying, and strengthening the spleen. In terms of the local microenvironment, this prescription has been shown to help restore vaginal microecology, improve vaginal cleanliness, reduce inflammatory indicators such as H₂O₂ and leukocyte esterase, promote the growth of beneficial microbiota, decrease HPV DNA viral load, and increase the rate of viral clearance.

Qingre Tiaoxue Decoction ^[25] employs *Rehmannia glutinosa* (Sheng Dihuang) and *Paeonia suffruticosa* (Mudanpi) to clear heat, cool the blood, and promote blood circulation to eliminate latent heat in the blood system. *Ligusticum chuanxiong* (Chuanxiong), *Corydalis yanhusuo* (Yanhusuo), and *Curcuma zedoaria* (Ezhu) are added to activate blood circulation, regulate qi, resolve blood stasis, and relieve pain, thereby alleviating lower abdominal discomfort. The formula combines heat-clearing with dispersing strategies, integrating blood-cooling and blood-activating

actions to achieve the therapeutic effects of clearing heat, eliminating dampness, resolving blood stasis, and relieving pain. In terms of immunoregulation, this prescription can modulate the balance of Th17/Treg cells, suppress excessive inflammatory responses, and promote the restoration of immune homeostasis, which supports the intrinsic relationship between its heat-clearing and blood-stasis-resolving effects and immune regulation.

Jiedu Quyu Decoction ^[26]utilizes *Phellodendron chinense* (Huangbai) and *Sophora flavescens* (Kushen) to clear heat, dry dampness, purge fire, and detoxify, thereby directly eliminating damp-heat toxins in the lower burner. *Curcuma longa* (Jianghuang) and *Cyathula officinalis* (Chuan Niuxi) are used to activate blood circulation, resolve blood stasis, and relieve pain, promoting the free flow of qi and blood. By combining heat-clearing with dispersing strategies, the formula achieves the therapeutic effects of clearing heat, removing dampness, activating blood circulation, and resolving blood stasis. Modern studies have shown that this prescription can significantly regulate cytokine networks by increasing the levels of immuno-enhancing cytokines such as IL-2, IL-12, and IFN- γ while reducing the expression of pro-inflammatory cytokines including IL-4 and IL-10, and inhibiting tumor-related genes.

Modified Yihuang Decoction ^[27]uses stir-fried *Dioscorea opposita* (Shanyao) and stir-fried *Euryale ferox* (Qianshi) to strengthen the spleen and kidney, consolidate essence, and arrest leukorrhea, thereby restoring vital qi. *Kochia scoparia* (Difuzi) and *Ailanthus altissima* bark (Chun Genpi) are included to enhance heat-clearing, dampness-draining, and antipruritic effects. The formula integrates tonifying, astringing, and dampness-clearing actions, addressing both symptoms and root causes, and exerts the therapeutic effects of consolidating the kidney, arresting leukorrhea, and eliminating damp-heat. At the molecular level, this prescription may exert anti-inflammatory and immunomodulatory effects by inhibiting the excessive activation of signaling pathways such as TLRs/NF- κ B. In addition, it can regulate T lymphocyte subsets by increasing the proportions of CD3⁺ and CD4⁺T cells while reducing the proportion of CD8⁺T cells, thereby enhancing cellular immune function.

Jiedu Xiaoliu Decoction ^[28]includes *Panax ginseng* (Shengshaishen) and stir-fried *Atractylodes macrocephala* (Baizhu) to tonify qi and strengthen the spleen, thereby supporting vital qi and reinforcing the foundation of postnatal qi and blood generation. *Malva verticillata* (Kuicao) and *Taraxacum mongolicum* (Pugongying) are used to clear heat, detoxify, dissipate nodules, and reduce swelling, thereby eliminating heat-toxin and blood stasis. This prescription combines tonification with elimination, achieving the therapeutic effects of reinforcing vital qi, detoxifying, and resolving masses. In terms of immune regulation, it has been shown to significantly improve cellular immune function by upregulating CD3⁺ and CD4⁺T lymphocyte levels and regulating the Th17/Treg balance, thereby synergistically enhancing antiviral and antitumor immune responses.

Wandai Decoction ^[29]emphasizes the use of *Atractylodes macrocephala* (Baizhu) and *Dioscorea opposita* (Shanyao) to tonify the spleen and eliminate dampness, thereby restoring spleen function and resolving damp turbidity. *Bupleurum chinense* (Chaihu) and *Paeonia lactiflora* (Baishao) are included to soothe the liver, relieve stagnation, and harmonize liver and spleen functions, ensuring smooth liver qi flow and strengthening the spleen. Through the coordinated actions of these herbs, the formula simultaneously regulates the liver and spleen, promotes the ascent of clear yang, and resolves dampness. Modern studies indicate that this prescription can promote immunoglobulin secretion and restore T-cell subset proportions, thereby enhancing both systemic and local mucosal immunity. Moreover, it can improve the structure of the vaginal microbiota by promoting the colonization of beneficial bacteria such as *Lactobacillus*, thereby restoring the mucosal immune barrier and re-establishing a healthy vaginal microecological environment.

Jianpi Jiedu Formula ^[30]contains *Solanum lyratum* (Shuyangquan) and *Hedyotis diffusa* (Baihuasheshecao) to clear heat, eliminate dampness, detoxify, and resolve masses, directly

targeting damp-heat toxins. Raw *Astragalus membranaceus* (Huangqi) and *Panax ginseng* (Shengshaishen) are included to strongly tonify primordial qi, strengthen the spleen, and support the body's vital qi, thereby facilitating toxin elimination. By combining pathogen elimination with vital qi reinforcement, the formula exerts both eliminating and tonifying effects. In terms of immunomodulatory mechanisms, this prescription can significantly improve both systemic and local immune status. It increases the CD4⁺/CD8⁺ T-cell ratio, enhances cellular immune function, upregulates IL-12 expression, and downregulates IL-4 levels, thereby strengthening the host immune response for viral clearance.

In summary, the internal treatment of HR-HPV infection in Traditional Chinese Medicine (TCM) is not a generalized therapeutic approach but rather is based on the principle of syndrome differentiation, with different therapeutic strategies targeting distinct pathogenic mechanisms. Heat-clearing and dampness-eliminating therapies are particularly effective in improving the local inflammatory environment, typically characterized by the downregulation of pro-inflammatory cytokines. In contrast, spleen-strengthening and vital-qi-tonifying therapies primarily regulate systemic immune function, with advantages in enhancing both cellular and humoral immunity. Although these approaches act through different pathways, they ultimately achieve the shared therapeutic goal of reinforcing vital qi, eliminating pathogenic factors, and promoting viral clearance.

4.2. External Therapy of TCM

External TCM therapy mainly delivers herbal medicines directly to the local lesion site or regulates meridian qi and blood circulation, thereby promoting lesion regression and physical recovery. Compared with internal therapy alone, external therapy emphasizes local action, safety, and direct improvement of the cervical and vaginal microenvironment, making it an important adjunctive strategy for enhancing overall therapeutic efficacy. According to the route of administration and mechanism of action, external therapies are generally divided into the following categories: (1) Local drug administration; (2) Herbal fumigation and washing; and (3) Acupuncture.

4.2.1. Abstract Local Drug Administration

Topical vaginal administration delivers therapeutic agents directly to the lesion site through dosage forms such as suppositories and gels. This route fully utilizes the traditional therapeutic effects of clearing heat, drying dampness, detoxifying, and eliminating pathogenic factors. Modern studies have further confirmed its comprehensive advantages in promoting viral clearance and improving the local microenvironment.

Baofukang suppository, composed of Curcuma oil and borneol, possesses the therapeutic effects of promoting qi circulation, activating blood circulation, clearing heat, and astringing sores. Studies by Fan Xiangmei, Li Qinghua, et al.^[31] demonstrated that Baofukang suppository combined with recombinant human interferon α 2a suppositories in the treatment of chronic cervicitis with HPV infection significantly shortened the duration of clinical symptoms and improved both the HPV negative conversion rate and the overall clinical efficacy. This therapy also showed notable effects in improving cervical erosion, reducing vaginal discharge, alleviating local inflammation, and decreasing recurrence rates, thereby helping to establish a microenvironment unfavorable for viral persistence^[32]. In addition, this combined therapy can effectively enhance the restoration rate of vaginal microecology and improve vaginal cleanliness, thereby synergistically promoting HPV clearance^[33].

Erhuang suppository consists of *Coptis chinensis*, catechu (*Acacia catechu*), *Bletilla striata*, and alum, which act synergistically to clear heat, detoxify, dry dampness, astringe tissues, promote

tissue regeneration, and facilitate wound healing. Studies by Li Jia, Xie Yaya, et al. [34] have shown that this suppository demonstrates significant advantages in the treatment of high-risk HPV (HR-HPV) infection. It not only improves traditional Chinese medicine syndrome scores and reduces the viral load of specific HR-HPV DNA, but also effectively restores vaginal microecology. These effects include regulating dominant microbiota, reducing H₂O₂ concentration, decreasing leukocyte esterase activity, and normalizing vaginal pH. Furthermore, it exhibits notable regulatory effects on inflammatory signaling pathways. Its mechanism may be closely associated with the downregulation of TNF- α , IL-6, TLR4, MyD88, and NF- κ B expression, along with the upregulation of IL-12 levels, thereby suppressing excessive local inflammatory responses.

Kushen gel, whose primary active component is total alkaloids extracted from *Sophora flavescens*, follows the traditional therapeutic principles of clearing heat, drying dampness, eliminating pathogens, and relieving itching. Clinical research by Jie Yuqing [35] demonstrated that when combined with interferon therapy, this preparation significantly improves the overall clinical efficacy and HPV negative conversion rate in patients with HR-HPV infection. It also helps reduce the risk of vaginal bleeding and recurrence without significantly increasing adverse reactions, indicating good safety. Furthermore, the combination of Kushen gel with LEEP surgery for persistent HR-HPV infection has shown synergistic therapeutic effects. This approach not only promotes histopathological repair of cervical tissue but also regulates the host immune status. Specifically, it reduces the levels of inflammatory cytokines such as IL-6, IL-18, and TNF- α , increases the expression of immunoglobulins including IgG, IgM, and IgA, and improves cellular immune status (e.g., increased proportions of CD3⁺ and CD4⁺ T cells and an elevated CD4⁺/CD8⁺ ratio). At the molecular level, this combined therapy can downregulate the expression of HPV oncogenic proteins E6 and E7 while upregulating the tumor suppressor proteins p53 and pRb, demonstrating multi-pathway antiviral and antitumor potential [36].

4.2.2. Herbal Fumigation and Washing

Traditional Chinese medicine fumigation and washing therapy refers to the process of decocting herbal medicines and applying the resulting vapor to fumigate the affected area while hot, or using the medicinal liquid to rinse or soak the corresponding body parts. Compared with oral administration, this method is associated with fewer systemic side effects, and because the medication acts directly on the local lesion, it can exert more targeted therapeutic effects in certain diseases.

Li Xiaojuan, Peng Huajie, et al. [37] used Qingre Huashi Decoction combined with traditional Chinese medicine fumigation and washing to treat chronic cervicitis with HPV infection. Clinical observations showed that this therapy significantly improved the HPV negative conversion rate and overall clinical efficacy while markedly reducing recurrence rates. Mechanistically, the therapy significantly decreased serum inflammatory cytokines including IL-6, TNF- α , and CRP, indicating notable anti-inflammatory effects. In this fumigation formula, *Coix lacryma-jobi* (Yiyiren) and *Astragalus membranaceus* (Huangqi) serve as the principal herbs. Yiyiren strengthens the spleen, promotes dampness drainage, and clears heat to discharge pus, while Huangqi tonifies qi, consolidates the exterior, and facilitates toxin elimination. Their combination synergistically reinforces vital qi and eliminates pathogenic factors. Additional herbs such as *Phellodendron chinense* (Huangbai), *Gentiana scabra* (Longdancao), and *Paeonia lactiflora* (Chishao) are included to clear heat, dry dampness, and regulate qi and blood. The integration of internal administration with external fumigation and washing enables the formula to exert comprehensive effects including clearing heat, resolving dampness, reducing inflammation, detoxifying, reinforcing vital qi, and eliminating pathogenic factors.

Aydana Uralybek ^[38]investigated a self-designed herbal fumigation and washing formula combined with interferon therapy for the treatment of HR-HPV infection. Although the improvement in viral negative conversion did not reach statistical significance, an increasing trend was observed, suggesting potential antiviral activity. The combined therapy significantly improved traditional Chinese medicine clinical symptoms, with the treatment group demonstrating superior effects in alleviating damp-heat symptoms such as abnormal leukorrhea and pruritus compared with the control group. The formula contains *Lonicera japonica* (Jinyinhua) and *Scutellaria barbata* (Banzhilian) to clear heat and detoxify, while *Trogopterus feces* (Wulingzhi) and *Cnidium monnieri* (Shechuangzi) promote blood circulation, relieve pain, eliminate pathogens, and alleviate itching. The combined actions of these herbs produce the therapeutic effects of clearing heat, eliminating dampness, activating blood circulation, and detoxifying, reflecting the unique advantages of external herbal therapy in holistic regulation and clinical symptom relief.

Zheng Rui, Sun Yiming, et al. ^[39]used Xiaoyou Decoction for vaginal irrigation to treat HR-HPV-related low-grade squamous intraepithelial lesions of the damp-heat downward flow pattern. The results demonstrated that this therapy significantly increased the HPV negative conversion rate and the normalization rate of ThinPrep cytology test (TCT), while also improving traditional Chinese medicine symptoms and the vaginal microecological environment. The formula uses *Smilax glabra* (Tufuling), *Phellodendron chinense* (Huangbai), and *Lithospermum erythrorhizon* (Zicao) to clear heat, dry dampness, cool the blood, and detoxify. These are combined with herbs such as *Cnidium monnieri* (Shechuangzi), *Sophora flavescens* (Kushen), *Sophora tonkinensis* (Shandougen), *Stemona japonica* (Baibu), *Kochia scoparia* (Difuzi), and *Brucea javanica* (Yadanzi) to eliminate pathogens, relieve itching, and remove turbidity and dampness. The combined actions of the formula clear heat, eliminate dampness, detoxify, and eradicate pathogenic factors. Clinical application demonstrated good safety without significant adverse reactions.

Yang Tingting, Wu Kuihua, et al. ^[40]applied Qushi Jiedu Decoction combined with the Fumigation Formula No.1 to treat cervical HR-HPV infection. The results showed that this therapy effectively promoted viral clearance and reduced recurrence rates while regulating serum inflammatory indicators such as TNF- α , hs-CRP, and IL-6. In the formula, *Prunella vulgaris* (Xiakucao) and *Lysimachia christinae* (Jinqiancao) clear heat and purge fire, while *Boswellia carterii* (Ruxiang) and *Commiphora myrrha* (Moyao) promote blood circulation and relieve pain. Together, these herbs exert the therapeutic effects of clearing heat, eliminating dampness, resolving blood stasis, and detoxifying.

Xu Mingdi ^[41]employed Fuzheng Quyau Decoction fumigation sitz bath combined with CO₂ laser therapy to treat perianal condyloma acuminatum. This therapy promoted postoperative wound healing, reduced recurrence rates, and regulated local immune and inflammatory responses. The formula includes *Coix lacryma-jobi* (Yiyiren), *Isatis indigotica* (Banlangen), and *Isatis tinctoria* leaves (Daqingye) to clear heat, detoxify, and eliminate dampness. Herbs such as *Salvia miltiorrhiza* (Danshen), *Curcuma zedoaria* (Ezhu), and *Sparganium stoloniferum* (Sanleng) activate blood circulation, regulate qi, resolve blood stasis, and relieve pain. The combined actions clear heat, activate blood circulation, eliminate pathogens, and reinforce vital qi, highlighting the synergistic role of external herbal therapy in enhancing postoperative recovery and reducing recurrence when combined with physical treatments.

Hou Peiyuan ^[42]used Qingyou Decoction fumigation and washing combined with recombinant human interferon α -1b spray for the treatment of condyloma acuminatum. This therapy improved the overall clinical effectiveness and patients' quality of life while also reducing adverse reactions and recurrence rates. The formula mainly includes *Isatis indigotica* (Banlangen), *Isatis tinctoria* leaves (Daqingye), *Portulaca oleracea* (Machixian), and *Sophora flavescens* (Kushen), which together exert the effects of clearing heat, detoxifying, cooling the blood, and reducing swelling.

The combination of herbal fumigation therapy with interferon spray demonstrates the comprehensive advantages of external Chinese medicine therapy in symptom relief and recurrence control.

4.2.3. Acupuncture

Acupuncture therapy is based on the meridian theory of Traditional Chinese Medicine (TCM). Acupoints are distributed along the meridians, which serve as pathways for the circulation of qi and blood and are also closely connected with the internal organs. Stimulation of specific acupoints through acupuncture can regulate functional imbalances in the body by transmitting signals along the meridians.

Zhao Lin, Song Dianrong, et al. ^[43] applied acupuncture to treat cervical HR-HPV infection in patients with the syndrome pattern of spleen – kidney yang deficiency. Within three months, this therapy significantly improved both the HPV negative conversion rate and the overall clinical effectiveness, demonstrating superior efficacy compared with the natural course of the disease. The study suggested that acupuncture may promote viral clearance by improving the local immune microenvironment of the cervix. Specifically, it increased the levels of IL-2, TNF- α , and secretory immunoglobulin A (sIgA) while reducing IL-10 concentration, thereby regulating the Th1/Th2 immune balance. The selected acupoints included Pishu (BL20) and Zusanli (ST36) to strengthen the spleen and replenish qi; Shenshu (BL23) and Guanyuan (CV4) to tonify the kidney and warm yang; combined with Qihai (CV6) to tonify qi, Sanyinjiao (SP6) to regulate the three yin meridians, Tianshu (ST25) to regulate qi and harmonize the intestines, and Fenglong (ST40) to resolve phlegm and eliminate dampness. The combined use of these acupoints exerts the therapeutic effects of strengthening the spleen, tonifying the kidney, warming yang, and resolving dampness.

Zhang Chen and Zhao Feiyan ^[44] used Qingre Tongli Decoction combined with acupuncture to treat elderly patients with chronic cervicitis accompanied by HPV infection. This combined therapy significantly improved the overall clinical effectiveness and exhibited synergistic effects in immune regulation and inflammation inhibition. The study demonstrated that the combined treatment increased serum immunoglobulin levels (IgA, IgG, and IgM), thereby enhancing humoral immune responses, while reducing the concentrations of pro-inflammatory cytokines such as IL-2, IL-6, and IL-17, effectively suppressing excessive inflammatory responses. The acupuncture prescription emphasized systemic regulation, including Hegu (LI4) for analgesia and sedation, Taichong (LR3) to soothe the liver and regulate qi, Ligou (LR5) to regulate menstruation and stop leukorrhea, Ciliao (BL32) to regulate the lower burner, Zhongji (CV3) to clear the bladder and promote urination, Guanyuan (CV4) to reinforce vital qi, Zusanli (ST36) to strengthen the spleen and harmonize the stomach, Yinlingquan (SP9) to drain dampness, and Sanyinjiao (SP6) to harmonize the liver, spleen, and kidney. The coordinated use of these acupoints produces the therapeutic effects of clearing heat, eliminating dampness, regulating qi and blood, reinforcing vital qi, and eliminating pathogenic factors.

Wu Siyi ^[45] reported that acupuncture therapy for high-risk HPV infection significantly improved both the cure rate and overall clinical effectiveness while effectively alleviating symptoms associated with spleen – kidney yang deficiency. In terms of mechanism, acupuncture may regulate the local immune microenvironment of the cervix by upregulating IL-2, TNF- α , and sIgA expression while downregulating IL-10 levels. This regulation helps restore the Th1/Th2 immune balance, enhance cellular immune responses, promote viral clearance, and potentially reduce the risk of reinfection. The selected acupoints included Guanyuan (CV4) and Qihai (CV6) to reinforce vital qi, Tianshu (ST25) to regulate qi and relieve stagnation, Zusanli (ST36) and Fenglong (ST40) to strengthen the spleen and resolve phlegm, Sanyinjiao (SP6) to harmonize the liver, spleen, and

kidney, and Pishu (BL20) and Shenshu (BL23) to strengthen the spleen and tonify the kidney. The combined application of these acupoints exerts the therapeutic effects of warming yang, strengthening the spleen, tonifying the kidney, eliminating dampness, and harmonizing qi and blood.

5. Existing Problems and Future Optimization Directions

Although TCM has demonstrated substantial potential in the treatment of HPV infection, several limitations remain.

First, the efficacy evaluation system has not been standardized. Different studies use different outcome indicators, such as HPV negative conversion rate, TCM syndrome scores, inflammatory markers, immune indicators, and microecological parameters, making direct comparison difficult and affecting the reliability and generalizability of conclusions. Future studies should establish a multidimensional evaluation system integrating etiological, symptomatic, biochemical, and quality-of-life indicators.

Second, current external TCM dosage forms, such as suppositories and gels, are still largely traditional and generally suffer from insufficient permeability, short retention time, and low bioavailability, which limit their therapeutic effects on deep cervical tissues. Therefore, formulation innovation is crucial. Novel drug delivery systems using nanotechnology and biomaterials may improve targeting efficiency and therapeutic efficacy.

6. Conclusion

HPV infection has become an important threat to women's reproductive health worldwide, particularly in China. Although screening coverage and vaccination rates have improved, major challenges remain in terms of vaccine genotype coverage, public awareness, and intervention for persistent infection.

In recent years, TCM has demonstrated substantial clinical value in HPV intervention. Based on pathogenesis theories such as deficiency, blood stasis, toxicity, damp-heat toxin accumulation, and latent pathogen retention, TCM has shown promising clinical outcomes through syndrome differentiation, immune regulation, and improvement of the vaginal microecological environment.

Relevant studies suggest that TCM has significant advantages in promoting HPV clearance, reducing viral load, improving vaginal microecology, and regulating inflammatory and immune markers, with high safety and low recurrence rates. Future efforts should focus on high-quality evidence-based research, optimization of TCM therapeutic strategies, integration with modern medicine, and the development of precision-targeted herbal formulations.

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